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ABSTRACT Designed to determine whether vocational education appears to make a difference in terms of a variety of outcomes, including opportunities for employment and advanced education and training, this report contains a review of previous national and non-national research concerning the effects of vocational education and a reanalysis of three national longitudinal data sets. The various methodological issues faced both in reviewing previous research and in reanalyzing national longitudinal data sets are discussed. Examined next are such characteristics of secondary vocational students and graduates as coursework taken, background, and test score differences. A variety of gainful employment outcomes associated with participation in secondary education programs is assessed, including employment status, employer satisfaction, job satisfaction, and self-employment. Also examined are occupational knowledge and skills, occupational advancement, and citizenship. Finally, these same student characteristics and outcome variables are examined with respect to postsecondary programs. The results of the research, as regards the title question, is a qualified "yes." Beyond that, an overall summary and a series of conclusions address the question in detail. Included in appendixes are descriptions of various survey samples, cross-tabular procedures and response procedures, and supplemental data on postsecondary enrollment patterns. (MN)

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DOES VOCATIONAL EDUCATION MAKE A DIFFERENCE?
A REVIEW OF PREVIOUS RESEARCH
AND REANALYSES OF NATIONAL LONGITUDINAL DATA SETS

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CHAPTER 1. INTRODUCTION

Does vocational education make a difference? That is the question addressed in this report. Specifically, we consider whether vocational education appears to make a difference in terms of a variety of outcomes including opportunities for employment, and advanced education and training. Our basic strategy for addressing these issues has been to:

- (1) review previous research, both national and non-national concerning the effects of vocational education, and
- (2) reanalyze three national longitudinal data sets.

Our study reviews evidence, available as of 1980, concerning the effects of vocational education at both the secondary and postsecondary levels of our nation's educational system. The study has yielded considerable illumination on past research (and discrepancies in past research findings) and also, we think, provides important new evidence concerning the role of vocational education in our nation's educational system overall. Nevertheless, in the course of our study, we have become painfully aware of how much we do not yet know about vocational education programs. Thus at the very outset of this report we wish to emphasize that, though our study builds upon and we think improves upon many previous studies of the effects of vocational education, our effort is still limited in several important respects. As we proceed we will point out relevant limitations and questions which we have not been able to answer. Nevertheless in this introduction let us explain our attitude toward the research we have conducted. Since we have conducted extensive analyses of employment and other social outcomes associated with vocational education, it would be easy to think of our study as an evaluation of vocational education. This is true only in a very general and vague way.

For it should be noted that our study clearly does not (and indeed, given its scope, could not) meet the prevailing standards for evaluation of specific programs. Therefore we think a better metaphor for our study is that of puzzle-solving. How does vocational education fit in with other aspects of the nation's educational system and with employment opportunities available in the economy? This is the puzzle we try to solve. But in doing so we know that we are using only some of the pieces necessary to show a full picture. Thus in working with only some of the pieces of the puzzle, we can produce only an outline of the complete picture, with many of the details missing.

Given this brief overview of how we view this study, in the remainder of this introductory chapter we describe

- the background and purpose of the study,
- why we view our inquiry as a study of outcomes associated with vocational education rather than as a study of the "effects" of vocational education,
- the questions addressed in the study and how they were identified,
- how we went about answering these questions, and
- the organization of the remainder of the report.

1.1 Background and Purpose.

In the Education Amendments of 1976, the U. S. Congress charged the National Institute of Education (NIE) with carrying out a study of vocational education and related programs in order to inform Congressional reauthorization of vocational education legislation. The NIE was specifically mandated to inquire into (1) the distribution of vocational education funds; (2) compliance with the applicable laws of the United States; (3) the means of assessing program quality and effectiveness; and (4) consumer and homemaking education. In connection with this broad mandate, the NIE also sought evidence on how and to what extent vocational education affects the work and life experiences of individuals who undertake study in vocational education programs. In other words, an answer was sought to the question "Does vocational education make a difference?" This question is of obvious importance. Members of Congress, and others interested in vocational education, frequently ask questions of this sort: "What difference does vocational education make?"; "What are the effects of vocational education?"; "Does investment in vocational education pay off?"

These are very large questions, but the NIE Vocational Education Study has invested only a relatively small amount (less than 10% of the extramural research funded) in studying the effects of vocational education. Why? As Henry David (1979), director of the NIE study, pointed out, several considerations influenced Study priorities. First, several of the other mandates for the Study required collection of new data and case studies in the field. Such studies are fairly expensive. Second, there was simply not time enough available, even if the money had been,

to mount a major new collection of data on the effects of vocational education. Even if data gathering had begun immediately after Congress authorized the NIE Study in 1976, there would have been only four years available before 1981, the due date for the Study report -- hardly enough time to study long-term effects of vocational education. Third, a substantial amount of pre-existing research and available data sets offered clear potential for studying the effects of vocational education, a potential which made the strategy of data reanalyses and research review seem to be a much more likely cost-effective strategy for the NIE Study to pursue.

The NIE began its pursuit of this strategy by organizing a meeting of experts with knowledge of various data sets and of previous research on vocational education in Washington, D.C., on June 26 and 27, 1978. The purpose of the conference was to discuss general methodological problems in reanalyzing national longitudinal data sets as a means of ascertaining the effects of vocational education. The most important general concern that emerged from the meeting was the difficulty of defining and identifying suitable treatment and control groups. The problem is that in most surveys students' curriculum programs are identified simply on the basis of their self-reports, and such reports can be inexact, dependent on students' personal perceptions and variations in the terminology used in the schools they attend. Nevertheless, the conference participants also agreed that the national data sets affording most potential for studying the effects of vocational education were the National Longitudinal Surveys of Labor Market Experience (also known as the Parnes Survey), Project TALENT, Class of 1972, and Youth in Transition.

With this endorsement, the NIE went ahead with its plans for studying the effects of vocational education. A request for proposals to carry out this work was issued in December 1978 (RFP-NIE-R-79-002). The purpose of the proposed work was described in the RFP as follows:

The objective of this project is to review existing studies of the effects of vocational education and to reanalyze available survey data to learn what more we can about the long- and short-term outcomes of both secondary and post-secondary vocational education programs. . . .

The research issues addressed should include the assumption about outcomes--particularly those with which the Congress is confronted--commonly held by both critics and advocates of vocational education that may be supported or refuted by this analysis. We are interested specifically in to what extent participation in the vocational education "program" produces different outcomes than alternative curricula. These will likely encompass a broad range of effects and thus the contractor should expect to examine outcomes that include not only earnings and potential earnings, but other such variables as the surveys will support (e.g. stability of employment, access to higher education, occupational and geographic mobility and job satisfaction as expressed by the respondent). (RFP, 1978, pp. 2-3)

Several different firms offered competitive proposals to perform the proposed study. After negotiations in the spring of 1979, The Huron Institute was awarded a contract to carry out the work needed. This report is the final product of this work.

1.2 Outcomes Versus Effects.

Given that work reported in this volume was originally conceived of and entitled as an enquiry into the "effects of vocational education," we should pause here to explain why this report is not titled something like "the effects of vocational education," and why we indeed have purposely avoided this term. Our reasons are quite simple. The word effects has come to have quite different meanings in social science research and in common parlance. In social science research the term effects is very widely used to refer to status differences between groups of individuals, typically called treatment and control groups, which may be attributed to some characteristics of the groups (for example, the treatment received by one group but not by the other). In common parlance, effect means "anything brought about by a cause or agent" (Webster's New World Dictionary, 1968). There is obviously a relationship between the common and social science meanings of the word "effect," but also there is an important difference. The social science usage carries a tentativeness which is easy to underestimate. The problem is that when comparisons of two groups are made in order to derive effects estimates, it is virtually impossible to be certain that the observed characteristics in terms of which the groups are defined (for example, a "treatment" such as participation in vocational education) are in fact the cause of the observed status differences in the groups. From a scientific perspective, the preferred method of handling this problem, that is, of disentangling cause and effect relationships, is to artificially manipulate conditions. For example, a group of individuals can be randomly selected and randomly split into two groups. If a specified treatment is administered to one such randomly selected group, but withheld from the

other group, then it is relatively easy to calculate, with specified levels of probability, whether subsequently observed differences in the two groups are actually due to the treatment. However, without some such manipulation of conditions, it is never possible to be certain that observed differences in outcomes between the groups are in fact "effects," that is, that they are specifically caused by the particular factors used to define the groups, such as participation in vocational education. The social science method of handling this problem is to use statistical methods to adjust for characteristics in terms of which groups differ, apart from the supposed treatment one is interested in studying. The problem with this approach is that it is never possible to be sure that all of the relevant characteristics have been measured (or for that matter even suspected) or that the statistical models used in making adjustments are entirely appropriate. This is one of the severest problems we face in trying to use survey data to estimate effects of vocational education. In comparing employment and other social outcomes of vocational students with outcomes of other students, we can statistically adjust for a range of personal, school, and other characteristics on which the groups differ, but we can never be absolutely sure that the observed differences in outcomes are not due in part to unmeasured background variables in terms of which the groups differ.

For this reason (and other ones, explained later) we decided in the remainder of this report largely to avoid using the potentially misleading term "effects," and instead refer more accurately to outcomes and outcome differences associated with participation in vocational education.

To anyone familiar with the research literature on educational and employment programs, which typically employs the term effects in studies precisely analogous to our own, this distinction in language may seem unnecessary. So let us provide a further illustration of why we think the phrase "outcomes associated with vocational education" and the metaphor of puzzle solving are more appropriate ways to describe our study than the phrase of 'effects of vocational education.' The illustration has to do with a controversial study of proprietary programs aimed at the single goal of preparing students for standardized admissions examinations such as the Scholastic Aptitude Test (SAT). The original study was carried out by the Federal Trade Commission (FTC), for reasons we won't go into here. The study employed data obtained from the Educational Testing Service (ETS) on individuals' test scores both before and after they attended coaching schools. Also, data were obtained for a sample of students from the same region as the coaching schools, to represent a control group. Background data on sex, family income and high school record were also available for use in statistical adjustments. These data were used by the FTC (1979) to estimate effects of one coaching school of 20 to 30 points. Nevertheless, as Messick (1980) pointed out in a critique of the FTC report, it is impossible to be certain that the effects estimated were strictly attributable to the test coaching school. The estimated effects may also have been due to selection factors, that is, to unmeasured characteristics (possibly including motivation, test-wisness, and rates of intellectual growth), which tended to differentiate between individuals who did and did not attend test coaching schools.

Despite typical practices in drawing inferences about "effects" in other areas of research, we think that such criticisms are ultimately quite sound. But contrast this case with our study of vocational education (and also of course to previous studies of the so-called effects of vocational education). In the test coaching study, documentary evidence was available on whether students had attended the program in question. As we will discuss in detail in Chapter 3, research clearly casts doubt on the reliability of alternative methods of identifying whether or not individuals participated in vocational education programs. Also, in the test coaching study, the programs had one clear and over-arching aim -- to help improve students' scores on college admissions tests. In contrast, and as we will discuss in the next section, vocational education programs are intended to serve a variety of aims. Moreover, in the test coaching study, reliable data, in the form of both pre-tests and post-tests, were available on exactly the single outcome at which the program under study was aimed. In contrast, for vocational education, as will be discussed in section 1.3, no data at all are available with which to examine some intended outcomes of vocational education, and for most of the outcomes for which we do have data, no directly relevant pretest data are available.

In sum, this contrast should make it clear that our avoidance of the term "vocational education effects" stems not simply from mere modesty. Rather, it derives from our appreciation of the difficulty of the task -- it is not easy to identify who participates in vocational education and who does not; vocational education programs aim at serving a variety of goals, and for some of these goals, we have available simply no directly relevant data at all.

If the task was difficult, how then did we go about fitting available pieces of the puzzle together to show the outlines of an answer to whether vocational education makes a difference, or in other words, to derive the best available answer to the question of what outcomes are associated with participation in vocational education.

1.3 Identification of Propositions to be Addressed

Our first task was to identify a set of propositions concerning the intended outcomes of vocational education which would serve as a framework for our study. In this regard it should be noted that we were not interested in all effects of vocational education but only the effects intended for individual students who participate in such programs. This distinction is extremely important for it should not be assumed that any study of the effects of vocational education on participating individuals, however well carried out, can adequately assess the overall worth of the endeavor. Why? For the reason that vocational education, particularly from the perspective of federal legislation, has historically addressed a variety of goals other than affecting individuals who participate in programs. For example, federal legislation on vocational education has clearly sought over the last twenty years to increase the responsiveness of institutions offering vocational education to the changing demands of the labor market. With this general caveat in mind -- namely, that our inquiry was addressed only to how vocational education is intended to benefit individuals who participated in it -- how did we go about identifying outcome dimensions to be examined?

Since this study was intended to inform Congressional deliberations on the reauthorization of federal vocational education legislation, our strategy was simply to review the legislative history of vocational education. Specifically we traced the history of vocational education in the United States seeking to identify the goals and concepts underlying the development of vocational education programs and particularly federal legislation pertaining

to vocational education over the last seven decades.* On the basis of this review we identified propositions concerning the outcomes which vocational education was intended to promote for individuals participating in it. Table 1.3.1 provides a description of the propositions identified. In brief, they may be summarized by saying that federal legislation and the associated legislative record indicate that vocational education has been intended to promote:

- gainful employment above the unskilled levels;
- academic credentials for advanced technical education programs (below the baccalaureate level);
- occupational knowledge and skills;
- basic skills in reading, writing and math;
- ability to cope with changes in jobs;
- long-term occupational advancement;
- years of schooling;
- "employability" skills.

Obviously such intended outcomes of vocational education are inter-related in important respects, and some of them just as obviously are not easy to assess. How then did we go about marshalling empirical evidence in order to assess whether vocational education appears to make a difference in regard to any such outcomes?

* See Dougherty, 1979, and Woods and Haney, 1979, for a full account of this effort.

TABLE 1.3.1: Propositions for Examination of Outcomes of Vocational Education Programs Identified Through Review of Legislation and Nationally Commissioned Studies of Vocational Education.

1. Vocational education secondary and postsecondary school programs prepare individuals for gainful employment as semiskilled or skilled workers or technicians. (1963) (employment as "subprofessionals" added in 1968) (definition condensed to "paid or unpaid employment" in 1976)
2. Vocational education secondary school programs provide individuals with the academic credentials necessary for enrollment in advanced technical education programs. (1968) (definition broadened to "for additional preparation for a career requiring other than a baccalaureate or advanced degree" in 1976)
3. Vocational education secondary and postsecondary school programs provide individuals with occupational knowledge and skills. (1963)
4. Vocational education secondary school programs improve individuals' basic skills in reading, writing and computation. (1963)
5. Vocational education secondary and postsecondary school programs prepare individuals to cope with changes over time in their jobs that require new occupational skills. (1963)
6. Vocational education secondary and postsecondary school programs prepare individuals for long-term occupational advancement in the labor market. (1963)
7. Vocational education secondary school programs increase the total number of years of secondary schooling attained by individuals. (1963)
8. Vocational education secondary and postsecondary school programs provide individuals with "employability skills" including good work habits and attitudes. (1963)

Source: Woods and Haney, 1979. It should be noted that this report actually identified ten propositions rather than eight. Two of the originally listed propositions dealing with "gainful employment . . . suited to needs, interests or ability" and "performance on academic core subjects" are omitted from the above list because they are closely related to propositions dealing with gainful employment and "basic skills" and in any case are not illuminated in this report with empirical evidence except that which bears on the latter two goals.

1.4 Means of Addressing Propositions.

As suggested in the original RFP for the work reported in this volume, our strategy for bringing evidence to bear on the propositions identified was three-pronged. The strategy was to:

- (1) review non-national studies of vocational education (that is, studies based on local, state or regional samples);
- (2) review previous national studies concerning the outcomes of vocational education; and
- (3) reanalyze selected national longitudinal data sets providing relevant data.

In this section, we describe how each of these three elements in our overall strategy was pursued.

Review of non-national studies. The review of non-national studies was carried out through a subcontract between The Huron Institute and the National Center for Research in Vocational Education (NCRVE) at Ohio State University. The methodology and results of the NCRVE subcontract have been reported separately in Mertens et al. (1980, a & b). Nevertheless, the overall strategy for carrying out this review will be briefly summarized here. First an effort was made to locate as many potentially relevant non-national studies reported in the period 1968 to 1979 as possible. The literature search was based on reviews of 1) standard computerized data bases (such as ERIC); 2) the holdings of the library of the NCRVE; and 3) bibliographies in previous studies of the effects or outcomes of vocational education. Also, each state director of vocational education was contacted in order to identify studies which otherwise might have been missed. This search located

references to approximately 1500 local, state and regional studies, reports or articles as potentially relevant. An initial screening of these references on the basis of titles and available abstracts led to a rejection of approximately half as being likely irrelevant in that they were apparently based on anecdotal evidence or were prescriptive rather than evaluative. A review of the remaining studies yielded a total of approximately 200 non-national studies as relevant to the NCRVE review in that they addressed the outcomes or effects of vocational education using empirical evidence. These studies naturally varied widely on a variety of dimensions, including scope of vocational education programs reviewed and methodological quality. As a result these studies were divided into two groups (more rigorous, and less rigorous) on the basis of criteria pertaining to sample size, response rates, whether standardized comparisons were used, and adequacy of variable definition and measurement. Over 100 relevant non-national studies were rated by NCRVE researchers as relatively less rigorous and some eighty studies as relatively more rigorous. Findings from the studies thus identified were reviewed and their results summarized in terms of secondary and postsecondary levels of vocational education, and three types of outcomes, namely, employment, education and training, and other outcomes. Results of the NCRVE review are presented in detail in Mertens et al. (1980 a,b). These results will not be summarized here since they are integrated with evidence from other sources on different kinds of outcomes in Chapters 4-7 of this report.

Review of previous national research on vocational education. Our second strategy for piecing together parts of the puzzle concerning outcomes associated with vocational education was to review previous research that is

national in scope. A review was conducted of the studies based on six national longitudinal data sets,* as follows:

Base Year

1960	Project TALENT
1961	Study of Intellectual Growth and Vocational Development (Growth Study)
1966	Youth in Transition (YIT)
1966/68	National Longitudinal Surveys of Labor Market Experience (NLS-LME)
	1966 Young Men (aged 14-24)
	1968 Young Women (aged 14-24)
	1966 Older Men (aged 45-59)
	1968 Older Women (aged 30-44)
1972	National Longitudinal Study of the High School Class of 1972 (NLS-1972)
1979	National Longitudinal Surveys of Young Americans (NLS-YA) (also known as the NLS-LME new cohort)

All the major reports based on primary analyses of these six data sets were reviewed in order to identify any results potentially useful for examining the propositions to be addressed in this study. Annotated

* Two other national longitudinal data sets were considered and eliminated from this review: Explorations in Equality of Opportunity - Fifteen-Year Follow-Up Study (EEO 15-Year Study) and NORC June 1961 College Graduating Class Study (NORC 1961 College Study). The former data set was excluded because of apparent sampling problems and low response rates and the latter because it focused on the college graduating class of 1961. Because it was based on a sample of four-year colleges and universities, it was judged to have very little potential for illuminating issues concerning either secondary vocational education programs or postsecondary programs below the baccalaureate level.

bibliographies were available for Project TALENT (Wise et al., 1979) and NLS-1972 (Peng et al., 1977) which allowed ready identification of other sources reporting secondary analyses in which outcomes for participants of vocational education or training programs were distinguishable. In the case of NLS-LME, a bibliography, updated as of 1979, provided by the Center for Human Resource Research Library, was used to identify other sources whose titles suggested they might contain relevant material. The other three data sets have been subjected to little or no secondary analysis to date. Analyses of the YIT data set appear to have been confined to those performed and reported by its primary investigators at the Institute for Social Research at the University of Michigan. Other than the primary analyses conducted by Educational Testing Service, secondary analyses of the Growth Study data sets seem to have been done principally by Karl Alexander and Martha Cook at the Johns Hopkins University. Since a public use data file for the NLS-YA 1979 baseyear data did not become available until December 1980, no secondary analyses of this data set had been reported at the time of this review.

A summary description of these six data sets is given in Table 1.4.1. Approximately 150 research reports, articles and books based on these national data sets were judged to be potentially relevant to assessing the outcomes of vocational education.* Each of these sources was consulted

* A full list of the documents reviewed as of March 1980 is given in E. Woods and T. Boutelle, "Bibliography and Notes on Review of National Longitudinal Sources, Vocational Education Project." Cambridge, MA: The Huron Institute, March 1980.

TABLE 1.4.1: Characteristics of National Longitudinal Studies Reviewed.

Characteristics	Project TALENT	Growth Study	Youth in Transition	NLS-LME	NLS-1972	NLS-YA
When was its initial survey?	1960 (Sp.)	1961	1966 (Fall)	Males - - 1966 Females - 1968	1972 (Sp.)	1979
What was primary sampling unit?	Schools-public and non-public	Public schools within 17 communities	Schools - public only	Households	Schools-public and non-public	Households
Who was sampled?	Boys and girls in grades 9-12	Boys and girls in elementary junior high and high school	Boys in grade 10	Young men and women aged 14-24	Boys & girls in grade 12	Young men and women aged 14-21
Who was left out?	School drop-outs	School dropouts	Females and non-public school enrollees	Any in military service or living in institutional quarters (e.g., dorms)	School dropouts	--
How many schools were sampled?	987 senior h.s. 238 junior h.s.	27	87	n.a.	1,318 (with replacement)	n.a.
How many individuals (about) were sampled?	375,000	32,000 in grades 5, 7, 9 and 11.	2,000	Males - 5,200 Females - 5,100	23,000 (expanded school frame,	12,700
When did it follow up?	Gr. 12: 1961, 1965, 1971 Gr. 11: 1962, 1966, 1972 Gr. 10: 1963, 1967, 1973 Gr. 9: 1964, 1968, 1974	First year after graduation for high school graduates of 1965 and 1967	1968 1970 1974	Males: 1966, 1967, 1968, 1969, 1970, 1971, 1973, 1975, 1976 Females: 1968, 1969, 1970, 1971, 1972, 1973, 1975, 1977, 1978	1973 1974 1976 1979	1980

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in order to ascertain whether any relevant data were reported. However, it was found that the vast majority provided no relevant information. The major problem was that even when information on relevant outcome data were provided, data were not disaggregated separately for vocational education students or those who had previously attended vocational education programs. Relevant data identified in these sources were organized around the eight propositions described in section 1.3. These were reported to the NIE in a set of notes and summary tables.* We will not try to summarize findings from this initial review here, because reanalyses described later in this report provide considerably more detailed information than was available previously, and because these previous findings have been integrated with findings from our own reanalyses. Nevertheless, before beginning to describe our own reanalyses, two additional points are worth noting. First, the initial review and summary helped to inform Chapter VII of the NIE's Study's Interim Report entitled "Determining the Effects of Vocational Education on Participants" (NIE, 1980, pp. VII-1-26). Second, since the initial review, additional reports and studies have been issued and these too are reviewed in subsequent chapters of this overall report.

* E. Woods, "Notes on Synthesis of Findings, Draft Review of National Longitudinal Literature." Cambridge, MA: The Huron Institute, June 1980, and E. Woods, "Summary Tables to Notes on Synthesis of Findings, Draft Review of National Longitudinal Literature." Cambridge, MA: The Huron Institute, June 1980.

Reanalyses of National Longitudinal Data Sets. The next step in our work was to assess whether it appeared to be worthwhile to proceed with reanalyses of national longitudinal data sets in order to produce evidence on the outcomes of vocational education, and if so, which data sets were most promising for purposes of our reanalyses.

On the first point we concluded past studies had not tapped the full potential of available data sets for illuminating the outcomes of vocational education. The two main reasons for this conclusion were the following: First, past investigations often have not differentiated results where data permit such differentiation, by vocational specialty, and have not taken into account amounts of coursework of various types, participation in cooperative work experiences, or the type of school in which vocational education training was received. Second, in providing data on outcomes for vocational education students in comparison to those for other types of students, past reports often have not made statistical adjustments to help control for differences in background characteristics and other variables that might affect outcomes, and in general have tended to neglect the potential influence on labor market outcomes of community characteristics and local labor market conditions.

The next question then was which data sets to reanalyze. We considered reanalyzing each of the six data sets described in Table 1.4.1. However, we decided to focus our efforts on three, namely:

- National Longitudinal Surveys of Labor Markets Experience -- Young Men (NLS-LME)
- National Longitudinal Study of the High School Class of 1972 (NLS-72)
- National Longitudinal Surveys of Young Americans (NLS-YA)

The other three data set, considered were excluded from reanalyses reported in this volume for the following reasons:

- For the Project TALENT data set, follow-up surveys on individuals beyond high school graduation showed relatively poor response rates (survey response rates for individuals one year after high school graduation were as low as 37%, see Wise et al., 1979, p. 16). Also, in the base year survey for Project TALENT, no data were acquired on the race or ethnicity of individuals surveyed.
- The sample for Youth in Transition was restricted to males and the sample size (N=2,200) was considerably smaller than it was for each of the studies selected.
- The Growth Study Survey was based on a purposive sample of only 27 schools in seventeen communities. The Growth Study was focused primarily on the intellectual growth of individuals during the elementary and secondary school years. Data were collected only one year out of high school on post-high school experiences of two grade cohorts represented in the sample.

Chapter 2 provides detailed information on how we went about reanalyzing the three data sets upon which our reanalysis effort focused.

1.5 Organization of Report

The remainder of this report is organized as follows. Chapter 2 provides a review of our research plans, discussing a variety of methodological issues which we faced both in reviewing previous research and in reanalyzing national longitudinal data sets. Chapter 8 provides an overall summary and conclusions from our study. The remaining chapters, namely 3-7, provide more detailed accounts of results of our research review and data reanalyses. In these middle chapters we attempted to break up our consideration of whether vocational education makes a difference into two broad categories, pertaining to secondary vocational education, (Chapters 3-5) and postsecondary vocational education. Insofar as possible, we attempted to focus in Chapters 3-5 on vocational education pertaining to those individuals who did not go on for any postsecondary schooling. This attempt could not be carried out altogether successfully for the simple reason that much previous research has not clearly differentiated between groups of individuals who have no more than twelve years of schooling (that is, who have exactly twelve years of schooling or who leave high school before completing twelve years of schooling) and those who go on for some postsecondary education.

Table 1.5.1 provides a summary of the way in which subsequent chapters of this report relate to the eight propositions we identified concerning the intended outcomes of vocational education, and of the three types of evidence upon which we drew in trying to piece together evidence concerning the various intended outcomes of vocational education.

We should explain why we have given special attention to gainful employment outcomes (a full chapter concerning secondary vocational programs, the longest in this report, and the only outcome treated in detail for the postsecondary level). The reason is that preparation for employment is the single goal which most clearly distinguishes vocational education from other forms of education. At the secondary level, preparing individuals for employment is the goal which most clearly distinguishes vocational education from alternative secondary programs, namely, general and academic or college preparatory high school programs. At the postsecondary level, our focus on gainful employment outcomes is premised on both the proposition that gainful employment is the goal which most clearly distinguishes postsecondary vocational education from other forms of postsecondary education below the baccalaureate degree and the fact that relatively little evidence is available concerning other intended outcomes of postsecondary vocational education.

Also, we should note that in our view there is no directly relevant evidence pertaining to the goals of vocational education to promote "ability to cope with job changes" and "employability skills." The primary reason for the lack of direct evidence on the goals is that they represent relatively broad constructs whose practical implications and meaning are not readily agreed upon. Regarding employability skills, for example, there are differences of opinion regarding the extent to which employers make decisions upon whom to hire based on information pertaining to specific occupational skills, basic skills in reading, writing and math, attitudes and work habits or other considerations (see Thurow, 1979, and Osterman, 1980, for

TABLE 1.5.1: Organization of Report and Sources of Evidence Concerning Intended Outcomes of Vocational Education

Outcome Propositions	Sector of Report in which Evidence Reviewed		Type of Evidence Reviewed		
	Secondary Level	Postsecondary Level	Non-National	Previous National	Reanalyses of National Long-Data Sets
-- Gainful Employment	4.1-4.10	7.1-7.5	X	X	X
-- Credentials for Advanced Education in Programs below Baccalaureate Level	6.1	NA		X	X
- Occupational Knowledge and Skills	5.1	NA	X	X	X
-- Basic Skills	*	NA			
-- Ability to Cope with Job Changes	NE	NE			
-- Long-term Occupational Advancement	5.2	NE		X	X
-- Years of Secondary Schooling	5.3	NA	X	X	X
-- Employability Skills	NE	NE			

Legend: NA = not applicable
 NE = no evidence directly pertinent is available
 * = not treated in this report
 X = indicates type of evidence relied upon.

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two unusual views on this question). Evidence on outcomes other than "employability skills" and "ability to cope with job changes" may provide some indirect evidence regarding the extent to which vocational education promotes these outcomes, but we have concluded that there is simply no relatively direct evidence on these outcomes for the simple reason that there is little agreement on what constitutes employability skills or ability to cope with job changes, much less measures with which to assess such outcomes. Additionally we should note that for two reasons this report presents no direct evidence on the basic skills attainment of participants in vocational education. First, the assessment of patterns of basic skills attainment of secondary vocational students was beyond the scope of work reported in this study. Second, a separate report is being prepared by us, under contract to NIE, to assess precisely this question.

Finally, we should note two respects in which the work reported in this volume extends beyond the scope of effort so far outlined. First, although it was not initially identified by us as an intended outcome of vocational education, citizenship was subsequently identified as a potential outcome of vocational education. Thus in section 5.4, we present and discuss evidence concerning this possible outcome. Second, in reviewing previous research concerning the degree to which secondary vocational education provides secondary students with credentials necessary for advanced education below the baccalaureate degree, we determined that there existed no clear evidence regarding what credentials are required for such education. Thus we undertook a national sample survey to bring evidence to bear on this question. Our findings for this survey are described in section 6.1.

CHAPTER 2. RESEARCH STRATEGY

As reported in Chapter 1, our review of information on outcomes associated with participation in vocational education draws on three broad types of evidence, namely, previous non-national studies, previous national studies, and reanalyses of three national longitudinal data sets of educational and labor market experiences of young adults. Before even beginning to piece together evidence, however, we had to confront several methodological issues. Therefore in this chapter we recount how, in both planning and carrying out research, we dealt with methodological issues concerning:

- comparison groups;
time points at which outcomes were assessed in reanalyses;
- measures used to address the various outcomes related to proposition;
- procedures for constructing reanalyses data sets;
types of reanalyses;
- criteria for assessing whether apparent differences in outcomes were noteworthy; and
- relative weight to give to different types of evidence in drawing overall conclusions.

2.1 Comparison Groups

To say that a group of vocational education students achieved a certain outcome, say 75% full-time employment, is a useful bit of descriptive information, but to say in any sense that such an outcome was associated with participation in vocational education per se, we need some basis of comparison in order to estimate what sort of outcome might have been achieved had these same students not participated in vocational education. There are a number of ways of developing such bases of comparison, but as suggested in Chapter 1, the most common approach is to use some sort of comparison group. The idea is simply that the comparison group provides an estimate of what individuals would have been like had they not participated in the program or treatment of interest, in our case vocational education. Obviously, therefore, one of the key decisions in our research strategy was to determine what constituted an appropriate comparison group at both the secondary and post-secondary levels.

Secondary Level. At the secondary level, the most obvious strategy would be simply to compare vocational program participants with non-vocational program participants generally. While this approach has been used in some past research, we rejected this strategy. Why? Our reasoning was as follows. High school program offerings are generally divided into three broad areas: typically called vocational, general, and academic or college preparatory. Previous research has indicated that on a variety of characteristics academic or college preparatory students tend to differ from both vocational and general program students more than either tend to differ from one another (see, for example, Grasso and Shea, 1979a;

Echternacht, 1976). Therefore we decided to exclude academic or college preparatory students from our reanalyses, and to use general program students as our comparison group for the purpose of estimating outcomes associated with participation in secondary vocational programs. In short, we agreed with Grasso's (1975) argument that comparing secondary vocational students with the high school general students is more appropriate than comparing vocational students to college preparatory students, not only because the characteristics of the general and vocational groups are more similar, but also because it seems likely that in the absence of a vocational program, most vocational students would enroll in the general rather than the college preparatory curriculum.

In comparing secondary vocational and general students two other important distinctions were made. First, to as great an extent as possible, we treated sex and race groups separately. That is, for most of our reanalyses, we treated separately white males, white females, black males and black females. Thus for the purpose of estimating outcomes associated with participating in vocational evaluation, white male vocational students were compared with white male general students, etc. We had hoped also to treat Hispanic males and females as two additional sex-race groups, but we found that in the data sets available, there were simply too few cases of Hispanics represented to allow separate analyses. Our reanalyses were therefore restricted simply to those cases identified as either white or black individuals.

Our reasons for treating sex-race groups separately were two. First, from a policy perspective it is of considerable importance to assess outcomes associated with participation in vocational education separately

for these sex-race groups. Second, from an analytical perspective, it is quite clear that the structure of both educational and labor market opportunities is, however unfortunately, quite different for males versus females and whites versus blacks. Thus had we not treated the sex-race groups separately, we would have been likely to confound outcomes associated with participation in vocational education with the differential structure of opportunities available to the different sex-race groups.*

The second distinction drawn was to focus mainly on those individuals with exactly twelve years of schooling -- that is, who provide no indication of having attended postsecondary school. To the extent possible with available data, we also provide data on early leavers -- that is, those who complete less than twelve years of schooling. However, it should be noted that no data on early leavers were available in the NLS-72 data set, whose baseyear survey was directed at individuals nearing completion of their senior year in high school. Also, sample size in other data sets generally allowed treating the early leavers separately for the white male group only.

Postsecondary Level. Of the three data sets reanalyzed, only the NLS-72 provided information relevant to postsecondary vocational education. Selection of a comparison group at the postsecondary level, however, was more complex than at the secondary level. Our first decision was to restrict

* From an analytical perspective, an alternative to treating sex-race groups separately would have been in regression analyses to employ dummy variables to control for sex and race. However this approach was rejected for two reasons. First, it would have yielded estimates of curriculum effects averaged over the sex-race groups. Second, it would not as clearly have yielded separate outcomes estimates for sex-race groups which are of interest from the policy perspective.

attention to those with more than twelve years of schooling, but with no more than fourteen years of schooling. The latter restriction was imposed as a means of excluding individuals who were pursuing baccalaureate degree programs. As noted already, federal legislation concerning postsecondary vocational education is specifically aimed at advanced education and training below the baccalaureate level.

The NLS-72 data set provides an indication of two types of postsecondary education for those with more than twelve years of schooling, namely, academic or vocational. Thus we could form six groups with various combinations of secondary and postsecondary educational experience* (again, still excluding those designated as college preparatory in secondary school), namely

- High School Vocational - Postsecondary Vocational
- High School General - Postsecondary Vocational
- High School Vocational - Postsecondary Academic
- High School General - Postsecondary Academic
- High School Vocational - Postsecondary None
- High School General - Postsecondary None

For descriptive purposes, we have included information on each of these groups, representing different kinds of secondary and postsecondary educational experience. However, for the sake of regression analyses, we had to choose one of these groups to serve as a comparison group, that is, against whom outcomes for the other groups would be compared. Because of the number of potential comparisons of interest with respect to these six groups (specifically 15), we decided to conduct two separate sets of regression analyses

* It should be noted that we actually ended up also using two other groups, comprising cases of individuals whose record clearly indicated that they attended postsecondary school, but had missing data pertaining to whether their postsecondary program was academic or vocational.

pertaining to these groups.

In the first set of postsecondary regression analyses, the HS-Gen-PS-None group was used as a comparison. This comparison was useful because it allowed direct comparison of the postsecondary results with those pertaining to secondary vocational, which also used the HS-Gen-PS-None group as a basis of comparison. However, this first set of postsecondary regression analyses, using HS-Gen-PS-None as a comparison group, does not provide any direct basis for comparing postsecondary vocational and postsecondary academic experience. Thus in our second set of postsecondary regression analyses, we used the HS-Voc-PS-Voc as a comparison. This allowed us to compare outcomes for the group of individuals having vocational education experience in both secondary and postsecondary school with individuals having the various other combinations of HS and PS experience.

In both sets of postsecondary regression analyses, we also conducted separate analyses for the four sex-race groups mentioned above. Additional details of the regression analyses performed at both the secondary and postsecondary levels will be described in section 2.5. However, before describing those details, let us first recount two more fundamental aspects of our reanalyses strategy.

2.2 Time Points at Which Outcomes Compared

A second key problem in any effort to assess outcomes of participation in vocational education is one of timing of assessments. Quite apart from the many practical problems of data availability and statistical analyses, there is an inevitable logical problem here. On one hand, one would like to know about the apparent efficacy of current vocational education programs. But the problem is that for programs that are current, that is, in which students are enrolled this year, there is simply no data available on what will happen to them after program completion. On the other hand, however, we would like to know not just what happens to vocational education participants in the short-term, but more broadly what happens to them in the longer run, say five, ten or even twenty years after completing a vocational education program. The problem, however, is that when we do examine data on long-term work experience of vocational education participants, say twenty years after they completed their programs, we inevitably are referring to vocational education programs not of today but of twenty years ago. In other words, in trying to piece together evidence on the outcomes associated with participation in vocational education, there is an inevitable tension between seeking data on current programs and seeking data on long-term outcomes.

How did we handle this dilemma? Essentially by drawing on data sets which offer different tradeoffs between currency, and long-term evidence. The YA data set based on a sample of youth aged 14-21 years in 1979 offers an advantage in terms of currency, but obviously now lacks any long-term employment data on these same youths. The NLS-LME survey of young males, aged 14-24 years in 1966, offers the advantage that it contains information

on individuals who have been in the labor market, or otherwise out of high school for as long as ten years. But just as obviously the vocational education programs in which NLS-LME survey respondents participated are those of the 1960s, not those of the 1980s. The NLS-72 data set offers something of a compromise between these two extremes, providing information on secondary vocational education programs of only about 10 years ago, and at the same time providing relatively long-term follow-up data (up to four years after high school graduation) on what happened to individuals after completing their high school programs. For this reason, and also because it offered a variety of practical advantages (most prominently it included far more detailed information on the nature of both secondary and postsecondary educational experiences than available in the other data sets), the NLS-72 data became the focus of our reanalyses effort.

In short then, drawing on the relative strengths and weaknesses of the three data sets reanalyzed, we sought insofar as possible to assess the outcomes of secondary vocational education programs at four time points, roughly job entry, and one year, four years, and ten years after high school graduation (or at least after anticipated time of high school graduation). For reanalyses pertaining to postsecondary vocational education, which focused exclusively on the NLS-72 data set, the only time point considered was the fall 1976 survey point, four years after high school graduation, or two to three years after job entry for those indicated to have undertaken one to two years of postsecondary education below the baccalaureate level.

2.3 Measures Used to Assess Each Outcome

Having identified a broad set of outcomes which have been expected of vocational education, and having identified comparison groups to be used in estimating outcomes associated with vocational education, our next step was to identify specific outcome measures available in each of the three data sets reanalyzed. Table 2.3.1 describes in schematic form each of the measures we used to address the various intended outcomes of vocational education, at each of the various time points after high school graduation (or for early leavers, anticipated graduation).* As noted already, most of our reanalysis effort focused on secondary vocational education. At the postsecondary level, we attempted only analyses pertaining to selected gainful employment measures. In subsequent chapters in presenting results, we will provide considerably more information on the outcome measures employed in our reanalyses. Here, let us only provide a brief overview of the technical quality of types of measures upon which we relied.

We should point out that we did not have the time nor resources to conduct independent studies of the reliability and validity of the various outcome measures upon which we based our reanalyses. Nevertheless, at least some methodological studies have been conducted on the quality of survey data of the sort we report. In general, such studies indicate that factually oriented survey items tend to be more reliable than items dealing with expectations and self-evaluations by respondents (e.g., Bailey, 1976). Indeed

* It should be noted that for both the LME and YA data sets, the time periods after actual or anticipated high school graduation were approximated, based on the assumption that 18 years is the average age of high school graduation. See section 2.4 for details on how these approximations were carried out.

TABLE 2.3.1: Summary of Measures Used to Assess Each Outcome/Proposition

Outcome and Measure Used to Assess Each	Type of Variable at Individ. Level	Data Set and No. Years Out of High School								
		NLS-IME		NLS-72			NLS-YA			
		Entry	4 yr.	10 yr.	Entry	1 yr.	4 yr.	Ent/1Yr.2-3 Yr.		
<u>1. Employment Status</u>										
1. Labor force participation status	Dich.	X	X	X	X	X	X	X	X	
2. Unemployment status	Dich.	X	X	X	X	X	X	X	X	
3. No. wks. unemployment in previous year	Cont.		X	X		X	X		X	
<u>2. Extent of Labor Force Participation</u>										
1. No hrs. worked/week	Cont.	X	X	X	X	X	X	X	X	
2. Full-time vs part-time work	Dich.	X	X	X	X	X	X	X	X	
3. No. weeks employed in prev. year	Cont.		X	X		X	X		X	
<u>3. Wages and Earnings</u>										
1. Weekly earnings (converted to constant \$1978)	Cont.	X	X	X	X	X	X	X	X	
2. Wages/hours (converted to constant \$1978)	Cont.	X	X	X	X	X	X	X	X	
3. Log weekly earnings	Cont.	X	X	X	X	X	X	X	X	
<u>4. Occupational Level & Status</u>										
1. Occupational categories	Ord.	X	X	X	X	X	X	X	X	
2. Occupational status (Duncan SEI)	Cont.	X	X	X	X	X	X	X	X	
<u>5. Employment Related to Training</u>										
DOT job classification match with voc. specialty (secondary only)	Dich.				X	X				
<u>Employer Satisfaction</u> (No relevant data in national surveys reanalyzed)										

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Table 2.3.1 (continued)

Outcome and Measures Used to Assess Each	Type of Variable at Individ. Level	Data Set and No. Years Out of High School						
		NLS-LME			NLS-72		NLS-YA	
		Entry	4 yr.	10 yr.	Entry	1 yr.	4 yr.	Ent/1Yr. 2-3 Yr.
7. <u>Self-employment</u> Reported self-employed	Dich.		X	X			X	
8. <u>Job Satisfaction</u> Job satisfaction ("satisfied" and "very satisfied" or "like very much" and "like fairly well")	Dich				X	X	X	X
Extreme job satisfaction ("very satisfied" or "like very much")	Dich.				X	X	X	X
9. <u>Occupational Knowledge and Skills</u> Objec. test of knowledge of occupations	Cont.	X						X
10. <u>Occupational Advancement</u> Duncan SEI change	Cont.				X	X		
On-job training and apprenticeships					X	X		
11. <u>Years of Secondary School Attained</u> Dropout/graduation status	Dich.						X	X
12. <u>Citizenship</u> Registered to vote	Dich.					X		
Ever voted	Dich					X		

Conger, Conger and Riccobono's (1976) study on the reliability of NLS-72 data concluded that "Factually based items are more reliable than subjectively oriented items" (p.30). For example, these investigators found that two subjective items dealing with educational expectations had the lowest reliabilities of any of the items studied -- with levels of agreement in a survey-resurvey study of only about 70% (p.19). On the basis of their findings, Conger, Conger and Riccobono (1976) offer the following warning:

This level of reliability clearly indicates that the item or composite data are not totally reliable and for some purposes they are not sufficiently reliable. For example, the level of reliability is not sufficiently high for path analyses even using a liberal assumption that if reliability is in the .90's analytic work may proceed. Similarly construct interpretations of correlations and regression analyses and comparisons of effects among various multiple classification groups all need to be done with caution. The failure to obtain significant relationships between dependent variables and independent variables could be due to an actual absence of a relationship or to poor quality data. (p.30)

This is a warning which needs to be kept in mind in any reading of our report. It also is one of the prime reasons why we have focused heavily on simple cross-tabular descriptive reports of results rather than on multivariate statistical analyses.

2.4 Construction of Reanalysis Data Sets

As discussed in section 1.4, reanalyses for this study were performed on the following three national longitudinal data sets:

- National Longitudinal Surveys of Labor Market Experience - Young Men (LME)*
- National Longitudinal Study of the High School Class of 1972 (NLS-72)
- National Longitudinal Surveys of Young Americans (also known as the LME new cohort) (YA)

These data sets are referred to as LME, NLS-72 and YA, respectively, throughout the remainder of this report. Table 2.4.1 identifies the source of the public use file for each of these data sets. Reanalyses at the secondary level were performed on all three data sets; those at the postsecondary level were performed solely on NLS-72.

An evaluation of the effects of vocational education was not among the aims of the studies for which these data were originally collected. These data sets were designed as broad inquiries serving a variety of purposes requiring a comprehensive set of data. However, in each case data were collected that provided indicators of outcome areas of interest to this study (see Table 2.3.1). The population sampled for each of these data sets (see Table 1.4.1) was broader than required by the group to be compared in this study (see section 2.1). As a result it was necessary to select a subset of respondents from each public use file that would approximate the populations of interest in this study. The basic population defined for examining outcomes associated

* Resources did not permit performing reanalyses for the LME young female cohort.

Table 2.4.1 Sources of Public Use Data Sets Used as Basis of Three Reanalysis Data Sets

LME Young Men Cohort

The public use tape file with follow-up data for young men through 1976 was used. This file is owned by Harvard Institute for Economic Research, but is made available to any users of Harvard University Computation Center.

NLS-72

A data tape was purchased by Huron from the ML-GROUP for Policy Studies in Education (formerly at CEMREL, currently at Northwestern University). This tape contained an exact copy of the public use pupil file available from NCES with follow-up data through 1976 (Levinsohn et al., 1979) and the school file (Lewis and Levinsohn, 1976). The school file was linked to the public use pupil file by the ML-GROUP (Hwang, 1980), as part of a contract with NCES (Contract No. 300-78-0546). In addition, a tape file was purchased by Huron from NCES containing 1970 Census Fourth Count School District data characterizing the schools included in the NLS-72 sample. These data were linked by Huron to the public use pupil-school file for reanalysis purposes.

YA

The public use file with data for the baseyear (1979) was purchased by Huron from the Center for Human Resource Research, Ohio State University, when it first became available in December 1980.

with secondary vocational education was individuals who last participated in or graduated from a public high school general or vocational curriculum and had pursued no postsecondary education (i.e., had completed exactly 12 years of schooling or less). For examining outcomes associated with postsecondary vocational education, the educational level of the population was restricted to those with less than a baccalaureate education who had not been enrolled full time in a postsecondary institution in fall 1974 or fall 1975 (i.e., the time points associated with three and four years after high school graduation).

In order to restrict the three reanalysis data sets to the secondary school population of interest and the NLS-72 data set to the postsecondary population of interest, three general criteria were used for selecting respondents from the respective public use data sets:

1. Type of High School. The RFP (RFP-NIE-R-79-002) limited the scope of this study to public secondary schools. As will be indicated below, we were able to apply this criterion to the NLS-72 and YA data sets but were unable to do so in the case of the LME data set due to a large number in the sample having not responded to a question asking what type of high school had last been attended.
2. Curriculum Comparison Groups. As indicated in section 2.1, comparisons were restricted to individuals who reported that the last high school curriculum they participated in or graduated from was either a general or vocational program. Those individuals who reported their last high school program was an academic (or college preparatory) one were not selected from the public use file for inclusion in the reanalysis data set.
3. Highest Educational Level. For reanalyses at the secondary level, individuals were selected who had not pursued any postsecondary education (i.e., had completed exactly 12 years of school or, in the case of early leavers, less than 12 years). For reanalyses at the postsecondary level, individuals were selected who had not completed a baccalaureate education and who had not been enrolled full time in a postsecondary institution in fall 1974 or fall 1975 (i.e., the time points associated with three or four years after high school graduation).

Other than these three general criteria that were used to select respondents during the preliminary screening stages of constructing the reanalysis data sets, complete data on three demographic characteristics which formed the basis of all reanalyses were required. These three variables were sex, race and self-reported curriculum classification. Also in order to determine whether a respondent had completed exactly 12 years or less of schooling (or in the case of the NLS-72 data set, had pursued some nonbaccalaureate postsecondary education), sufficient information was required to identify the number of years and type of schooling completed.

With this background of the general criteria used in defining the subsamples selected from the public use samples for purposes of our reanalyses, details of the specific selection procedures used for each data set follow. Parenthetically, we should note why we provide such detailed documentation on the construction of these data sets. One reason is because of the difficulty we had in identifying the composition of the subsamples used in previous regression studies. It appears that one of the major criteria applied in selecting the subsample examined may be complete data on all the variables included in the regression analyses. Since researchers vary greatly in the particular subset of variables examined, application of such a criterion results in different studies of the same data sets being based on varying subsets of respondents whose composition is not clearly documented. A better practice would be to identify and apply some general screening criteria on particular variables prior to imposing any complete data requirement. For example, in the case of studies examining such labor market outcomes

as earnings or number of hours worked, one criterion could be that an individual be in the labor force and employed as of the relevant survey week and documentation could be provided as to how the labor force classification was defined.

LME

While the NLS-72 sample is based on grade enrollment (those enrolled in the twelfth grade in spring 1972), the samples for LME and YA are based on age cohorts drawn from households. For LME young men aged 14-24 were surveyed in the baseyear (1966). The baseyear respondents were followed over a ten-year period to 1976 when the cohorts were aged 24-34. Data were collected each year between 1966 and 1976, except for 1972 and 1974.

Typically the LME data have been analyzed by pooling the age cohorts; for example, those in the labor force in 1970 with exactly 12 years of schooling pooled across ages 18-28. Since some previous studies have suggested that differences in earnings between vocational and general program graduates may decrease with increasing years out of high school, using a research strategy that pools ages across a wide range means such time trends cannot be detected. A strategy to make the age cohort samples more comparable to grade enrollment samples was suggested by Hofferth (1980) in analyses of LME data. Three time points for out-of-school analyses were defined with reference to the year in which respondents would have been in grade 12 if they had graduated with their high school class. The modal age for completing grade 12 was defined to be age 18. Time points for approximately three, five and ten years after high school were represented by ages 21, 23 and 27. In this approach, data for a 17-year-old boy who dropped out of school in 11th grade, for example, would be represented by information for the same survey year as his classmates who did graduate.

A similar strategy was adopted for this study. Three time points after leaving or completing high school were defined: the entry year, four years out, and ten years out. While Hofferth's procedure was based solely on age approximations, we used a two-stage procedure:

1. A cluster of questions across the survey years was used to identify the actual year when each respondent last attended and left or completed high school.
2. If the pattern of nonresponses to the questions used in the first stage was such that it was impossible to identify the actual year when a respondent had last left high school, age information was used to approximate the three time points. Age 18 was used as the modal age for high school completion. Age 22 was used as the modal age for four years out of high school, and age 28 for ten years. Of course, not all students who graduate from high school are exactly age 18; some may be slightly younger or older. Similarly, not all youth at age 22 will be out of high school exactly four years or at age 28, exactly ten years. Thus, this procedure can be expected to provide only a rough approximation of outcomes at these three time points.

Since a number of the outcomes examined in this study (see Table 2.3.1) were concerned with labor market outcomes, this restricted the chronological years associated with entry, four years out or ten years out, to the survey years in which labor market information had been collected. Specifically this meant that no labor market information for the entry year was available for the older age cohorts who had left or completed high school prior to the baseyear 1966. Similarly, some of the older age cohorts in the baseyear (i.e., ages 23-24) could have been four years out of high school prior to 1966. Moreover, some of the younger age cohorts in the baseyear (i.e., ages 14-17) had not reached the ten years out of high school time point by the 1976 survey year. Further, for those

respondents for whom the chronological year associated with one of the three time points was 1972 and 1974, the years in which surveys were not conducted, no labor market information was available.

While this pooling procedure was planned in order to approximate a grade cohort strategy and improve the precision of estimates by increasing the sample size associated with a particular time point, we recognize that it does have some limitations. First, it disregards variation in labor market conditions in the chronological years for which data were pooled together. The pooling of the LME data resulted in labor market outcomes being represented by data for chronological years spanning 1966 to 1976.* Second, it disregards variation in the type of vocational programs offered over the span of graduation classes represented by the three time points. The subsamples associated with each of the three time points vary with respect to the chronological years in which the majority of their members graduated or left high school. The majority graduated or left high school between 1966 to 1970 for the entry year subsample; between 1962 to 1969 for the year 4 subsample, and between 1959 to 1966 for the year 10 subsample.

The total number of respondents in the public use file was 5,225. Table A-2.1 in Appendix A-2 provides a record of the criteria used to

* We had planned to test whether outcome differences were due to differences in labor market conditions and other historical variations related to outcomes for the years pooled by including dummy variables representing the year associated with the time point for each individual in the regression analyses. Resources did not permit performing any regression analyses on the LME data set so that variation in the chronological years represented for each time point was never examined.

delete respondents from the public use file in order to obtain the re-analysis data set. At the first stage those whose high school curriculum was academic or those who did not report their curriculum were deleted. Since the number of cases who were of another race than white or black was too small for analysis, these cases were also deleted. Since birth-year information was required for the age approximation, the few cases for whom such information was not reported were also deleted. We were not able to apply the criterion that the last attended high school be a public one due to the large number of nonresponses to the relevant question concerning public versus nonpublic schooling. Thus the population defined by the LME reanalysis data set is based on both former participants and graduates of public and nonpublic high school general and vocational curricula.

Since the public use file contains all baseyear respondents, a number of these respondents did not participate in all eight follow-up surveys (i.e., 1967, 1968, 1969, 1970, 1971, 1973, 1975, 1976). In some cases, a chronic missing data problem for the set of questions used to classify the educational level of an individual (i.e., early leaver, 12 years exactly or some postsecondary) made it impossible to classify the educational level. A record of cases deleted for this reason is provided in stage 2 reported in Table A-2.1, as well as those cases deleted because they were classified as having attended some postsecondary. Reanalysis of the LME data set was restricted to those with no postsecondary educational experience.

In the third and fourth stages, individuals were deleted if the target year identified did not fall within the range of 1966-1967 or if it were one of the two years when information was not collected (1972 or 1974).

Individuals were also deleted if they had not participated in the survey year associated with the target year.

Table A-2.1 indicates that of the original public use sample of 5,225 cases, the reanalysis data set for the entry year time point contained 1,301 cases, for four years out of high school, 890, and for ten years out of high school, 539. The overlap among the subsamples representing each time point varied by time point. The percentages of cases for which there was a match with either of the other two time points was 36% for the entry year, 64% for year 4, and 44% for year 10.

Table 2.4.2 compares the high school curriculum last reported during the period 1966-1976 by all cases in the public use file to those in the reanalysis data set for each of the three time points represented. Since the data set is restricted to former general and vocational curriculum participants, the percentages reported for the reanalysis data sets excluded those reporting an academic curriculum. For this reason the percentages for the public use file are reported in two forms: both with and without academic participants included in the basis. We should also note that there are some problems with using percentages such as these to examine enrollment time trends based on national longitudinal studies. The percentages reported in the first column of Table 2.4.2 represent all cases who were last enrolled in high school over an interval spanning at least ten years. Enrollment percentages can vary greatly depending on the population represented. The percentages in column 1 of Table 2.4.2 agree more closely with ones derived for young men in grades 9-12 in 1966 than they do with those for young men in grade 12 in 1966.*

* For grades 9-12 in 1966: academic, 40%; general, 47%; and vocational, 13%. For grade 12 in 1966: academic, 45%; general, 40%; and vocational, 15% (derived from Table 1.1, Grasso and Shea, [1979b], p. 8).

Table 2.4.2: Comparison of Curriculum Composition of Public Use Total Sample with Reanalysis Subsample (unweighted): LME Young Men (aged 14-24 in 1966)

Self-Reported H.S. Curriculum	Public Use Data Set ^a (including academic curriculum)	Public Use Data Set ^a (excluding academic curriculum)	Reanalysis Data Set		
			Entry Yr.	Year 4	Year 10
Academic	35.1	--	--	--	--
General	50.6	77.9	76.4	76.3	77.5
Vocational:					
Commercial	3.3	5.0	5.0	4.5	4.1
Other	<u>11.0</u>	<u>17.0</u>	<u>18.6</u>	<u>19.2</u>	<u>18.4</u>
Total	14.3	22.0	23.6	23.7	22.5
N (percent based on):	4,589	2,978	1,301	890	539
Excluded:					
Nonresp. Curr.	636	636			
Academic Curr.	---	1,611			
Grand Total	5,225	5,225	1,301	890	539

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^aSource: Reanalysis based on total public use file.

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Table A-2.2 provides a description of the sample (unweighted) and Table A-2.3 a description of the population (weighted) represented by the LME reanalysis data set for each of the three time points by educational level (early leaver or 12 years exactly), curriculum, and race. A further breakdown by the chronological year associated with the entry year, year 4 and year 10 are provided in Tables A-2.4 - A-2.6. In the analyses of outcomes pertaining to gainful employment outcomes (see Table 2.3.1), some of the outcomes (e.g., number hours worked, earnings, occupational level or status, self-employment status, and job satisfaction) required information on jobs held. For this information it was necessary to restrict the analyses to those who were in the labor force and employed as of the reference time.* Tables A-2.7 - A-2.10 provide a description of the subsamples used for these reanalyses. A criterion of at least 20 cases in a cell was used for reporting a result separately for the subclassification represented by a particular cell. These tables indicate where it was necessary to pool both business and other vocational groups together in order to report results. They also show that for blacks at the two later time points, the sample size was insufficient to report even pooled vocational results.

NLS-72

The total number of respondents in the NLS-72 public use file was 22,652. Table A-1.1 in Appendix A-1 provides a record of the criteria used to delete respondents from the public use file in order to obtain the reanalysis data set. At the first stage nonpublic high school

*The procedure used to classify labor force participation status is described in detail in section 4-0.

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attendees and high school academic curriculum graduates were deleted. The number of cases who were Hispanic or some other race than black was too small to perform separate analyses, so these cases were deleted. At the second stage the educational level criterion was applied. At the secondary level, those with exactly 12 years of schooling and no postsecondary education were reanalyzed. At the postsecondary level, these were included and any whose postsecondary education was less than four years and who had not indicated attendance full time in fall 1974 or fall 1975. The latter criterion was imposed in order that any individuals included in the postsecondary reanalyses had the potential of being in the labor market full time for at least two years after completing any full-time schooling. Also individuals enrolled full time at these two later time points would have been more likely to be baccalaureate candidates. We should emphasize that the educational level classification was not based on the responses to one question but was estimated on the basis of a number of questions. In the third follow-up in 1976, respondents were asked what their highest level of education was as of October 1976 (TQ49a). A total of 12% of the sample (2725/22652) were not classified by this question. For those respondents who had indicated high school only and those unclassified, responses to a cluster of questions related to postsecondary education in the first three follow-ups (1973, 1974, and 1976) were checked. Specifically, the activity state questions asking about attendance at college full time or part time were checked, as were questions related to type of postsecondary institution last attended, postsecondary curriculum last pursued and postsecondary credentials obtained.*

* It appears that other researchers may have relied on responses to this one question for classifying the highest level of education completed (e.g., Gustman and Steinmeier, July 1981; Meyers, June 1981).

The final criterion imposed was that individuals had responded to all three follow-up surveys (i.e., 1973, 1974 and 1976). This criterion was imposed in order to be able to apply the same weight (W17) to reanalyses. Applying the same sampling/attrition weight to all analyses of outcomes over time (entry, year 1 and year 4) avoided one potential source of variation in differences associated with curriculum over time.

Table A-1.1 (Appendix A-1) indicates that of the original public use sample of 22,652 cases, the reanalysis data set contained 7,170 cases. Unlike the LME data set, the same NLS-72 subsample was used for each of the three time points (entry year, year 1 and year 4). Table 2.4.3 compares the high school curriculum reported in spring 1972 by all cases in the public use file to the subset of cases in the reanalysis data set. Since the reanalysis data set contains no academic curriculum graduates, the percentages for the public use file are reported in two forms: both with and without academic graduates included in the basis.

The tables in Appendix A-1 describe various samples (unweighted) and populations (weighted) associated with the various reanalyses of the NLS-72 data set, which vary on several dimensions:

- Sex x race x curriculum, disregarding educational level or labor force status
- Sex x race x curriculum by educational level (secondary vs. postsecondary)
- Sex x race x curriculum y educational level for those who were employed in labor force as of four years out of high school*

* The procedure used to classify labor force participation status is described in detail in section 4.0.

Table 2.4.3: Comparison of Curriculum Composition of Public Use Total Sample with Reanalysis Subsample (unweighted): NLS-72

Self-Reported H.S. Curriculum	Public Use Data Set ^a (including academic curriculum)	Public Use Data Set ^a (excluding academic curriculum)	Reanalysis Data Set (excluding academic curriculum)
Academic	39.6	--	--
General	36.2	59.9	55.5
Vocational:			
Business-Office	NA	NA	22.0
T&I/Home Ec.	NA	NA	12.2
Other	NA	NA	<u>10.2</u>
Total	24.3	40.1	44.5
N (percent based on):	22,590 ^b	13,653	7,170
Excluded:			
Nonresp. curr.	62	62	
Acad. curr.	<u>--</u>	<u>8,937</u>	<u>---</u>
Grand Total	22,652	22,652	7,170

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^aSource: H.S. program composite (V1073), Levinsohn et al. (Vol. II, 1979).

^b20,583 were classified from self-report (V209-BQ2); 2,007 were classified from school administrator report.

- Sex x race x curriculum by educational level for those who had course transcript data
- Sex x race x curriculum by educational level for those who were employed in labor force* as of each time point
- Sex x race x curriculum by educational level for those who both had transcript data and were employed in labor force as of each time point.*

YA

Similar to the LME sample, the YA sample is based on age cohorts drawn from households. For YA those aged 14-21 were surveyed in the base-year (1979). Since only baseyear data were available for this study, the strategy used with the LME data set to approximate various time points out of high school was not required. However, in order to be able to examine differences in labor market outcomes over time points out of high school, we did not wish to pool the information for all ages as an aggregate. With the exception of early leavers, those recently out of high school in the YA data set would typically be aged 18-21. In preliminary analyses we found that for those out of high school in the labor force with exactly 12 years of schooling, the sample size was insufficient to retain discrete age categories for ages 18, 19, 20, and 21. It was necessary to collapse these ages into two categories: ages 18-19 and ages 20-22 (the sample age criterion was based on age as of January 1979; however, as of the survey week, some 21 year olds had turned 22). For comparative purposes this categorization allowed us to infer that the results for ages 18-19 represent outcomes as of entry to one year out of high school and

* The procedure used to classify labor force participation status is described in detail in section 4-0.

results for ages 20-22 represent outcomes as of about two to three years out of high school.

Table A-3.1 indicates that of the original public use sample of 12,686 cases, the reanalysis data set (including those with some post-secondary education) contained 7,711 cases. Table 2.4.4 compares the high school curriculum last enrolled in for all the cases in the public use file to the cases in the reanalysis data set.* Since the reanalysis data set contains no academic curriculum graduates, the percentages for the public use file are reported in two forms: both with and without academic graduates included in the basis.

The results of applying the public school and no academic curriculum participants criteria to the public use file are reported in Table A-3.1 (Appendix A-3). All races were retained. We had hoped to report results separately for blacks and Hispanics, respectively. However, since only baseyear data were available for those aged 14-21, over half of the sample was still enrolled in high school. The result of this is that the number of cases with exactly 12 years (or less) of schooling who were in the labor force and employed was extremely small for blacks and Hispanics, even when all vocational program categories were pooled (see particularly Tables A-3.6 - A-3.7). Thus it was necessary to restrict the reporting of results generally to white males and females.** However, in a few cases, by pooling across ages and vocational specialty areas,

* The enrollment percentages reported in column 1 of Table 2.4.4 vary slightly from those reported for those enrolled in grades 9-12 in the baseyear 1979: academic, 33%; general, 52%; and vocational, 15% (Table 15.1, Borus et al., 1980, p. 257).

**Those classified as white in the YA public use file include a small proportion (about 2 percent) who are "native Americans or of Asian or Pacific Island descent" (Borus et al., 1980, p. 3).

Table 2.4.4: Comparison of Curriculum Composition of Public Use Total Sample with Reanalysis Subsample (unweighted): YA (aged 14-21 in 1979)

Self-Reported H.S. Curriculum	Public Use Data Set ^a (including academic curriculum)	Public Use Data Set ^a (excluding academic curriculum)	Reanalysis Data Set (excluding academic curriculum)
Academic	29.4	--	--
General	54.5	77.2	77.1
Vocational			
Business-Office	5.5	7.7	7.6
T&I/Home Ec.	5.6	7.9	8.1
Other	<u>5.1</u>	<u>7.2</u>	<u>7.2</u>
Total	16.2	22.8	22.9
N (percent based on):	11,538	8,150	7,711
Excluded:			
Nonresp. curr.	1,148	1,148	
Academic curr.	--	<u>3,388</u>	
Grand Total	12,686	12,686	7,711

^aSource: Reanalyses based on total public use file.

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it was possible to report separate results (e.g., dropout rates) for blacks and Hispanics.

The tables in Appendix A-3 describe various samples (unweighted) and populations (weighted) associated with the various reanalyses of the YA data set:

- Sex x race x curriculum disregarding educational level or labor force status
- Sex x race x curriculum by educational level (early leavers, 12 years exactly, some postsecondary, enrolled in high school)
- Sex x race x curriculum for those out of high school by educational level and age classification
- Sex x race x curriculum for those out of high school who were employed in the labor force by educational level and age classification.*

* The procedure used to classify labor force participation status is described in detail in section 4-0.

2.5 Types of Reanalyses

This section provides an overview of the reanalyses performed on the three national longitudinal data sets described in section 2.4 (namely, LME, NLS-72 and YA). Details of the cross-tabular and regression procedures used in performing the reanalyses (as well as certain technical issues) are described in Appendices D-1 and D-2, respectively.

The reanalyses conducted were of four types: descriptive analyses, basic regressions, detailed regressions, and coursework analyses. The descriptive analyses were performed for all three data sets; the remaining three types of analyses were performed exclusively on the NLS-72 data set. Resources did not permit performing the basic and detailed regressions on all three data sets; there were five reasons why NLS-72 was selected rather than the others. First, NLS-72 was the only data set for which the sample sizes were sufficient for all four sex-race groups (white males, white females, black males, black females) to allow performing separate regressions for each sex-race group. Second, given the intent of the study, to examine outcomes associated with both secondary and postsecondary vocational education programs, NLS-72 was the only data set that had a sufficient sample size to allow examining both educational levels. Third, NLS-72 was the only data set which had course transcript information available which allowed examining the relationship of the amount and kind of coursework with subsequent outcomes. Fourth, as already noted, among the three data sets, NLS-72 offered a compromise between the competing desiderata of having information on relatively recent vocational education participants, and also having follow-up information beyond a few years of the job entry. Fifth, NLS-72 is the only one of

the three data sets for which all three points over time are represented by the same sample (rather than by different age cohorts).

Our reanalyses focus heavily on descriptive statistics rather than on more complex multivariate results. There are several reasons for this emphasis. First, we are of the school of data analysis which holds that thorough description of data should precede multivariate analyses. Second, there are at least eight dimensions on which outcome results might usefully be compared--by high school curriculum program, by sex, by race, by educational level (early leaver, 12 years exactly, some postsecondary), by number of years after high school graduation, by particular outcome measure, by data set, and by chronological year. Cross-tabular presentation of descriptive results allowed us to show results in a manner which facilitates comparisons to be drawn on a number of such dimensions.

Descriptive Analyses

Reanalyses were performed to obtain two types of descriptive statistics:

1. Sample (unweighted) and population (weighted) characteristics with respect to basic demographic variables; and
2. Average outcome values reported in a standard sex x race x curriculum x educational level format.

For the first type, cross-tabulations by curriculum and educational level were obtained for each of the three data sets by: sex, race, parental SES characteristics (e.g., mother's and father's education, occupations, income or SES composite, if available, and test scores, if available).

For the second type, averages (means) on each of the outcome variables

identified in Table 2.3.1 were obtained for each of the three data sets and relevant time points using a standard sex x race x curriculum x educational level (early leaver, 12 years exactly, some nonbaccalaureate postsecondary) format. The standard format facilitated the comparison of results across data sets and time points and also the synthesizing of previous results in the literature with those based on reanalyses. These descriptive results were obtained for those with exactly 12 years of schooling for each of the three data sets. Results were obtained for early leavers for the young male cohort for both the LME and YA data sets.* Results at the postsecondary level were obtained for NLS-72.

We should note that a criterion of at least 20 cases (unweighted) in a cell was used for reporting an average separately for any particular subclassification.

Basic Regressions

The purpose of the basic regressions was to estimate differences among curriculum groups when differences due to SES were controlled. Race and sex were also controlled for by performing these regressions separately for each sex-race group (i.e., white males, black males, white females, black females). Though some researchers choose to represent sex and race as dummy variables in one regression equation, such a procedure yields estimates of the effects of different curricula averaged

* The lack of adequate sample sizes to present results on female early leavers, it should be noted, is not simply a technical issue. Substantively, it reflects the fact that males are significantly more prone to leave high school before graduation than are females.

over the sex-race groups.* If the relations between curricula and outcome vary by sex or race, important differences may be concealed by simply using dummy variables to represent race and sex.

These regressions were performed on the NLS-72 data set for three subpopulations:

- Exactly 12 years of schooling
- Exactly 12 years of schooling or some nonbaccalaureate postsecondary education
- Some nonbaccalaureate postsecondary education

Curriculum was represented as a set of dummy variables in each set of regressions; Table 2.5.1 describes the set of curriculum dummy variables used for each subpopulation.

SES was represented in these regressions as the SES composite score available in the NLS-72 public use file. This measure is based on five components: father's education, mother's education, parents' income, father's occupation, and household items (Levinsohn et al., 1978, p. 75). Interaction terms for SES and curriculum were included in preliminary analyses, but results suggested a low probability that such interactions exist and might affect curriculum differences in outcomes in reanalyses of the NLS-72 data. These interaction terms were thus not included in the basic regressions or in the detailed regressions described below. However, SES was standardly controlled for all regressions performed.

We should note that test scores were not entered into any of the regressions performed for this study. Vocabulary, reading and

* These researchers have also typically performed unweighted regression analyses. Since the sampling design for NLS-72 overrepresented blacks, unweighted effects estimates would consequently be biased. We conducted regression analyses on weighted samples.

Table 2.5.1: Description of Curriculum Dummy Variables Used in Regression Analyses for Three Subpopulations

Subpopulation 1. Exactly 12 years of schooling

- For males:
1. Business/office vocational
 2. T&I vocational
 3. Other vocational (including agriculture, distributive education, health and home economics)
 4. General

- For females:
1. Business/office vocational
 2. Home economics
 3. Other vocational (including agriculture, distributive education, health and T&I)
 4. General

The dummy variable for general was left out of the regression equation so that the regression coefficients represented contrasts of each of the three vocational categories with the general curriculum. Although home economics was treated separately in these analyses, gainful employment results are not presented for this category because it encompasses in unknown proportion two different types of secondary vocational education programs--namely, occupational and nonoccupational home economics.

Subpopulation 2. Exactly 12 years or some nonbaccalaureate postsecondary education.

1. H.S. vocational, postsecondary vocational
2. H.S. general, postsecondary vocational
3. H.S. vocational, postsecondary academic
4. H.S. general, postsecondary academic
5. H.S. vocational, postsecondary major not reported
6. H.S. general, postsecondary major not reported
7. H.S. vocational, postsecondary none (exactly 12 years)
8. H.S. general, postsecondary none (exactly 12 years)

The dummy variable for the last classification (h.s. general, postsecondary none) was left out of the regression equation so that the regression coefficients represented contrasts of each of the first seven classifications with the h.s. general, postsecondary none group.

Subpopulation 3. Some nonbaccalaureate postsecondary education

1. H.S. vocational, postsecondary vocational
2. H.S. general, postsecondary vocational
3. H.S. vocational, postsecondary academic
4. H.S. general, postsecondary academic
5. H.S. vocational, postsecondary major not reported
6. H.S. general, postsecondary major not reported

The dummy variable for the first classification (h.s. vocational, postsecondary vocational) was left out of the regression equation so that the regression coefficients represented contrasts of each of the last five groups with the H.S. vocational, postsecondary vocational group.

mathematics tests were administered to the NLS-72 sample when they were seniors in spring 1972, and scores for these tests are available on the public use file. We avoided using these test scores as a control variable in assessing gainful employment outcomes for three reasons. First, twelfth grade test scores themselves may to some extent be outcomes of the high school curriculum. To the extent this is so, adjusting for test scores would implicitly have also adjusted for differences in outcomes associated with participation in secondary vocational programs. Second, we are conducting a separate study of test score changes between entrance and exit from different high school programs, and after gaining some understanding of whether test scores themselves are outcomes of the high school curriculum, we will examine, as part of the separate study, the relation of test scores on subsequent labor market outcomes. Third, of the 7,170 cases included in the reanalysis data set (see Appendix A-1), 28 percent of them had no test score information. Those with no test scores tend to be students who attended schools who refused to participate in the original baseyear survey (19.5% of the original school sample).* The nonparticipating schools were not randomly distributed across the total school sample; they tended to be "small schools (under 300 enrollments), often in the South, often in rural locations" (Creech, 1974, p. 1). The deletion of cases without test scores in the NLS-72 data set would thus have resulted in a subsample less representative of the nation.

* Of the original 231 schools who refused to participate in the NLS-72 baseyear data collection, 205 of these schools later cooperated in the first and subsequent follow-ups. Extended baseyear item information was obtained from students who had attended these schools at the first follow-up time point.

Detailed Regressions

The purpose of the detailed regressions was to assess the plausibility of whether there were any other sources of variation, not taken into account in the basic regressions, that might mask curriculum differences in labor market outcomes. The basic regressions included analytical controls for SES, which is commonly assumed to account for a large proportion of variability in initial differences. The model underlying the basic regressions is an individual- or status-attainment model. Critics of past studies of vocational education have identified a number of other sources of potential variation, involving system or structural variables as well as other individual ones. Very few of past studies investigating curriculum differences on the basis of existing national longitudinal data sets have included variables controlling for differences in local labor market conditions or structural differences. Research based on NLS-72 has recently shown some improvement over earlier national longitudinal studies (e.g., Project TALENT and Youth in Transition) in this regard.* In contrast, investigations of the LME data sets have generally used a human capital or resource perspective, which though also focused on individual attributes does consider the influences of economic conditions and labor market supply and demands. Apart from Grasso (1975) and Grasso and Shea (1979a, 1979b), these investigations have tended unfortunately to use poor indicators of educational experiences. "Education" has typically been represented as simply the number of years completed, and in cases where curriculum has been included, it has generally been represented as a

* For example, Meyer (draft June 1981) includes area wage rate and area unemployment rate among the independent variables.

dichotomous variable (i.e., college preparatory vs. other curricula), which allows no differentiation of outcomes associated with the general or vocational education curriculum.

In broadening the framework that has usually been applied in investigations of curriculum and school effects, we primarily drew on the human capital perspectives (e.g., Schultz, 1971a, 1971b, 1972; Thurow, 1970, 1975; Welch, 1974). This perspective has resulted in a specification of variables that characterize individual differences in human capital attributes (i.e., time invested in various educational, training and work-related activities), as well as differences in community and local labor market conditions. We should note that the segmented labor market perspective --whether based on hypotheses of dual or tripartite segments or even a greater number of segments (e.g., Andrisani, 1973; Bluestone, 1970; Buchele, 1976, Doeringer and Piore, 1971; Freedman, 1976, Gordon, 1972; Gordon et al., 1973; Rosenberg, 1975)--was reviewed for purposes of identifying the structural characteristics of industries and occupations that have more recently been hypothesized to be the chief determinants of individual economic outcomes rather than individual attributes. While we believe the question of whether structural characteristics of labor markets affect outcome differences among curricula is an important one, limited resources did not allow us to investigate this question. We made this decision on the basis of the questionable payoff that such research would have. When we considered the previous research that has been done with respect to this theory and the resources that have been concentrated on obtaining confirmatory evidence that segmentation does determine differences in labor market outcomes, it seemed clear that the information and resources available to us for examining this question were even less than those associated with past investigations.

Thus, though we did include some variables bearing on human capital theory in our reanalyses, we did not include any ones bearing directly on theories of segmented labor markets. The major sources of variation other than initial status variables (sex, race, SES) that we examined in our detailed regressions at the secondary level were:

- Individual investments in educational and work-related activities during high school
- High school and community contextual characteristics
- Individual investments in job training activities subsequent to high school
- Individual investments in work related activities subsequent to high school

Table 2.5.2 identifies the variables used to examine each of these potential sources of variation.

For each of these sets of variables, a series of regressions were performed separately for each sex-race group for those with exactly 12 years of schooling. We should emphasize that the purpose of introducing these variables into the regressions was not to test whether there is a relation between any of these variables and labor market outcomes; we assume there is one. The purpose of these regressions was to assess whether relations between curriculum comparison groups and labor market outcomes changed when the controls for the influence of such variables were introduced. In the regressions each of the variables identified for each set in Table 2.5.2 was stepped into the regression immediately after the curriculum dummy variables (see Table 2.5.1) and the individual SES variable had been entered. By stepping in the variables separately, we were able to assess whether, after adjustments for a particular variable,

Table 2.5.2: Description of Control Variables Used in Regression Analyses at Secondary Level

1. Individual investments in educational and work related activities during high school
 1. Average hours of work outside school while a senior in high school.
 2. Amount and type of coursework during last three years in high school represented as semester courses in 12 content areas:
 - English
 - Mathematics
 - Social studies and fine arts
 - Science and foreign languages
 - Agriculture
 - Business
 - Commercial
 - Distributive Education
 - Health Occupation
 - Home Economics
 - Industrial Arts
 - Trade or industrial occupations
2. High school and community contextual characteristics
 1. Percent of vocational enrollment in high school attended in senior year
 2. Residence in South while attending high school
 3. Size of community resided in while a senior in high school (total population)
 4. Average income of community resided in while a senior in high school (average income per person in labor force aged 16 and over)
 5. Percent unemployment of local community resided in while a senior in high school (unemployed males aged 16 and over)
3. Individual investments in job training activities subsequent to high school. These variables were only examined at the four year (1976) time point.
 1. A set of variables describing the cumulative number of training programs begun each year between 1972-1976 of six types: on-the-job, military, manpower, apprenticeship, correspondence, and others.

The rationale for the selection of these six types is provided by those types that accounted for the greatest proportion of training in NLS-72 breakdowns by sex and race (Peng and Holt, 1977, Vol. I, pp. 290-291; Peng et al., 1979, Vol. II, pp. 515-516). These six variables were entered simultaneously with a seventh variable describing the cumulative sum of the number of months of the longest program each year between 1972 and 1976 and an eighth variable describing the cumulative sum of whether the longest program each year was completed.

2. Cumulative number of on-the-job training programs between 1972-1976 entered separately.
3. Cumulative number of apprenticeship programs between 1972-1976 entered separately.
4. Individual investments in work-related activities subsequent to high school.
 1. Number of weeks in current job in 1976 (job tenure)
 2. Number of hours worked weekly (for earnings outcome analyses only)

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the regression coefficient (unstandardized) associated with each curriculum contrast (e.g., business-office to general) remained the same (stable) or changed. The regression coefficient associated with each curriculum dummy variable represents what the difference in the average value on the outcome variable is between having been a participant of one curriculum group rather than the other. For example, if the regression coefficient associated with the dummy variable representing the business-office to general curriculum contrast was \$10 in an equation predicting weekly earnings, then this would indicate that business-office high school graduates on the average earn \$10 more weekly than general high school graduates. If after SES is stepped into the regression, the coefficient changes to \$5, then we learn that about half of the original differences between the business-office and general groups may be due to initial SES differences in the composition of the groups. Without such a control for SES, larger outcome differences could have been incorrectly attributed to one curriculum group.

This strategy is different than that typically followed by researchers using multiple regression procedures. A number of researchers who use multiple regression procedures for predicting gainful employment outcomes are concerned with identifying all the important determinants of the outcome variable and maximizing the predictability of the outcome variable. To this end they include a large number of independent variables in the regression equation. The results are usually reported for equations which include 25 or more independent variables. The regression coefficient for a curriculum contrast dummy variable included among all these independent

variables would be interpreted as the "net" average difference between the two curriculum comparison groups represented by the dummy variable; that is, the net difference between the two groups after adjustment simultaneously for all the other independent variables. In contrast, the purpose of the detailed regressions performed in this study was not to identify which variables contribute significantly to explaining who does better in the labor market but rather to assess whether participation in a vocational program is associated with subsequent advantages in the labor market. By stepping in each of the variables within the sets of variables identified in Table 2.5.2, after first adjusting for individual SES, we were able to identify whether the association of the curriculum classification changed or remained stable. Our strategy in examining the regression results was first to contrast the differences among the curriculum comparison groups without any adjustment with the differences adjusted for individual SES. We then contrasted the differences adjusted for individual SES with the differences obtained when adjusted for each of the variables identified in Table 2.5.2.

Detailed regressions were also performed on the two postsecondary subpopulations:

- Those with exactly 12 years of school or some nonbaccalaureate postsecondary education
- Those with some nonbaccalaureate postsecondary education

The sets of variables introduced in the regressions for the first subpopulation are identified in Tables 2.5.3. In the reanalyses for the second postsecondary subpopulation (restricted to those with some nonbaccalaureate education), in addition to controlling for SES, the basic

model included variables representing differences in the type of post-secondary education pursued, as follows:

- Type of postsecondary institution: Dummy variables representing four types of institutions were used:

vocational-technical
two-year/community college
four-year college
other

The four-year college variable was omitted from the equation so that the others were contrasted to it.

- Full time-part time enrollment status as of October 1972 and as of October 1973 (coded as 1 and 0)
- Certification represented as whether a postsecondary certificate license or two- or three-year degree had been received by October 1976 (coded 1 and 0)

The type of postsecondary curriculum (academic or vocational) last pursued was already represented in the curriculum contrasts (see Table 2.5.1). All these variables were entered simultaneously with SES. The sets of variables listed in Table 2.5.3 were then entered separately.

Coursework Analyses

The purpose of the coursework analyses was twofold: (1) to examine the extent to which the self-reported curriculum is a valid indicator of the amount and type of coursework received; and (2) to assess whether the findings of the outcome analyses differ as a function of whether the self-reported curriculum classifications or the amount and type of coursework are used alone or in combination. The NLS-72 was the only national longitudinal data set available at the time of this study that included

Table 2.5.3: Description of Control Variables Used in Regression Analyses at Postsecondary Level

1. Individual investments in educational and work-related activities during high school
 1. Average hours of work outside school while a senior in high school
 2. Amount and type of coursework during last three years in high school represented as semester courses in 12 content areas:
 - English
 - Mathematics
 - Social studies and fine arts
 - Science and foreign languages
 - Agriculture
 - Business
 - Commercial
 - Distributive Education
 - Health Occupation
 - Home Economics
 - Industrial Arts
 - Trade or industrial occupations
2. High school and community contextual characteristics
 1. Percent of vocational enrollment in high school attended in senior year
 2. Residence in South while attending high school
 3. Size of community resided in while a senior in high school (total population)
 4. Average income of community resided in while a senior in high school (average income per person in labor force aged 16 and over)
 5. Percent unemployment of local community resided in while a senior in high school (unemployed males aged 16 and over)
3. Individual investments in job training activities subsequent to high school
 1. A set of variables describing the cumulative number of training programs begun each year between 1972-1976 of six types: on-the-job, military, manpower, apprenticeship, correspondence, and others.

The rationale for the selection of these six types is provided by those types that accounted for the greatest proportion of training in NLS-72 breakdowns by sex and race (Peng and Holt, 1977, Vol. I, pp. 290-291; Peng et al., 1979, Vol. I, pp. 515-516). These six variables were entered simultaneously with a seventh variable describing the cumulative sum of the number of months of the longest program each year between 1972 and 1976 and an eighth variable describing the cumulative sum of whether the longest programs each year was completed.

2. Note that the postsecondary education experience was already represented in the curriculum dummy variables (see Table 2.5.1)
4. Individual investments in work-related activities subsequent to high school
 1. Individual number of weeks employed 1972-1976
 2. Proportion of full-time jobs held by individuals across the dates October 1972, 1973, 1974, 1975, and 1976.
 3. Number of weeks in current job in 1976 (job tenure)
5. Other individual
 1. Marital status as of October 1976.

course transcript information.* Three types of coursework analyses were performed on the NLS-72 data set.

1. Cross-tabular analyses. Cross-tabular breakdowns of coursework averages in specific subject areas were obtained in a sex x race x self-reported curriculum x educational level (12 years exactly, some baccalaureate postsecondary) format. The amount of coursework was represented in three forms: semesters, period or hours. The type of coursework was represented in 12 different content categories (see Table 2.5.3, section 1.2). Self-reported curriculum was represented in one set of analyses as two categories: general and total vocational. In a second set of analyses, the vocational category was disaggregated into three categories: (1) business-office; (2) T&I for boys and home economics for girls; and (3) rest vocational.

2. Discriminant analyses. Amount and type of coursework were used to predict membership in a self-reported curriculum coded as a dichotomy (general or total vocational). Amount of coursework was represented in three forms: semesters, periods or hours. The type of coursework was represented by the general content categories used in the cross-tabular analyses. The amount and type of coursework was entered in various combinations with information on SES and reading

* Transcript data were collected in May 1980 for those aged 18-21 in the baseyear YA sample. The data were collected and coded by the National Center for Research in Vocational Education. The Center for Human Resource Research (CHRR) will be responsible for linking these course data to a YA public use file. As of September 1981, these course data had not been released by NCRVE to CHRR; CHRR estimated that a YA public use file containing the course data may not be available until September, 1982.

and mathematics test scores. Each set of analyses was performed separately for each sex-race group. The analyses were confined to those with exactly 12 years of schooling.

3. Regression Analyses. As part of the detailed regressions described above, the amount and type of coursework was represented in various ways and related to labor market outcome variables. Three approaches were used in examining the relationship. First, we simply added coursework data to the self-reported curriculum classifications (see Table 2.5.1) in the basic model with SES. This allowed us to examine how the addition of course data changed the relationship between outcomes and self-reported curriculum. Second, we excluded the self-reported curriculum classifications and regressed outcomes on SES and the course data directly. This provided a direct test of the relationship between course data and outcomes. Third, we re-performed the first set of analyses but restricted the course data to the four types of courses relevant to the major vocational specialty areas; namely, semesters in business, commercial, trades and industry, and industrial arts courses. Since to the extent an individual takes more of one type of course, the less he or she can take of other types of courses, we hypothesized that such interdependence in course-taking of different types might obscure relationships among vocational coursework, self-reported high school curriculum and gainful employment outcomes in the first set of analyses.

2.6 Criteria for Assessing Noteworthy Differences

In presenting evidence on outcomes associated with participation in vocational education in subsequent chapters, we rely upon several different sorts of criteria for determining whether apparent differences in outcomes between different groups of individuals are worth noting. To some extent we rely upon the criterion which seems to have become something of a touchstone in statistical analyses of the sort we report, namely, tests of statistical significance. Yet we wish to emphasize that tests of statistical significance are nothing more than heuristic devices when used with non-experimental data. Whether outcome differences show up as statistically significant depends not only on the sizes of the samples of cases compared in different groups but also upon the processes by which individuals originally came to be members of the groups compared. In regression analyses, we can to some extent adjust for such differential processes by introducing control variables, such as indicators of individuals' socioeconomic status (SES). But as we have already explained, lacking experimental manipulation of the programs or treatments studied, such statistical controls are inevitably incomplete, and hence, statistical tests of significance represent nothing more than handy devices to determine the probability that apparent differences might have occurred merely by chance if experimental manipulation of conditions (such as randomization) had been employed. Moreover, statistical tests of significance tell us nothing about the substantive meaning of outcome differences. Very small differences may appear as significant if sufficiently large samples are employed.

Thus while we do rely upon tests of statistical significance in reporting results of regression analyses, we also rely upon other, much more obviously heuristic grounds for determining whether outcome differences are apparent in both our review of previous literature and our reanalyses of the NLS-72, LME and YA data sets.

Before describing the specific criteria which we generally used for determining notable differences, let us also mention two more practical reasons for not relying exclusively upon tests of statistical significance as a criterion for determining outcome differences worthy of note. First, in terms of previous literature, both national and non-national, statistical tests of significance often were not included in analyses, and where they were, different standards were applied in different cases, or else the exact bases for calculation of statistical tests of significance were not clearly spelled out. Second, many of our reanalyses were comprised simply of descriptive cross tabulations of outcomes for different groups of individuals and for such cross-tabulations no tests of statistical significance were calculated.

Thus in describing results of research regarding outcomes associated with participation in vocational education, in addition to relying upon tests of statistical significance, we also relied upon the following guidelines for determining noteworthy outcome differences found in our reanalyses:

<u>Outcome Measure</u>	<u>Difference Generally Treated as Noteworthy</u>
Labor force participation rate	10%
Unemployment rate	5%
No. weeks unemployment	2 weeks
Hours worked per week	2 hours
Full-time employment rate	5%
Weekly earnings	\$15 to 20 (roughly 10% difference for females and males respectively in 1978 dollars)
Occupational level	10% (of those employed in jobs above unskilled level)
Occupational status	4 SEI points
Self-employment rate	5%
Job satisfaction rate	10%

Several points should be noted regarding these guidelines used in assessing outcome differences. First, these are only general guidelines. In cases where regression analyses were performed on these outcomes, results of statistical significance tests were also taken into account in reporting findings. Also, more generally, where differences smaller than indicated levels were apparent across several comparisons, such consistencies in direction of findings were deemed noteworthy. Conversely, where differences greater than these amounts were inconsistent across different comparisons or for particular reasons were considered suspect, they may be discounted. Second, the previous guidelines for assessing noteworthy differences implicitly reflect the distribution of particular variables. Thus, for example, noteworthy earnings differences for females are considered to be lower than for males, because the distribution of weekly earnings for females is lower than for males.

Third, and most important, the value and meaning of particular outcome differences ultimately are subjective questions. Thus, while we have generally tried to rely upon fairly consistent guidelines for assessing noteworthy outcome differences, we have also presented much descriptive data, so that readers, if they wish to apply different standards, can reach their own conclusions.

2.7 Weight Given to Different Sources of Evidence

As already noted several times, this study is based on three types of evidence, namely, non-national studies of vocational education, previous national studies concerning vocational education, and our own reanalyses. Before moving on in subsequent chapters to present findings drawn from these three types of evidence, we pause in this section to describe the relative weight given these three types of evidence in drawing overall conclusions.

Our first consideration in this regard was simply availability of evidence. The only available studies bearing directly on employer satisfaction, for example, were non-national ones, and thus our review of evidence on this outcome indicator in section 4.6 is based exclusively on non-national studies. Conversely, no non-national studies providing evidence on patterns of self-employment among vocational education graduates were located in the review of non-national studies and hence our review of evidence on this outcome indicator in section 4.7 was based exclusively on reanalyses and previous research, national in scope.

For many outcome indicators, however, evidence of all three types was available and in such cases, the relative weight given to them in drawing overall conclusions was as follows: First, we tended to give less weight to non-national sources than to ones national in scope. This was done merely because our goal was to piece together a national picture of outcomes associated with participation in vocational education, and it is inevitably hazardous to try to piece together a national picture based on available non-national studies which represent no clear sampling of either programs, students or geographic areas. Also, we found most non-national studies to be limited in terms of duration

research reports (particularly non-national studies, but also to a significant extent previous research which was national in scope), documentation provided was simply insufficient for us to be certain as to what their overall limitations were.

Though we generally weighed evidence in this manner (with greater weight given to reanalyses, and least to non-national studies), two final points should be noted. First, this is simply our overall strategy. For particular outcome indicators, availability of different types of evidence or other considerations may have required other weightings. Second, this weighting for the purpose of this report (namely, to piece together the best overall national picture of evidence regarding outcomes intended for vocational education programs generally) should not be construed as an overall valuation of these different types of information. For other purposes, for instance, evaluation of vocational education programs in particular states or localities, a different weighting would very likely be more appropriate.

CHAPTER 3. IDENTIFICATION AND DESCRIPTION OF SECONDARY VOCATIONAL EDUCATION STUDENTS AND GRADUATES

Before describing outcomes associated with participation in vocational education, we need to come to grips with more basic problems, namely, how to identify participants in vocational education programs, and how they compare to other groups of students with whom they might be contrasted. These issues might seem so fundamental as to need no elaboration, but by way of introduction we note that several previous studies ostensibly estimating the "effects" of vocational education have ignored precisely these questions. The consequence, as we eventually explain, has been that previous findings concerning "effects" of vocational education are at best extremely tenuous and at worst considerably misleading.

A reasonable place to begin this discussion is with a definition of vocational education. The NIE Vocational Education Study's Interim Report recently described vocational education as consisting of "organized programs of instruction less than the first baccalaureate degree level, offered in secondary and postsecondary institutions to youths and adults, designed to impart knowledge and skills related to participating in paid employment or in other socially productive activities" (NIE, 1980, p.VI-1). The NIE report also documents, however, how difficult it is to operationalize this definition in clear and consistent terms. Estimates of the numbers of vocational education students nationwide vary by millions depending on the exact operationalization of key terms used in defining vocational education and on the methods used to collect data. One of the greatest problems in identifying vocational

education programs and students appears to derive from ambiguity in definitions of what constitutes an organized "program." There are no standard definitions available for determining how many courses or class hours constitute a program.

This problem obviously has implications for any effort to describe outcomes associated with participation in vocational education. Therefore in this chapter we first explore the problem of identifying vocational education participants. Section 3.1 compares identification of vocational education participants via student self-report and via school administrator report. Section 3.2 compares coursework taken by students self-reported to be vocational students and those self-reported to be high school general program participants. Section 3.3 compares students self-reported to be vocational or general program participants in terms of two important background characteristics, namely socioeconomic status (SES) and test scores. Section 3.4 describes the implications of the previous sections for analyses reported in Chapter 4.

Before proceeding let us offer a word of introduction concerning sources of information relied upon and their limitations. We draw on two basic sources of information, namely, previous literature and re-analyses of national longitudinal data sets.

Previous national longitudinal studies generally have identified vocational education participants simply on the basis of self-reports to a very general question asking respondents to indicate their program of study in high school. Project TALENT and Youth in Transition provided five choices: (1) general, (2) college preparatory, (3) vocational,

(4) commercial or business, and (5) agriculture. The LMF surveys gave the first four choices. NLS-72 and YA asked those who named a vocational or technical curriculum to identify in which of six areas they had specialized.

In addition to using an expanded self-report format, the latter two studies employed other means of curriculum identification. In the NLS-1972 study, the hours of coursework in specific academic and vocational subject areas were recorded from each student's transcript; in addition, school administrators classified the students' curriculum program on the basis of reviewing student transcripts. In the NLS-YA survey, students were asked to identify the courses taken in the last year of high school. Transcript data on high school courses were not yet available for the YA data set at the time of this study, however, and so could not be used in our reanalyses.

As a result in this chapter we focus heavily on our reanalyses of the NLS-72 data set. It is the only source available which provides three alternative means of identifying vocational education graduates or participants, namely, student self-report, coursework, and school administrator classification based on review of transcript information. Also, we devote particular attention to the meaning of student self-reports. We do this not because we think them necessarily superior to the school administrator's classification but because student self-reports are the only means of identification available in the other data sets. If we are to rely on such self-reports, we need to scrutinize their meaning closely in the NLS-72 data set, where alternative means of identification are available.

3.1 Curriculum Classification Via Student Self-Report and Via Administrator Report.

The means of classification typically used in past studies of curriculum effects has been the self-report of a student or graduate to a very general question asking about their high school program of study. Studies conducted by the Bureau of the Census provide the earliest critical assessment of the accuracy of such self-reported classifications. When a sample of respondents to the 1970 Census were re-interviewed after a period of a few months, about 38 percent of those who originally indicated that they had completed a vocational program said they had not, and 9 percent of those who initially said they had not completed a vocational program indicated in the reinterview that they had (U.S. Department of Commerce, 1979, p.11; Suter, 1979). To pretest a question on high school curriculum program for use in the 1980 Census, a similar follow-up study was performed by the Bureau of the Census in 1976. The Bureau found that "about one-half of those who reported having received a [vocational training] certificate in the [initial] mailout survey did not report it in the follow-up interview" (U.S. Department of Commerce, 1979).

Since many of the respondents in these Census studies were being asked to report on a vocational program completed several years earlier, it could be hypothesized that self-reports would be more accurate from respondents who were currently participating in a vocational curriculum or had completed one in the immediate past. The NLS-1972 data cast some doubt upon this hypothesis, however. In addition to the self-reported curriculum identified in the baseyear survey by the NLS-72 sample of high school seniors, the / hours of course work in specific academic and vocational subject areas were

recorded from each student's transcript by each school, and a school administrator classified each student's curriculum program on the basis of reviewing the transcript. In comparisons of NLS-72 curriculum classifications by school administrators and self-reports by students, it was found that only 66 percent of those classified as vocational students by administrators were so classified by students themselves in self-reports (Fetters, 1975, p. 4).^{*} At least one researcher (Rosenbaum, 1980) has assumed that the school administrator's classification represents the "actual" curriculum taken. Other work suggests, however, that the school administrator's classification may also be inaccurate. A check of the reliability of the administrator's classification indicated overall agreement of only 77 percent between two independent classifications based on an examination of students' course transcripts in 50 school districts included in the NLS-72 sample; disagreements accounted for about 15 percent of all cases and missing data for the rest (Creech, 1974, pp. 40-41).

Past analyses of the NLS-72 self-reported and school administrator curriculum classifications have limited their attention to three broad high school curriculum areas, namely academic, general and vocational. However, both the students and the school administrators were asked to

^{*} Similarly, 21% of those classified by survey administrators as general curriculum participants were classified in self-reports as vocational, and 4% of those classified by administrators as academic were self-reported as vocational.

identify which of six specialty areas* best described the student's vocational program of study. In reanalyses of these data, we examined the agreement among the specialty area classifications for those students classified as vocational both by their own self-report and by the school administrator. The overall agreement in the specialty area classifications for this latter group was 86.4 percent (or 13.6% disagreement). The picture changes when the total group was disaggregated into relevant subgroups. In addition to performing separate analyses by sex-race groupings, we separated the sample into two educational levels: no postsecondary education as of four years out of high school (i.e., 12 years exactly) and some postsecondary experience. We hypothesized that of the two educational levels, the coursework

* Agricultural occupations, business or office occupations, distributive education, health education, home economics occupations, and trade or industrial (T&I) occupations. There are two notable problems with the six choices provided. First, a technical specialty area was not included as a choice. This may be because technical course preparation is primarily offered at the postsecondary level; according to VEDS statistics, it accounted for less than 1% (i.e., 0.6%) of the 1978-79 enrollment in occupationally specific vocational education programs in grades 11-12 (Wulfsberg, 1980, p. 22). However, estimates based on a special 1972 NCES course enrollment survey, which distinguished between vocational program enrollees and elective course takers, place the enrollment in high school technical programs closer to 5% (Brown and Gilmartin, 1980). We can only assume that NLS-72 respondents who were participating in a technical vocational program would have chosen "trade or industrial occupations" as their program.

The second problem is the failure to make a clear distinction among the choices provided between the two subspecialties within the home economics area: namely, the consumer and homemaking education subspecialty and the occupational home economics subspecialty. The former offers preparation for "unpaid" employment (e.g., homemaker role). The NLS-72 survey may have intended that only those in the latter subspecialty preparing for gainful employment should have chosen "home economics occupations." Students enrolled in the consumer and homemaking education subspecialty, who were able to make such a subtle distinction, would probably have selected a general program. However, it is highly probable that a number of students enrolled in the consumer and homemaking education subspecialty would not have made such a distinction and would have indicated "home economics occupations" as their program.

completed by the former group who entered the labor market immediately on high school graduation would reveal a more coherent pattern of vocational courses than would that of students who pursued postsecondary education. If this were the case, graduates who had pursued this coursework and school administrators examining the course transcript should be in higher agreement as to the nature of the specialty area being studied. An opposite pattern emerged for three of the sex-race groups: the disagreement in the specialty area classifications between student self-report and school administrator was lower for those graduates who had some postsecondary education as of four years out of high school (see Table 3.1.1). Disagreement was greatest among the classifications for black male graduates with no postsecondary education; 31 percent of the school administrator specialty area classifications differed from the student self-reported specialty areas.*

TABLE 3.1.1 Percent Disagreement in Vocational Specialty Area Classifications for Students for Whom Vocational Program was Identified as Student's Program by Both Self-Report and School Administrator's Classification

<u>Education as of 1976</u>	<u>Sex-Race Group</u>			
	<u>M-W</u>	<u>M-B</u>	<u>F-W</u>	<u>F-B</u>
12 years exactly	18.0	31.1	10.0	19.8
Some postsecondary	11.6	18.7	9.8	24.1

* We should note that a supplementary analysis revealed that the 66% overall agreement picture reported by Fetters did not change as radically when disaggregated by sex and race. The baseyear crosstabulations reported by Thompson (1974) included a breakdown of the student's self-reported curriculum by the school administrator's curriculum (Table 2, pp. 52-53). We derived the following percentages by sex-race groupings for those students classified as vocational-technical by the school administrator who reported themselves as vocational-technical:

	<u>M-W</u>	<u>M-B</u>	<u>F-W</u>	<u>F-B</u>	<u>Gr.Total</u>
School Voc.-Self Voc.	59.3%	61.5%	73.0%	71.0%	67.1%

When we examined the types of discrepancies between the specialty area selected by the student and that by the school administrator, some could be explained by coursework commonalities or overlaps that might be expected between two related specialty areas; for example, between business and distributive education or between health education and home economics, or even between agriculture and T&I. There is one discrepancy characterizing the classifications for males, however, that is not explainable from the perspective of related coursework. About 30 percent of the disagreements for white and black males involved classifications in which the student himself identified business or distributive education as his program and the school administrator characterized the program as T&I (see Section A; Table 3.1.2). While all male students might take a few T&I course electives, it is difficult to conceive of a student majoring in business or distributive education having been enrolled in a sufficient number of T&I courses to be identified as a T&I major from his course transcript. Or phrasing the issue from the other perspective, it is hard to imagine that a student whose course transcript includes a sequence of T&I courses in such number and organized sequence as to appear to the school administrator to characterize a T&I major could perceive himself as a business or distributive education major.

This trend was even more pronounced in similar analyses we performed on groups of males formed on the basis of self-report and school administrator disagreements involving both the vocational and general program; that is, in classifications in which the student reported himself as in a general program and the school administrator identified him as completing a vocational program or vice versa. For these two groups the general

TABLE 3.1.2. Percent of Misclassifications in Each Grouping Involving Trade & Industry Specialty Area

	12 Yrs. exactly		Some Postsecondary	
	<u>M-W</u>	<u>M-B</u>	<u>M-W</u>	<u>M-B</u>
A. <u>Self-reported Vocational and School Administrator Vocational</u>				
School identified T&I and student identified business or distributive education.	27.9	36.8	30.3	33.3
B. <u>Self-reported General and School Administrator Vocational</u>				
School identified T&I and student, general	73.2	47.1	68.3	56.5
C. <u>Self-reported Vocational and School Administrator General</u>				
School identified general and student, T&I	47.4	36.8	45.0	37.8

program classification was associated with a T&I specialty area classification in one-third to three-fourths of the cases (see Sections B and C, Table 3.1.2).

We also examined how consistent the student's self-reported classification remained over time and whether its stability was related to agreement between the student's self-reported classification and that of the school administrator. In their study Meyer and Wise (1980) used as the curriculum classification responses to an NLS-72 first follow-up survey question which asked: "While you were in high school did you receive specialized training intended to prepare you for immediate employment upon leaving school?" Past studies have documented that one third of the students who had completed a vocational program according either to their own self-report (Tabler, 1976, pp. 660-661) or to the school administrator's classification (Lewin-Epstein, 1979, p. 279), responded "no" to this question; further, about one fourth of those who had completed a general program said they had received specialized training. We hypothesized that the highest percentage of yeses to this question should be associated with those students who were classified as in a vocational program both by their self-reports and by the school administrator's characterization and the lowest percentage of yeses to those classified as general by both. This proved to be the case across the sex-race groupings and two educational levels, with the exception of black males (see Table 3.1.3). Note, however, that even for students identified as general participants by both self-report and administrator's report, some 17-39% across the different subgroups still indicated that they had received specialized job training in

TABLE 3.1.3: Percent Yes Responses to First Follow-up Survey Question:
 "While you were in high school, did you receive specialized
 training intended to prepare you for immediate employment
 upon leaving school?"

Education as of 4 years out of high school	Self-Reported vs School Administrator Curriculum			
	Self Voc School Voc	Self Gen School Gen	Self Gen School Voc	Self Voc School Gen
<u>12 years exactly</u>				
M-W	63.2	16.7	40.8	37.8
M-B	50.9	26.2	48.3	51.5
F-W	81.2	32.6	53.2	53.6
F-B	71.3	25.6	50.0	27.1
<u>Some Postsecondary</u>				
M-W	64.8	17.6	33.3	31.6
M-B	57.1	18.3	20.0	23.1
F-W	78.6	29.4	49.6	58.9
F-B	69.6	39.2	56.3	57.8

high school. The perception of about one half of the black males one year out of high school who, both by their own self-report in senior year and by the school administrator, were classified as in a vocational program was that they had not received any specialized training in high school. Also notable in this analysis is the failure of this question to differentiate between those students who were in the two types of misclassification groups (general by self-report and vocational by school administrator; or vocational by self-report and general by school administrator).

3.2 Coursework Taken by Vocational and General Program Participants

The discrepancies in the classifications by student self-reports and school administrators summarized in Section 3.1 raise questions about the extent to which general reports of participation in vocational or general programs represent differences in the actual course content of a student's program. Since two of the three national longitudinal data sets we were to reanalyze had only a self-reported curriculum classification available and most of the past studies reviewed were based on a self-reported classification, we examined the relationship between the self-reported curriculum and actual coursework. Specifically, in this section we consider the extent to which student self-reports of participation in a vocational or general curriculum indicate different amounts of coursework taken in academic and vocational content areas.

The NLS-72 data set was the only national longitudinal data set available at the time of this study that included transcript course information and student self-reported curriculum classifications.* Two types of re-analyses performed on the NLS-72 data set -- what we term the cross-tabular analyses of the course data and the discriminant analysis of the course data -- are described in this section. The course results will be represented in this section by semesters of coursework taken, specifically between July

* Following the trend established by NLS-72, transcript data were collected for students included in the YA sample. Copies of the transcripts themselves were collected in May 1980; the course information was to be coded by the Ohio National Center for Vocational Education Research and then linked to the YA public use file. These data had not been linked to the YA public use file when it became available to us in December 1980. The only other data set with course transcript information that has a comprehensive sample coverage (though it is not a national probability sample) that we are aware of is for one of the cohorts included in the Intellectual Growth and Vocational Development Study (Cook and Alexander, 1980).

1969 and the date of graduation for students in the high school class of 1972 (or for the years corresponding to their last three years in high school). We should note, however, that we analyzed the course information in three different forms -- in terms of semesters of coursework, periods of coursework and hours of coursework. Since the results seemed highly similar in these three different forms, we report only the analyses based on semesters of coursework. Before describing the results of these reanalyses, some background information on the NLS-72 course data is provided.

The NLS-72 course data were derived from student transcripts by having school administrators classify students' courses into fourteen different content areas. This classification was based on two questions in the NLS-72 School Report Information Form. The first question (SRIFQ4) asked simply:

How many semester courses will the student have taken in each of the following subjects between July 1, 1969 and the date he or she graduates?*

There followed a listing of eight subject areas:

- Science
- Foreign Languages
- Social Studies
- English
- Mathematics
- Industrial Arts
- Commercial
- Fine Arts or Performing Arts

The next question on the school report information form (SRIFQ5) asked the school administrator to "indicate the total number of semester courses this student will have taken in each of the following vocational-technical subjects by the time he or she graduates." Six vocational-technical

* The question went on to ask administrators to indicate also the numbers of class periods per week, but since we report analyses based exclusively on semester courses, this part of the question is not described.

subject areas were listed as follows: .

- Agriculture
- Business or Commercial
- Distributive Education
- Health Occupations
- Home Economics
- Trade or Industrial Occupations

Thus, data on the total number of semester courses taken in fourteen subject areas between July 1969 and the date of graduation were recorded for students in the NLS-72 sample. For the analyses reported in this section, we collapsed these fourteen categories into twelve, specifically grouping together: (1) science and foreign language; and (2) social studies and fine arts.* Consistent with our general analytic framework (see Chapter 2, section 2.1), the analyses were performed separately by sex and race and by educational level (12 years exactly and some postsecondary education).

Cross-Tabular Analyses. In examining differences in amount of course-work between the general and vocational self-reported curriculum groups, we examined the curriculum classification from two perspectives. First we examined differences between the two when all vocational specialty areas were grouped together. Second, we examined differences between the general group and selected vocational specialty subgroups. Past studies utilizing the NLS-72 data have generally reported results only for a pooled vocational classification. The primary reason for pooling results across specialty areas within the vocational curriculum is that the sample size in some

* While such grouping represents a modest loss of information, it should be noted that it retains far more information than that used in a previous analysis of NLS-72 course data related to vocational outcomes (e.g., Wiley and Harnischfeger, 1980).

specialty areas (e.g., health occupations) is too small to permit analysis. However, the enrollments in the T&I area for boys and the business area for girls represent such a large proportion of the total vocational enrollment that it is difficult to understand why past studies utilizing the NLS-72 data have not disaggregated data for at least the larger specialty area subgroups within the vocational curriculum. Recent evidence suggests clearly that patterns and amounts of vocational coursework do differ across specialty areas. Copa (1980), for example, in an investigation of differences among students taking varying amounts of vocational education, utilized course information data in the Minnesota Secondary School Follow-up System and found differences in results by specialty area. Cook and Alexander (1980), utilizing data for one of the cohorts included in the Intellectual Growth and Vocational Development Study, were able to distinguish the business group from the general group on the basis of course information.

The selection of vocational specialty area subgroups used in our analyses was determined mainly by sample size constraints. Specialty areas with the largest enrollments were represented by a separate classification. In the case of the analyses for males, three classifications were used: (1) trade and industry/technical (about 55% of male vocational enrollment in our NLS-72 reanalysis sample)*; (2) business-office (about 15% enrollment); and (3) other vocational specialties pooled (including agriculture, health, distributive education, and home economics). For females, three classifications were also used: (1) business-office (75% enrollment for white females; 55% enrollment for black females);

* See footnote discussing problems with NLS-72 vocational specialty area choices for the technical and home economics areas in Section 3.1 (p. 3.1.3).

(2) home economics*; and (3) other vocational specialties pooled (including agriculture, health, distributive education, and T&I). Home economics is given a separate classification because no clear distinction was made in the NLS-72 survey between the two subspecialties within the home economics area: (1) the consumer and homemaking education subspecialty in which preparation is offered for "unpaid" employment (e.g., homemaker role); and (2) the occupational home economics subspecialty. Since outcomes for these two types of home economics subspecialty areas can be expected to differ, we treated home economics as a specialty area separate from other vocational, so as to avoid confounding outcome results for consumer and homemaking education specialization with those of other vocational specializations which are more clearly aimed at preparing students for paid employment.

In examining differences in amount of coursework in each of the twelve content areas between the general and total vocational groups, we used a difference of about one semester course as our criterion. Overall we found few differences in courses taken by general and vocational students, and results were largely consistent for both white and black males (Appendix B, Table B-1.1 and B-1.2). The only differences in course content areas taken by general and vocational which exceeded one semester course over the period of three years were as follows: General students averaged about one more course in the social studies and fine arts category

* See footnote discussing problems with NLS-72 vocational specialty area choices for the technical and home economics areas in Section 3.1 (p. 3.1.3).

than vocational students; vocational students averaged about 1 1/4 more courses in the T&I category. What is most noteworthy about these results is the lack of difference between the two groups on seven of the eight vocational content areas.

The other noteworthy finding in these results is the trend that is seen in the results for black males with 12 years exactly (Table B-1.1). Across all course categories both general and vocational black male graduates averaged an equal or lower number of semester courses than their white male counterparts. The total semester course averages support this trend. While white males in both curriculum groups took about 23 1/2 semester courses, black males in both curriculum groups averaged only about 19 semester courses in the last three years in high school. The gap between the two races is smaller in the postsecondary level group (Table B-1.2). White males averaged 23 semester courses and black males averaged slightly over 21 semester courses. We have no explanation for these anomalous results between black and white males, so here we merely note their potential significance for interpreting outcomes associated with secondary schooling.

Results for white and black females were also fairly consistent. The academic course area showing the most difference between the general and total vocational female groups again was the social studies and fine arts content area. A difference in the science and foreign language area also emerged for black females with 12 years exactly (i.e., general averaged

3.6 courses; vocational 2.6 courses). Among the eight vocational course types, the business and commercial categories were the only ones which showed clear differences between the two groups. White females in vocational programs at both educational levels averaged about 2 more courses in each area than those in a general program. Black females with 12 years exactly averaged only about 1 1/2 courses more, and those with postsecondary education less than 1 course more, in the business and commercial categories than those in a general program. In short, the pattern for females was similar to that for males. No differences in courses taken were apparent in most vocational content areas for either blacks or whites, but there appeared to be differences in patterns of course-taking across the two female race groups. While white females with some postsecondary education, for example, averaged 24.5-27 semester courses in the last three years in high school, black females with some postsecondary education averaged about 20 semester courses (see Table B-1.2).

Greater differences in coursework are apparent between general and vocational students when the total vocational group is disaggregated into the vocational specialty groups described above. The differences for males were more pronounced for whites than blacks (see Appendix B, Table B-2). Students who reported they were in a business program averaged 1-2 semester courses more than general students in both business and commercial content areas; they also averaged one course less in both the T&I and industrial arts content areas than general students. Further, white males, reporting they were in a T&I program, averaged 2 1/2 more semester courses

of T&I, and one semester course more of industrial arts, than general students. Black males, reporting they were in business, averaged one course more than general students in both business and commercial content areas; those in T&I averaged 1 1/2 more courses in T&I than general students. As previously noted, differences between the general and total vocational groups in the academic content areas, though small, were greatest in the social studies and fine arts area. The results for the three male vocational subgroups indicate that those majoring in business are more similar to those in a general program in their academic coursetaking than those majoring in T&I or other vocational programs.

The differences between the general and the vocational students were magnified for females when female vocational subspecialties were considered separately. White females in business-office programs averaged 3 1/2 more semester courses in business and 3 1/2 more in commercial areas than general students. Black females in business-office programs averaged 3 1/2 more semester courses in business and 3 more in commercial areas than general students. The results reported by the home economics subgroup showed that for both white and black females those reporting a major in that area averaged 1 1/2 more semester courses in the home economics area than those in a general program.

Thus, much greater discrimination between the coursework completed by self-reported general and vocational graduates was obtained when the comparisons were based on the vocational specialty areas accounting for the largest enrollments (business-office and T&I for males; business-office for girls). The practice of pooling the total vocational education

group apparently averages differences among the specialty areas and thus masks important differences in the amount of coursework taken in content areas related to particular specialty areas. The findings by the separate specialty areas indicate that the coursework taken by males who major in business or T&I is related to the specialty area they report and is different from that taken by those who report they are in a general program. Similarly the findings for females indicate that females who report they are in a business-office program average more coursework in areas related to their specialty than those in a general program. It should be noted, however, that this overall finding does not hold equally for the two races. More courses were found to differentiate between general and vocational graduates for whites than for blacks.

Discriminant Analysis. The cross-tabular analyses allowed us to describe differences among the curriculum groups for each of the twelve course content categories, one area at a time. The results of these analyses tell us little, however, about differences in the overall pattern of coursetaking across the twelve course content categories; that is, whether taking a greater amount of some content areas is related to taking a lower amount in other content areas. Therefore discriminant analysis procedures were used to determine the extent to which vocational curriculum participants can be distinguished from general curriculum participants on the basis of their overall pattern of courses across the twelve course categories.

Two past studies based on NLS-72 data (Echternacht, 1976; Rosenbaum, 1980) have reported the use of discriminant analysis as a procedure for

examining similarities and differences among students in different curricula. Neither of these studies included the course information in their analyses; instead they included such variables as background characteristics, test scores, psychological traits, and educational plans and aspirations. Echternacht attempted to discriminate vocational participants from academic and general participants; Rosenbaum, however, pooled vocational and general curriculum participants into a non-academic grouping and attempted to discriminate between the pooled non-academic group and the academic group. Since the vocational and general curricula share a number of similarities in how they differ from the academic curriculum, it is these similarities that are best described by Rosenbaum's study. Echternacht's study showed a much lower power for discriminating between the vocational and general groups than between the vocational and academic groups. In analyses performed separately by sex and race, a maximum of 14 percent of the variance (R square) between the vocational and general self-reported curriculum groups was explained.*

In our reanalyses of the NLS-72 data, we tried a variety of discriminant analyses, entering course information in various ways (e.g., in terms of semester courses, periods and hours) and in various combinations with other information (e.g., both with and without an SES composite measure and reading and math test scores). The results were fairly consistent for the various models tested. We achieved only a slightly higher discriminatory power with the course variables than Echternacht (1976) did with selected background and other variables. The variance explained (R square) by the course variables, SES and test score data never exceeded 20 percent for any

* Vocational vs. general R in the calibration sample was as follows:
M-W, .1225; M-B, .1296; F-W, .1369; and F-B, .1444.

of the sex-race groups (Appendix B-3).^{*} Taken either individually or collectively, course variables and SES and test score data have very little power to discriminate between the self-reported general and total vocational groups. A summary of the variables entering significantly into the full discriminant model for each sex-race group is shown in Table 3.2.1. For other models (e.g., without SES or test data), the course variables entering into the discriminant function at a significant level were slightly different, but the overall pattern of results was similar.

In several ways these results parallel those of the cross-tabular results summarized above. For example, social studies and fine arts coursework is associated with general curriculum participation. T&I and commercial coursework is tied to self-reports of participation in vocational education for both white males and females (and partly for black males and females). It should also be noted, however, that the pattern of variables discriminating significantly between vocational and general participation is different for the sex-race groups (with fewer course variables distinguishing such participation for blacks than for whites). Further an apparently anomalous result for white females with respect to home economics coursework should be noted. For this group, home economics coursework is characteristic of general program rather than vocational program participation, at least as such participation was indicated in self-reports. This discrepancy may be due in part to the home economics area being defined as "home economics occupations" in the self-report curriculum question included in the NLS-72 survey. As noted already, there are two subspecialties within the home economics area: (1) the consumer and homemaking education subspecialty in which preparation is offered for "unpaid" employment (e.g., homemaker role);

^{*} Actually in most cases, the R square was only around .10 or less, and in several cases in which it approached .20, there was evidence of over-specification.

TABLE 3.2.1: Variables Entering into Discriminant Analysis of Self-Reported Curriculum (Vocational or General)^a for 12 Years Exactly Group (weighted results)

Variables	Sex-Race Group			
	Males White	Males Black	Females White	Females Black
SES Composite			9	-
Reading test score				
Math test score		+		
Number of semester courses in:				
English			+	
Ma n				
Science & F. Lang.	+			
Soc. St. & Fine Arts	+		+	
Industrial Arts				
Trade and Industry	-	-	-	
Commercial	-		-	-
Business			-	
Home Economics			+	
Agric. & Dist. Ed. & Health			-	+
R Square	.076	.170	.186	.145

^a In the analyses summarized here, curriculum was coded 1 for general and 0 for vocational. Thus pluses are used to indicate associations with participation in a general program and negative signs to indicate participation in a vocational program. Only variables entering the discriminant function at a statistically significant level ($p < .03$) are indicated in this table.

and (2) the occupational home economics subspecialty. Students enrolled in the consumer and homemaking education subspecialty, who were able to make the subtle distinction required by the definition of the home economics area provided, would probably have selected the general program in the survey form. The discrepancy also offers some support for the contention that many women take home economics courses without perceiving them as constituting their program of study (see Grasso and Shea, 1979a, p. 111).

Our discriminant analyses were limited to a representation of the vocational curriculum classification as a pooled total vocational group. Our cross-tabular results, however, suggest that better discrimination may be obtained if the analyses are conducted separately for business or office majors for males and females and T&I majors for males. A recent study offers evidence in support of a better discrimination being possible between general majors and business majors than that obtained with the total vocational group. Cook and Alexander (1980) used course transcript information in an attempt to discriminate among self-reported academic, general, business and other vocational curriculum groups. Their study is based on data from one of the cohorts (5th graders in 1961 who graduated in 1969) included in the Intellectual Growth and Vocational Development Study (the "Growth Study") conducted by ETS (see Hilton, 1971 and 1979).^{*} Cook and Alexander (1980) examined whether students in different curriculum tracks take core sets of distinct courses. Four curriculum groups based on student self-reports were used: academic, business, general, and what they refer to as "other." The other classification includes vocational, home economics, agriculture, industrial

^{*} At the time of the Growth Study a secondary school transcript of coursework was collected for this cohort, but these data were never coded as part of the original Growth Study. ETS recently shared these data with Dr. Karl Alexander, Johns Hopkins University, who as part of another study coded and linked them to the original Growth Study data set. An earlier discriminant analysis performed on this data set did not include the course information and was based on two curriculum criterion groups: academic and non-academic (Alexander, Cook & McDill, 1978; Alexander & McDill, 1976).

arts, or undecided as of junior high year in high school. Their analysis was limited to the data for nine schools representing three school districts, each of which was in a different state. The course information used as the basis of their discriminant analysis was categorized into 68 distinct subject matter areas. For example, courses that were pooled into a T&I or industrial arts category in the NLS-72 data, were retained in eleven distinct categories as follows: commercial art, general shop, industrial arts, drafting, woodworking, electricity and/or electronics, metal shop, auto shop, printing press, machine shop, and work experience (p.35). Their analysis within each of nine schools was based on any of the 68 categories, associated with at least a 1% enrollment in two different grade levels (p.44). This criterion resulted in an average of 20-25 course categories being included in each school-level discriminant analysis. Thus, their course information afforded an opportunity for detecting even greater variation in coursework between the general, business and other vocational groups than that allowed by the NLS-72 data, which are restricted to a maximum of fourteen content areas.

They were able, on the average, to correctly predict the curriculum of almost 80 percent of the eleventh graders from coursework taken in grades 9, 10 and 11. The centroids obtained from the school-level discriminant analyses identified which curriculum groups were distinguished most accurately by the discriminant function. The centroids showed that the academic and business tracks could be clearly differentiated from one another and that they were almost equally distant from

the general and other vocational tracks. The latter two groups in the majority of the school-level analyses were indistinguishable from one another. Cook and Alexander (1980) summarize their findings as follows:

Although four tracks were identified by students' [self] reports, in half of our schools only three distinct tracks could be distinguished through the patterning of coursework. In the majority of these cases the tracks identified were the Academic, the Business, and a residual General/Other category. In the other half of the schools, four tracks were isolated. In only two schools did the specialized Academic, Business, and Vocational/Other tracks emerge, with the General track being indistinguishable as a particular cluster of coursework. In most instances, therefore, the General track does not appear to be a core of wide-ranging courses upon which the various specialized curricula might build. Additionally, the frequent indistinguishability of the Vocational program leads us to suspect that its students are receiving less than their share of specialized preparation. (p.167)

One reason why their analyses may not have detected differences between the general group and the other vocational group is that their discriminant analysis was not performed separately by sex (or race for that matter). Sex and race were included as dichotomous variables in their analysis. Differences in T&I courses associated with males specializing in T&I were thus averaged out when pooled with females who take little, if any, T&I coursework.

3.3 Background and Test Score Differences Between Self-Reported Curriculum Groups at the Secondary Level

In the previous section we considered course differences associated with self-reported high school curriculum groups. In this section we review SES differences and test score or aptitude differences along the same lines. Of 52 local (non-national) studies reporting results for high school vocational students or graduates, included in the literature review by Mertens et al. (1980a), only 6 (12%) studies included any description of SES characteristics and 5 (10%), any description of test scores or aptitude. Thus, our examination of differences in SES and aptitude between high school general and vocational curriculum groups will be confined in this section to past studies based on national longitudinal data sets and our own reanalyses of three of these data sets.

Our reanalyses are based on the subpopulations of general and vocational participants with no postsecondary education as of selected time points out of high school. Under this general rubric we include both graduates (i.e., those with exactly 12 years of schooling) and early leavers (i.e., with 10-11 years of schooling). These groups will be the focus of our inquiry in Chapters 4 and 5.* In keeping with our general analytic framework, results will be reported by sex-race groups and by vocational specialty areas.

Both the NLS-72 and LME data sets included an SES composite variable.** The YA public use file released in December 1980 did not include an SES

* For description of these subpopulations see section 2.4 and Appendix A.

**The SES composite measure available in the LME data set is a weighted average of five components: level of education of (1) father, (2) mother, and, if appropriate, (3) oldest sibling; (4) father's occupation when respondent was age 14; and (5) an index of the availability of reading materials in the home at the time. A score was calculated for each respondent for whom at least three of the five measures were available (Grasso and Shea, 1979, p. 5). The precise rules used in the construction of this measure are provided in Kohen (1975, pp. 177-183). (continued)

composite. Other SES proxy variables available in the YA data set included mother's or father's education or occupation. An SES composite score provides a more reliable index than any one single proxy variable. Our assessments for the NLS-72 and LME samples are thus based on the SES composite; however, we did compare our findings based on the composite with those we would have reached if our assessment had been based on either mother's or father's education. We found that results based on mother's education corresponded more closely than those based on father's education with results based on the SES composite. Thus, to maximize comparability of analyses of different data sets, we used mother's education as an SES indicator for the YA data set, where no SES composite was available.

In past studies of curriculum groups, high school test scores have often been called aptitude measures. In a minor break with this tradition, however, we shall avoid the terms aptitude and ability for three simple reasons. First, such terms are sometimes used quite carelessly and are often misunderstood. We know, for example, of instances in which high school grades have been treated as measures of ability. Second, the differential use of the terms aptitude and achievement often has as much to do with how test results are used (e.g., to predict future events or to evaluate past ones) as with anything intrinsic to the tests or how they were constructed. Third, since we do not have time or space here to review the general literature on the

* (continued)

The SES composite measure available in the NLS-72 data set is based on five components: father's education, mother's education, parents' income, father's occupation, and household items as of the time of the baseyear survey in spring 1972 when the respondents were seniors in high school. (Levinsohn et al., 1978, p. 75)

aptitude/achievement distinction, nor to evaluate individually all of the instruments represented in the national longitudinal surveys under review, we will eschew both of the terms aptitude and achievement, and simply describe test score differences.

Test score data are available in the LME data set* and in the NLS-72 data set. The YA data set contains no test data. Reading and math tests were administered to the NLS-72 sample in the spring of their senior year in high school; as such they may reflect differential effects of curriculum programs on test scores, as well as test scores of students at exit from high school curriculum programs.

SES Differences. The largest SES differences among curriculum groups identified in past studies have been between the vocational (or general) curriculum and the academic curriculum. No evidence of large differences on SES between the general and vocational curriculum groups is provided by past studies based on national longitudinal data sets (e.g., Project

* The measure of "scholastic aptitude" available in the LME data set is based on pooled test score results reported by school officials in a special mail survey conducted by the Bureau of the Census in 1968. The most recent mental ability test scores were sought for the 4,007 young men in the LME sample (out of a total of 5,225) who had completed the 9th grade by the time of the 1966 baseyear survey and had signed a waiver form permitting the Census Bureau to request their scores (Kohen, 1973, p. 156). Scores were received for 3,375 of the 4,007 males (84.2%) and represented over 30 different tests of mental ability tests. The test scores reported apparently varied in time of administration by both grade level (i.e., ranging from grades 7-12) and year (i.e., ranging from 1954-1966). The reported test scores were combined into a single measure scaled in a fashion similar to intelligence tests, with a mean of 100 and a standard deviation of approximately 15 (Grasso and Shea, 1979, pp. 5-6). Kohen (1975, pp. 155-174) provides a detailed discussion of the conversion procedures and the results of studies conducted to assess the adequacy of the procedures.

TALENT: Evans and Galloway, 1973, pp. 29,33; YIT: Bachman, 1971, p.26; LME: Grasso and Shea, 1979b,pp. 171-172; NLS-72: Creech, 1974, pp. 92, 97, 110, 117). While differences are slight (and generally within the realm of sampling error), consistency of the differences across studies and across different SES proxy variables has been interpreted to indicate that vocational programs tend to draw youth from lower SES backgrounds than does the general program. Results have been reported generally for the pooled total vocational group, with the exception of the LME data in which commercial-business majors have been distinguished from other vocational programs. Also results have generally not been disaggregated by race.

One clear difference between most past studies summarized above and our own approach in this section should be noted. Our focus in the reanalyses reported in this section is the subpopulation of general and vocational early leavers and graduates with no postsecondary education represented in each of the NLS-72, LME and YA data sets. By restricting our attention to this subpopulation, we would expect that there might be less variation on SES shown in our reanalyses than in past studies that did not similarly restrict analysis populations. Our reanalyses do extend past studies since they allow examining whether past findings are generalizable to sex and race groups and different specialty areas. Also the results from the YA data set will provide a check on whether findings based on data collected in 1972 or earlier hold for data collected as recently as 1979. The only notable differences between programs identified by our reanalyses were for blacks and were between the general and business groups (Appendix

C-1, Tables C-1.1 ~ C-1.4). The SES backgrounds for white males and females were more or less equivalent between the general group and the vocational specialty areas. The NLS-72 and LME (entry year subpopulation) results indicate that black males graduating from a business program tend to come from a higher SES background than black males graduating from the general program. The discriminant analysis results reported in section 3.2 anticipated a similar result for black females. Recall that the discriminant analysis showed the SES composite score as discriminating significantly for black females between the general group and the total vocational group (see Table 3.2.1). The SES analyses show that this significance was due primarily to black females who graduated from the business specialty area. Black females who graduated from a business program tended to come from a higher SES background than those graduating from a general program (see Table C-1.1).

The findings based on mother's education from the YA data for high school graduates (with 12 years exactly) essentially support the findings for whites based on the older LME and NLS-72 data.* For both white males and females the distribution on mother's education is very similar between the general and vocational programs. The YA data also allowed looking at the distribution on mother's education for youth still in school who reported they were in a vocational or general program. While there is more variation between programs on mother's education for those still in school than found for high school graduates, the magnitude of any differences was less than 10% (Table C-1.3, 1.4).

* Because of insufficient sample sizes, results for the YA data set are restricted to white males and females (see Chapter 2, section 2.4).

For male early leavers there were only slight SES differences for each race between those who reported they had last participated in a high school general or vocational program (Table C-1.2, C-1.3). The results do, however, suggest large differences in SES between early leavers and high school graduates. While only about 25% of the high school graduates from a general or vocational program reported their mothers as not having completed high school, nearly 60% of the early leavers from either program reported such (Table C-1.3). The LME data indicate not so strong a difference between early leavers and high school graduates on SES background, but do suggest some variations may exist by race (Table C-1.2). Since insufficient sample sizes prohibited looking at blacks with the YA data, no firm conclusions regarding possible race interactions can be drawn.

Test Score Differences

Similar to the SES differences, the largest test score differences among curriculum groups found in past studies have been between the vocational (or general) curriculum and the academic curriculum. The proposition that students with the lowest test scores tend to participate in vocational programs appears to be founded more on differences characterizing particular localities rather than the overall average national picture. While it may be true in some schools that school staff have a tendency to steer poorer ability students into vocational programs, the data do not indicate that this tendency is characteristic of the majority of the nation's schools.

Previous results have usually been descriptive of whites and typically have been based on the pooled total vocational group. In general, the results of past studies suggest that males in the general curriculum tend to have slightly higher aptitude test scores than those in the pooled total

* Early leaver contrasts are restricted to M-W for YA and M-W and M-B for LME. The NLS-72 data set contains no early leavers.

vocational group but that females in the two curricula tend to be more equivalent (e.g., Project TALENT: Flanagan et al., 1964, p. E-2; LME: Grasso and Shea, 1979b, pp. 171-172). The LME results reported separately by business-commercial subgroup present a somewhat different picture for males. Differences between the general and business groups were characterized by a greater incidence of white males in the business group than the general group being in the middle test score range and less of them in the low or high range.

Our reanalyses of test data available in the LME and NLS-72 data sets indicate only slight differences between the general and vocational programs. The LME results (Table C-2.1) show the average test scores of males (white and black) graduating from general and vocational programs to be more or less equivalent.* The NLS-72 reading and math test results similarly indicate no substantial differences between the average scores of white or black males graduating from a general versus a vocational program (Table C-2.2).** The reading and math test results for females (Table C-2.2) also show no important differences between the general and vocational program graduates.

The LME results for early leavers are in agreement with the general findings for high school graduates: test score differences between early leavers from the general or vocational program are slight. Further the results suggest that early leavers, on the average, do not differ in test results from those of high school graduates (Table C-2.1).

* The test measure available in the LME data set was based on a standard score having a mean of 100 and a standard deviation of 15 for the total population. We used one-half a standard deviation as our criterion of an important difference.

**Our analyses of the NLS-72 reading and math test data are based on the standard score data, which have a mean of 50 and a standard deviation of 10 for the total population. Again we used one-half a standard deviation as our difference criterion.

3.4 Implications for Assessing Outcomes

In this section we draw implications from the findings reported in the first three sections of Chapter 3 for our assessment of outcomes associated with participation in secondary vocational education programs. Implications are discussed under six categories:

- focusing on vocational specialty areas
- comparing vocational subgroups and general program participants
- exercising caution in interpreting self-reports of vocational program participation
- distinguishing the commercial and industrial arts course areas from more conventional academic subject areas
- exercising extreme caution in interpreting race differences in outcomes associated with vocational education participation
- other implications for subsequent analyses.

Focusing on Vocational Specialty Areas. Perhaps the major implication of the data reviewed in this chapter is that it is necessary to focus on vocational specialty areas rather than trying to draw conclusions about vocational program participation in general. Results reported in section 3.2 indicated that when the total undifferentiated vocational group was compared with general program participants very few differences were apparent in the number of different courses taken, in either academic or vocational areas. Only when comparisons were based on vocational specialty areas were variations of more than one semester course apparent. These comparisons were made for the vocational specialty areas with the largest enrollments, that is business-office and T&I for males and business-office for females.* Business-office majors -- both males and females -- were found to take more business and commercial courses than general program participants, and male T&I participants were found to take more T&I and industrial arts coursework than general participants.

*Due to insufficient sample size, these comparisons could not be made for other occupational specialty areas.

Results of our discriminant analyses also indicated the necessity of focusing on vocational specialty areas rather than on vocational education as an undifferentiated aggregate; these results showed that coursework (and vocational coursework in particular) does not discriminate well between general and total vocational groups. Supporting evidence of a much better discrimination of transcript data being possible between the general group and vocational participants specializing in business was provided in a recent study by Cook and Alexander (1980).

Comparing Vocational Subgroups and General Program Participants

The second implication we draw is that, as we suspected initially, general-program participants provide a much better comparison group for vocational education participants than would academic or college preparator students. As noted in section 3.3, previous literature has shown that academic track participants can be distinguished from other curricula groups (including both general and vocational program participants) on a variety of background characteristics. However, in terms of the evidence reviewed in section 3.3, from a variety of national longitudinal data sets, general program and vocational participants are far more similar.

In general, differences in SES and test scores were found to be slight among high school graduates from the general program and vocational specialty areas. The only exception to this general conclusion was found for black females (and to a lesser extent black males) who graduated from a business program. Black graduates who self-reported they participated in a business program rather than a general program tend, on the average, to come from a higher SES background. These findings support our choice of the general

group as the appropriate comparison group (see Chapter 2, section 2.1) for vocational students. They also suggest the utility of our decision to examine results separately by sex and race as well as vocational specialty area.

The general finding of SES and test score similarity between general and vocational high school male graduates was found to hold also for early leavers. Differences in SES and test scores between male early leavers from a general or vocational program were slight. However, relatively large differences in SES were apparent between male early leavers and high school graduates from both programs.

Caution in Interpreting Self-Reports of Vocational Program Participation.

As noted in section 3.1, most previous studies of the effects of vocational education have relied simply on student self-reports as a means of identifying vocational participants. However, evidence reviewed in section 3.2 concerning discrepancies between self-reports and later follow-up questions and between self-reports and administrators' reports of participation in vocational education, clearly indicates that caution should be exercised in relying upon such self-reports as a means of identifying vocational participants. Moreover, the findings reported in section 3.2, concerning the relationship between self-reports of participation in vocational or general programs, substantiate the proposition that mere self-reports of vocational participation should not be taken as clear evidence of students having taken a substantially different pattern of coursework than general program students. In only one of eight vocational course areas, did self-reported general and overall vocational students show a difference of more than a single semester course out

of around 20 semester courses in the last three years of high school. Only when data were disaggregated into vocational specialty areas did more differences in vocational course-taking appear. Specifically,

- self-reported male business students (both white and black) averaged 1-2 semester courses more than general students in both business and commercial courses.
- white males self-reported as participants in T&I programs averaged 2 1/2 semester courses in T&I and one of industrial arts more than general students.
- Females, both white and black, self-reported as business-office program participants averaged 3 1/2 more semester courses in business and 3 to 3 1/2 more semester courses in commercial areas than general program females.

While these results clearly indicate the necessity of focusing on vocational specialty areas, they also indicate substantial caution must be used in interpreting self-reports of vocational specialty areas. Even when the course data were disaggregated by self-reported vocational specialty areas, vocational students were not found to have undertaken a substantially different program of coursework in high school than general program students, since 2-3 semester courses represent only 10-15% of the total semester coursework of students, on the average, in the last three years of high school (total semester coursework as noted in section 3.2 averaged in the range of 19-23).

In urging caution in the interpretation of self-reports of vocational participation as representing particular courses of high school study, we should note that some observers have suggested that this problem is not as severe as we view it. Commenting on the problem of curricular identification in using national survey data, Grasso and Shea (1979b, p.107) suggested the following:

On one hand, self-reported curriculum appears to be inappropriate for investigating effects of the program of study, as long as the program is conceived to signify the content of a series of courses. On the other, self-reports may be used as long as the program of study is conceived to signify the student's orientation to the high school experience. This latter conception is more compatible with the purposes of some types of basic research than it is for evaluation of effects of federal dollars expended for vocational education.

We wish to note explicitly that we eschew "this latter conception" for three reasons. First, we know of no research to suggest that self-reports of curricular participation represent any stable psychological orientation to the high school experience apart from the particular course-work undertaken. Second, the documented unreliability of student self-reports of curricular participation in surveys administered only a few months apart (e.g., U.S. Department of Commerce, 1979, p. 11; Suter, 1979) makes this interpretation seem implausible to us. Third, our purpose in this report is not to conduct a study of students' general orientation to the high school experience, but instead to investigate outcomes associated with participation in vocational education, defined, as noted in the introduction to Chapter 3, as "organized programs of instruction."

Given our skepticism about the meaning of self-reports of participation in vocational education, we should reiterate the reasons for still relying on this means of curricular identification in most of the analyses reported in subsequent chapters. First, self-reports were the only means of identification in two of the three national longitudinal data sets used in the re-analyses and have also been the dominant means of identification used in past research. Second, though the NLS-72 data contains three alternative

sources for a curriculum classification, the two sources other than the self-reported curriculum are not independent sources of information. The school administrator's classification of each student's curriculum program was based on a review of the transcript course data. In our reanalyses of the NLS-72 data set, we used the course data (i.e., semesters of coursework in specific academic and vocational subject areas) and the self-reported curriculum classification. We chose the self-report rather than the school administrator's classification, since it represents information independent of the course data and thus has greater potential for explaining variance in outcomes other than that explained by the course data.*

Distinguishing the Commercial and Industrial Arts Course Areas from More Conventional Academic Subject Areas. As part of our planned reanalyses, the NLS-72 course data were to be used in examining the relationship between the amount and type of vocational coursework and subsequent labor market outcomes. In planning how the course data should be represented in these reanalyses, we reviewed the only study then available (i.e., Wiley and Harnischfeger, 1980) in which the NLS-72 course information had been used in an attempt to estimate the effects of vocational education on labor market outcomes.** In the introduction to section 3.2, we described the eight course areas identified by SRIFQ4 (i.e., science, foreign languages, social studies, English, mathematics, industrial arts, commercial, fine arts, or performing arts) and the six course areas listed under SRIFQ5 (i.e., agricultural, business or commercial, distributive education, health occupations, home economics, trade or industrial occupations). The latter course areas were referred to

* We would have preferred to carry out our entire investigation using all three, but resources did not allow us to do so.

**Two other studies recently reported (Meyer, draft June 1981; Gustman and Steinmeier, rev. July 1981) are reviewed in section 4.11.

in SRIFQ5 as "vocational-technical" subjects. Wiley and Harischchfeger in their study treated all eight course areas listed under SRIFQ4 (including industrial arts and commercial courses) as "academic" coursework and the six listed under SRIFQ5 as "vocational" coursework. The coursework was represented in their analyses in the form of two grand totals: (1) the total number of hours taken of "academic" coursework (including commercial and industrial arts); and (2) the total number of hours taken of "vocational" coursework (restricted to the six course areas listed under SRIFQ5). Putnam and Chismore (1970) were referenced as providing the rationale for this grouping strategy.

In planning our reanalyses, we questioned the appropriateness of counting industrial arts and commercial subject areas as academic coursework. When we referred to Putnam and Chismore (1970), we found that each of the courses listed under the "business" category has a cross-reference to a comparable course under the "office" or "distributive education" categories. Similarly, many of the courses listed by Putnam and Chismore under the "industrial arts" category have cross-references to courses listed under the "trade and industrial" or "technical" category. We learned from NCES that the NLS-72 School Report Information Form (SRIF) completed by school administrators did not contain any special instructions to assist administrators in making a discrimination between which courses should be classified as "commercial" under SRIFQ4 and which should be classified as "business and commercial" under SRIFQ5, or which should be classified as "industrial arts" under SRIFQ4 or as "trade or industrial" under SRIFQ5. We also were concerned at the planning stage that combining the coursework reported for fourteen subject areas

into two totals might conceal important relations. Since the primary purpose motivating the use of course data instead of a broader curriculum classification (e.g., vocational or general) was to provide a better indicator of the "organized program of study," it seemed that representation of the organized program would require exploiting more of the fourteen categories of course information available. Thus in the preliminary analyses we performed which were reported in section 3.2, we retained ten of the fourteen categories as separate entities and collapsed four into two further categories, namely: (1) science and foreign language; and (2) social studies and fine arts.

One clear implication we drew from the results of these preliminary analyses, which were reported in section 3.2, was that students (both males and females) who report themselves as enrolled in a business-office program averaged as many semesters of courses more than general students in the "commercial" category (SRIFQ4) as in the "business or commercial" category (SRIFQ5). Further, males who reported they were enrolled in a T&I program averaged more semesters than general students both in courses in the "industrial arts" category (SRIFQ4) and in the "trade or industrial" category (SRIFQ5). We thus concluded that in examining relations of the amount and type of coursework in vocational education with subsequent labor market outcomes, coursework in the commercial (or office) and industrial arts areas should be treated as vocational coursework or, at the least, should be represented in the analyses in a way that would allow their relationship to be distinguishable from that of the other more conventional academic areas identified by SRIFQ4.

Extreme Caution in Interpreting Race Differences The final implication we draw from the preceding sections in this chapter is that extreme caution must be exercised in interpreting race differences with regard to vocational education. As noted in numerous places in section 3.1, the relationships between alternative identifications of vocational participation were often quite different for blacks and whites. Even when attention was restricted to only those designated as vocational participants by both student self-report and administrator report, it was found that there was 18% disagreement on vocational specialty area for white males, but 31% disagreement on vocational specialty area for black males. Racial differences were also apparent in the relationships between self-reports and coursework discussed in section 3.2, particularly for males. Differences in coursework between those in vocational specialty areas and general programs were quite consistently greater for white males than for black males. White males reporting they were in a business program averaged 2 semester courses or more than general students in both business and commercial courses, but black males reporting they were in the business specialty area averaged only one more course than general students in such courses. Such differences were less pronounced for females, but the general pattern seemed to hold quite consistently that more courses were found to differentiate between general and vocational graduates for whites than for blacks. Why this is so is unclear, though we can think of a number of hypotheses which we simply do not have the resources or data to test. Nevertheless the implications for estimating outcomes associated with participation in vocational education based on self-reports are clear: if one is interested in vocational education defined as an organized program of

instruction or coursework, extreme caution must be exercised in interpreting results based on self-reports for blacks versus whites, because the relationship between self-reports of vocational participation and vocational courses taken appears to be different for blacks than for whites.

Other Implications for Reanalyses. We have concluded from findings reported in this chapter that past investigations of outcomes associated with participation in a high school vocational program have been flawed in at least two important ways. First they have generally been based on a self-reported curriculum classification in which all students in any vocational specialty area have been pooled into one total group. Second, with the single exception of the NLS-72 data set, national longitudinal data sets have not included course information which would allow describing participation in terms of the amount and type of vocational education courses taken. Research based on these data has had to rely in effect on a single criterion -- the self-report of the curriculum. Although the NLS-72 data set offers alternate sources of curriculum classification, relatively little use has been made of them. The NLS-72 school administrator curriculum classification has been used in only a few studies (e.g., Wiley and Harnischfeger, 1980; Lewin-Epstein, 1979); and only one researcher (Lewin-Epstein, 1979) considered whether findings would change if the self-reported curriculum classification rather than the school administrator classification had been used. Further, while the course information available in the NLS-72 data set has been associated with later outcomes in one study (Wiley and Harnischfeger, 1980), this study, in relating the coursework to outcomes, used only the total amount of

vocational coursework rather than the amounts in different types of vocational content areas, and excluded coursework in the commercial and industrial arts areas from the vocational coursework total.*

Thus, our reanalyses of the NLS-72 data set will attempt to exploit the alternative sources of curriculum identification available in the NLS-72 more than has been done in the past. The vocational curriculum will be represented by three classifications for each sex as follows:

<u>Males</u>	<u>Females</u>
1. Business**	1. Business-office**
2. T&I	2. Home Economics
3. Other vocational	3. Other vocational

Regression analyses will incorporate both the amount and type of coursework taken by the general group and the three vocational subgroups for each sex.

The same vocational subgroup classifications used in the NLS-72 reanalyses will be used for the YA data set. Since the LME survey only included two alternative classifications for the vocational students (commercial-business or vocational), our reanalyses of the LME data set will be based on these two categories. Since neither of these data sets includes course information, our analyses for the LME and YA data sets will be restricted to descriptive cross-tabulations. Regression analyses will be confined to the NLS-72 data set which, because of the course information it contains, offers the greatest possibility of relating outcomes to a more accurate specification of the program of study taken by survey respondents.

* Two very recent studies also utilize the NLS-72 course data: Meyer, June 1981 (draft); Gustman and Steinmeier, July 1981 (rev.). These studies are briefly reviewed in section 4.11.

**We should note that the NLS-72 program choice was "business or office" and the LME program choice was business or commercial. In previous literature, these three terms (business, office, and commercial) appear to have been used somewhat interchangeably, but given no clear and consistent distinction among these terms in previous literature and in data sets reanalyzed, we will generally use the term "business" for male, and "business-commercial" or "business-office" for females, unless a specific referent suggests otherwise.

CHAPTER 4. GAINFUL EMPLOYMENT OUTCOMES ASSOCIATED WITH PARTICIPATION IN SECONDARY EDUCATION PROGRAMS

The primary purpose of secondary school vocational programs, since the passage of the first Vocational Education Act in 1917 (Smith-Hughes Act of 1917) through the Vocational Education Amendments of 1968, has been to prepare individuals for gainful* employment as semiskilled or skilled workers or technicians in recognized occupations.** Among the indicators of gainful employment that will be examined in this chapter are: employment status; number of weeks of unemployment in past year; number of hours worked weekly; number of weeks of employment in past year; earnings; occupational level and status; job satisfaction; and the incidence of self-employment. We also examine indicators of two criteria for evaluating the effectiveness of vocational programs explicitly mentioned in the Education Amendments of 1976, namely, employment in entry-level jobs related to high school training and employers' opinion that students are well trained and prepared for employment.

Before summarizing findings concerning these outcomes, an introduction to two methodological problems is needed. Two major sources of potential

* The term "useful employment" was originally used in the Smith-Hughes Act of 1917 (Sections 10,11), This became "gainful employment" in the Vocational Education Act of 1963 and 1968 Amendments. In the Education Amendments of 1976 the term used was "paid or unpaid" employment. The modification in the 1976 definition ("gainful" to "paid or unpaid") was intended to clearly encompass the two subspecialties in the home economics vocational specialty area. While the occupational home economics subspecialty provides preparation leading to gainful or paid employment, the consumer and homemaking education subspecialty provides preparation for the unpaid role of homemaker. It should also be noted that in addition to preparing individuals for paid or unpaid employment, secondary vocational education programs also aim at preparing individuals for postsecondary vocational education. In this chapter, however, since we focus mainly on individuals with no postsecondary education this intended goal of secondary vocational education is not a prominent issue.

** Any programs fitting individuals for employment in occupations generally considered professional or as requiring a baccalaureate or higher degree are excluded.

variation in the results reported from different studies are:

- Differences in definition of labor force status; and
- Differences in populations described.

Such differences will be discussed in the first two parts of this introduction to Chapter 4, and the third part will provide an overview of the organization used in the remainder of the chapter in presenting findings. The overview describes the general strategies followed in conducting reanalyses of national longitudinal data sets, as well as the conventions used in presenting the results.

Defining Labor Force Status. A basic concept underlying all employment indicators is labor force status -- whether an individual is "in the labor force" or is "not in the labor force." Two of the indicators we examine in section 4.1 are directly derived from the labor force classification; namely, labor force participation rate (LFPR) and unemployment rate. In this section we will describe the standard Federal criteria for labor force classification, the bases of the classification in our reanalyses, and how the bases used in past studies may vary from standard practices.

The most widely publicized labor force statistics are reported monthly by the Bureau of Labor Statistics of the U.S. Department of Labor. Table 4.0.1 describes the classification criteria used by the Department of Labor in classifying persons as "in" or "not in" the civilian, noninstitutional labor force during a particular reference period. The population on which this classification is based is defined as all civilians 16 years* or over

* All persons 14 and over are actually surveyed. However, since 1967, data for 14- and 15-year-olds have been excluded from the total count and have been published separately (Werneke, 1979).

who are not inmates of institutions. We wish to note that Table 4.0.1 contains the most precise statement of the classification criteria we were able to identify by synthesizing general descriptions available from several sources (e.g., Dorfman and Ferrara, 1975; National Commission on Employment and Unemployment Statistics, 1979; U.S. Department of Commerce, 1979; Werneke, 1979).

The Bureau of the Census and the Bureau of Labor Statistics routinely calculate two statistics based on these criteria,* namely:

- Labor force participation rate (LFPR) - ratio of the number in the labor force (both employed and unemployed) to the total population (those both in and out of the labor force); and
- Unemployment rate - ratio of number unemployed in the labor force to the total number in the labor force (both employed and unemployed). Those classified as out of the labor force are excluded from this calculation.

Since the labor force statistics reported by the Department of Labor are based on the Current Population Survey (CPS) conducted by the Bureau of the Census, the procedures for classifying persons as in or out of the labor force using these criteria are commonly referred to as "CPS estimation procedures." The standard questions included in the CPS interviews

* It should be noted that these criteria are not without weaknesses. In criticizing these current criteria, for example, the National Commission on Employment and Unemployment Statistics (1979) recommended several changes in the definition of those counted as in or out of the labor force. At present, however, the labor force definitions above, are the ones used by the two Bureaus since revisions made in 1967. These revisions were based on recommendations made by the Gordon Committee in 1962. Thus, despite shortcomings, it likely will be some time before the recommendations of the 1979 national commission will result in revisions, if any, in the present definitions.

TABLE 4.0.1: Description of Criteria Used in Classifying Labor Force Status Used by Department of Labor and Bureau of the Census.

Category	Labor Force Status	Classification Criteria
1 (a)	In the labor force - employed	All those who did any work at all as paid employees or in their own business or profession, or on their own farm, or who worked 15 hours or more as unpaid workers on a farm, or in a business operated by a member of the family; and
1 (b)	In the labor force - employed but temporarily not working during the reference week.	All those who were not working but who had jobs or businesses from which they were temporarily absent because of illness, bad weather, vacation, or labor-management dispute, or because they were taking time off for personal reasons whether or not they were paid by their employers for time off, and whether or not they were seeking other jobs.
2 (a)	In the labor force - unemployed	All those who had no employment but were available for work and had engaged in any specific jobseeking activity <u>within the past 4 weeks</u> , such as registering at a public or private employment office, meeting with prospective employers, checking with friends or relatives, placing or answering advertisements, writing letters of application, or being on a union or professional register; or
2 (b)	In the labor force - unemployed	All those who had no employment but were waiting to be called back to a job from which they had been laid off; or
2 (c)	In the labor force - unemployed	All those who had no employment but were waiting to report to a new wage or salary job within 30 days.

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TABLE 4.0.1 (cont.)

Category	Labor Force Status
3	<p>Not in the labor force - those persons 16 years or older not in the civilian labor force for the following reasons:</p> <ul style="list-style-type: none"> a) persons in the military service; b) persons whose major activity was school attendance; c) persons engaged only in own home housework; d) persons unable to work because of family responsibilities or because of long-term physical or mental illness or disability; e) persons who are retired or too old to work; f) seasonal workers for whom the reference week fell in an off season; g) persons doing only unpaid family farm or business work who worked less than 15 hours; h) persons who are voluntarily idle; and i) discouraged workers.^a

a. Discouraged workers are defined currently as persons of working age 16 years and over, who want a job but did not actively seek work in the four weeks prior to the survey because they believed no suitable work was available. A worker is classified as discouraged if reasons for not looking for work are: (a) believes no work available in line of work or area; (b) could not find any work; (c) lacks necessary schooling, training, skills, or experience; (d) employers think too young or old; or (e) other personal handicap (such as employer discrimination) in finding a job.

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which form the major basis for the labor force classification are listed in Table 4.0.2. In situations where a person is engaged in more than one of the categories identified in Table 4.0.1, the "in-the-labor force" activities take precedence over the "out-of-the-labor-force" activities (Werneke, 1979).

Two of the three data sets on which our reanalyses are based had labor force classifications already available on the public use files.* These data sets were the LME and YA public use files prepared by the Ohio Center for Human Resources Research. These data sets were prepared under contracts to the Department of Labor. The data collection efforts in both instances included the standard set of questions used in the CPS interviews (see Table 4.0.2). In addition, CPS procedures were followed in deriving the labor force classifications. The YA and LME classifications do vary somewhat from the CPS procedures in that a standard reference week was not employed.**

Unlike the LME and YA data sets which were prepared under the auspices of the Department of Labor, the NLS-72 data collection efforts and public

* The LME public use tape file contained a "recoded" labor force status classification for survey years 1966, 1967, 1968, 1969, 1970, 1975, and 1976, coded as follows: (1) employed, in labor force; (2) unemployed, in labor force; and (3) out of labor force. Telephone interviews were used in survey years 1971 and 1975. A "recoded" labor force status classification was not provided for these years; an activity state classification for the survey week was provided, as follows: (1) working; (2) with a job but not at work; (3) looking for work or on lay off; (4) going to school; (5) not used; (6) unable to work; (7) other. For our reanalyses categories (1) and (2) were classified as "employed, in labor force"; category 3, "unemployed, in labor force"; and categories 4, 6, and 7, "out of labor force." Tables A-2.8-10 in Appendix A indicate what percent of the labor force classification for each time point was based on survey years 1971 and 1975.

**In the YA survey the reference period was "last week" or the week preceding the interview week. Since YA interviews were conducted from late January through August '79, there is a potential 8-month variation in the reference week. The LME survey for the young male cohort also uses "last week" as the reference period; interviews began in October and usually extended over a two- to three-month period (Center for Human Resource Research, 1979).

TABLE 4.0.2: Major Set of Questions Included in CPS Interviews for Purposes of Classifying Labor Force Status

The interview questions are designed carefully to elicit the most accurate picture of each person's labor force activities. The major questions that determine one's employment status are:

1. What was _____ doing most of last week -- working, keeping house, going to school -- or something else?

For everyone not working and not reported unable to work because of a physical or mental disability, the next question is:

2. Did _____ do any work at all last week, not counting work around the house?

For those who say no, the next question is:

3. Did _____ have a job or business from which _____ was temporarily absent or on layoff last week?

For those who say yes, the next question is:

4. Why was _____ absent from work last week?

If the response to this question indicates that the person is waiting for a new job to begin within 30 days or awaiting recall from layoff, he is counted as unemployed.

For those who were reported as having no job or business from which they were absent, the next question is:

5. Has _____ been looking for work during the last 4 weeks?

For those who say yes, the next question is:

6. What has _____ been doing during the last 4 weeks to find work?

If a specific activity, such as applying directly to an employer, placing or answering ads, registering with either a public or private employment agency, being on a union or professional roll, or checking with friends and relatives, is mentioned, the following question is asked:

7. Is there any reason why _____ could not take a job last week?

If there is no reason except temporary illness that the person could not take a job, he is considered to be not only looking but also available for work, and he is counted as unemployed.

Source: U.S. Department of Labor, Bureau of Labor Statistics. How the Government measures unemployment. In D. Werneke, Ed., Counting the Labor Force: Readings in Labor Force Statistics. Appendix Volume III. Washington, D.C.: National Commission on Employment and Unemployment Statistics, December 1979. Reprinted from Report 505, U.S. Department of Labor, Bureau of Labor Statistics, 1977.

use file preparation were designed and carried out by educational researchers and psychologists under contract with the National Center for Education Statistics. The NLS-72 follow-up surveys did not include the standard sequence of questions included in CPS interviews (see Table 4.0.2), and no labor force status classification was available on the public use file. Therefore for purposes of our reanalyses of the NLS-72 data set, it was necessary to derive the best approximation to the CPS labor force status classification (see Table 4.0.1), as permitted by the data available in the NLS-72 data set.

This task made us aware of how extremely difficult it is to duplicate CPS classification procedures without having an exact replication of the CPS questions used in the CPS interviews (see Table 4.0.2) in determining labor force participation and employment status. There is simply no comparable information in the NLS-72 data for some categories of information in Table 4.0.1. Specifically, the NLS-72 data contains no information to allow clear identification of persons as temporarily absent from work during the reference week for the reasons specified in the CPS criteria (category 1 (b)). Also in the NLS-72 data there was only partial information available to determine whether a person should be classified as unemployed (category 2). In using NLS-72 data, our classification of a person as in the labor force and unemployed (category 2 (a)) thus was confined to the criteria that the person was not employed in the reference week and had

looked for work in the four-week period preceding the reference week.*

In summary, in using NLS-72 data we were able to approximate CPS definitions of those in the labor force and employed who fell into category 1 (a) and those out of the labor force (CPS category 3).** In our classification of those unemployed and in the labor force (CPS category 2), we were restricted to the criteria that individuals had not worked and had looked for work within a 4-week period around the reference week. Our classification of those in the labor force and employed, but temporarily not working during the reference week (category 1 (b)) was based on an NLS-72 question that identified those temporarily laid off (though it also included those waiting to report to work).

Thus, for the two labor force statistics (namely, LFPR and unemployment rates) reported in our reanalyses summaries, our overall assessment is that the LME results are most comparable to those reported by the Department of

* In contrast, the CPS criteria require not only that the person report that he or she has looked for work but that he or she has actually engaged in certain specified job-seeking activities (see Category 2 (a)). One question was included in the NLS-72 data set that appeared to include persons who could fall in Categories 2 (b) or (c) or even Category 1 (b); specifically, it asked respondents whether they had not worked during the reference period because they were "on temporary layoff from work or waiting to report to work." For category 1 (b) the CPS procedures differentiate between those laid off indefinitely and those laid off temporarily with a report-back date within 30 days. Information was not available to make such fine distinctions with the NLS-72 data.

** While we believe we were able to classify relatively accurately as "out of the labor force," we would not have been as accurate if the classification required disaggregation to the reason why. There were several subcategories within the "out of labor force" category that would have been difficult to classify exactly with the NLS-72 data. For example, it would be difficult to distinguish between a person who was a discouraged worker or one who was voluntarily idle. Also there was no information that would allow classifying a person as out of the labor force because he was a seasonal worker for whom the reference week fell in an off season.

Labor based on CPS data. The YA results are less comparable than the LME results because they contain a potential 8-month variance in reference week which served as a base for calculating labor force statistics.* We are least confident of those derived for the NLS-72 data because of the lack of comparable information for all the criteria utilized in the CPS procedures.

As to previous research concerning labor force status summarized in our review of local and national studies, again we are most confident of results reported on the LME and YA data sets. In the few cases that LFPR or unemployment rates have been reported in other past research, we suspect that such data have typically been derived on the basis of a single activity state question rather than on the basis of the CPS procedures being applied to several questions (e.g., Mertens et al., 1980a, pp. 35-36).**

This problem is potentially quite severe, since estimates based on single activity state questions can differ substantially from those based on CPS procedures. The severity of this problem can be illustrated as follows. All the national longitudinal data collections, contain a question similar to the first one in the CPS interview (see Table 4.0.2), asking the respondent to indicate what he or she was "doing most of last week" (or some specific reference week such as the first week in October). The options provided or responses coded by interviewers include: working, keeping house, going to school, with a job but not at work, looking for work, unable to work. Since the YA data set included not only the coded responses to this single activity state question but also to all the questions included in the

* The potential variation for LME results for young males never exceeded three months

** Before gaining access to the NLS-72 public use tape file, we ourselves had used existing tabulations of responses to single activity state questions (e.g., Peng and Holt, 1977, pp 47-47; Peng et al., 1978, pp 61-64) to estimate labor force status and unemployment rates for NLS-72.

CPS standard set of questions, we were able to use the YA data to assess the extent to which labor force statistics derived from such a single activity state question would vary from those based on the CPS procedures. For replication purposes, we based this comparison on a population for which YA results had previously been reported (i.e., Table 2.1, Borus et al., 1980, p. 16). Borus et al. reported the unemployment rates by sex and race for a population defined as youth between the ages 16 to 21 on the interview date who were interviewed before June 1979 (see footnote 1, page 15, Borus et al., 1980). The first two columns of Table 4.0.3 show the unemployment rates derived using CPS procedures: the first as reported by Borus et al., and the second as replicated by ourselves. They vary only slightly due to differences in the total weighted N we obtained using the population definition described by Borus et al.* In contrast the third column reports labor force classification results derived from the single activity state question (Section 8, item 1, YA baseyear interview). In all cases, the single activity state classification leads to a much lower unemployment rate. The differences in classification, based on the single activity state question and on multiple responses classified according to the CPS procedures, vary considerably by sex and racial group. The underestimation of unemployment is greater for females in each of the race groups; it is also greater for blacks than for either whites or Hispanics.

* The difference in the total weighted N was slight. Our total was 24,336,620 versus their reported total of 24,570,000. Our replication is thus highly similar to Borus et al.'s results, showing a difference in total weighted N of less than one percent and in unemployment rates by no more than one-half percent for any subgroup. The exact causes for minor differences between our replication and Borus et al.'s original results are unclear. In part they may be due to rounding and in part to minor differences in population definition. In defining the 16-21 age population, for example, we relied on birth year and month while Borus et al. may have included day in defining the 16-21 age population.

TABLE 4.0.3: Comparisons of Unemployment Rates Based on Single Activity State Question Versus Those Based on CPS Estimation Procedures for Fixed Universe of NLS-YA Respondents.

Sex-Race	Borus Results ^a CPS Procedures	Huron Replication ^b Borus Results-CPS Procedures	Huron Results ^c Single Activity State Questions	Difference Between Col. (2)-(3)
	(1)	(2)	(3)	(4)
<u>BLACK</u>				
Total	38.8	39.0	16.2	22.8
Female	41.1	41.6	15.8	25.8
Male	36.7	36.6	16.5	20.1
<u>HISPANIC</u>				
Total	22.9	23.2	9.5	13.7
Female	24.6	24.8	8.6	16.2
Male	21.7	21.9	10.2	11.7
<u>WHITE</u>				
Total	16.1	16.0	4.6	11.4
Female	18.1	17.4	4.1	13.3
Male	14.3	14.7	5.1	9.6
<u>TOTAL</u>				
Total	19.3	19.3	6.2	13.1
Female	21.2	20.7	5.5	15.2
Male	17.5	17.9	6.7	11.2

a. Results reported in Table 2.1, Borus et al., 1980, p. 16. Defined universe (N=24,570,000) was civilians age 16-21 on interview date. Any interviewed after May, 1979 were excluded.

b. Huron replicated analyses reported by Borus et al. using YA public use tape file and universe definition provided. (N=24,336,620)

c. Huron results on same universe (N=24,336,620) when single activity state responses (Section 8, Item 1) were used as the basis of the labor force classification.

The differences in unemployment rates derived from the two procedures were due primarily to differential treatment of respondents in two activity state categories: going to school or keeping house. The CPS procedures reclassified any who were going to school as employed if they reported they were also working or as unemployed if they reported they were looking for work. This was also true for those who had indicated their major activity to be keeping house in the reference week.

From other evidence, it is clear that the going-to-school category can be a major source of variation in LFPR and unemployment rates for other reasons, even when CPS procedures are used. In a comparison of the LFPR and unemployment rates derived from the YA data and those derived from CPS data for March, 1979 for a population of civilians age 16-21, Borus et al. (1980, pp. 33-35) found that the YA data yielded overall higher LFPR's for youth whose major activity was school during the survey week. The differentials in rates between the two surveys indicate that the CPS classified more people in school and thus out of the labor force than was true for the YA. This also led to a lower unemployment rate for the CPS than for the YA. Since the same set of questions had been used to calculate standard CPS rates for both surveys, it appears the differential derived not from the questions asked or from the algorithm used to calculate rates, but from the type of respondents interviewed. The YA survey was based directly on interviews with the youth aged 16-21 themselves, while CPS data on youth aged 16-21 are usually obtained from the head of household (or parent).

Whatever the exact cause behind this problem (namely artificial differences in the calculation of LFPR and unemployed rates for youths enrolled in school), we should note that it is not relevant to the results of our reanalyses reported in Chapter 4. In the reanalyses for this chapter, we

focus exclusively on youth with exactly 12 years of schooling (and for LME and YA data early leavers) thus excluding any NLS-72 respondents who subsequent to graduation indicated that school attendance was their major activity during the reference week.

Our overall assessment of these considerations is that LFPR and unemployment findings based on a single activity state question should be interpreted very cautiously. Thus, estimates of LFPR and unemployment rates based on CPS procedures will be given more credence in our review of research findings on these outcomes.

Differences in Population Described. Past studies of employment outcomes associated with participation in secondary vocational education programs vary greatly in definition of the population for which pertinent results are reported. With the exception of some analyses reported by Grasso and Shea (1979b) and more recently by Gustman and Steinmeier (1981), in which populations were restricted to those with exactly 12 years of schooling and not enrolled in the specific reference period examined, past results have usually been based on a population that includes high school graduates with varying amounts of postsecondary education. Since past research findings typically cover the years immediately following high school completion, the study populations often appear to include youth who are enrolled in postsecondary institutions. As noted above, labor force participation rates can be affected substantially by the number and percentages of youth pursuing postsecondary schooling. Earnings and other employment indicators can also be expected to vary due to differences in the educational levels completed by members of the population described. In the reanalyses reported in this chapter, we thus restrict attention to the population of those with exactly 12 years of

schooling (that is, with no postsecondary schooling as of 4 or 10 years out of high school) and for the LME and YA data sets only, early leavers (that is, those who completed less than 12 years of schooling).

In the case of employment indicators (e.g., earnings), there is a further potential source of variation in the population definition. Once the labor force status and unemployment statistics have been derived, for the sake of clarity the population used in studying other employment outcomes should be restricted to those in the labor force (either employed or unemployed) or those in the labor force and employed as of the reference week. We used such population restrictions in our reanalyses, and we believe them generally to have been used in past research. However, in some studies it was not always made clear whether such restrictions had been imposed; in some cases we had to use indirect evidence to assess whether such criteria had been imposed.*

Organization of Findings. In the remainder of Chapter 4, we present our review of evidence concerning eight types of gainful employment outcomes associated with participation in secondary vocational education programs. Each section covers one type of outcome and draws on three types of evidence: namely (1) previous non-national (i.e. local and state) studies; (2) previous national data; and (3) results of our own reanalyses of national longitudinal data sets. Evidence concerning non-national studies is drawn partly from Mertens et al. (1980a), a report of a subcontract to the current study (most of which is repeated in Mertens et al. 1980b) and partly

* For example, individuals with zero earnings were included in earning breakdowns reported by Conroy (1979). This would seem to indicate that such data included people not employed.

on our own review of previous non-national studies. Our review of data from previous national studies is restricted initially to descriptive analyses and excludes previous regression analyses concerning vocational education. Our reasons for this are two: First, many of our own reanalyses have taken the form of descriptive cross-tabular analyses; second, several aspects of previous regression analyses concerning outcomes associated with participation in vocational education can be explained more easily after we have first explained our own regression analyses.

Our own reanalyses employed three national longitudinal data sets, as described in Chapter 2, namely, the National Longitudinal Study of the High School Class of 1972 (NLS-72); the National Longitudinal Study of Labor Market Experiences of Young Males (LME); and the National Longitudinal Study of Young Americans (YA). In this chapter, we focus mainly on individuals with twelve years of schooling exactly, that is, on high school graduates with no postsecondary schooling as of four or ten years after high school graduation. The only exception to this primary focus of attention in Chapter 4 is that for white males we also review data concerning early leavers; that is, those with less than twelve years of schooling, as identified in the LME and YA data sets. Sample sizes for early leavers of other sex-race groups were too small to warrant analysis.

Descriptive Analyses. Reanalyses of all three data sets encompass descriptive cross-tabulations by high school curriculum: general, business and trades and industry vocational specialty areas for males; and commercial for females; and the remaining vocational specialty areas for each sex combined into a category referred to as either "rest" or "other" vocational. The trades and industry (T&I) specialty was not identified in the LME data set. Thus

the "rest" vocational category includes different types of individuals for the different data sets (e.g. for the LME data set, it includes males specializing in T&I, whereas for others it does not). For both the NLS-72 and YA data sets, results for females exclude females in the home economics vocational specialty areas since this area does not in the main aim at preparing individuals for gainful or paid employment.

Results for our descriptive analyses are presented simply in the form of percentages, proportions or averages. Sample sizes have been excluded from descriptive result presentations for two reasons. First, descriptive results are based on weighted averages of samples of individuals actually surveyed so as to provide a nationally representative picture of results. Presentation of weighted sample sizes would have provided an inaccurate characterization of individuals actually surveyed of each sex-race high school curriculum group. Second, since actual sample sizes represented in each of the sex-race-curriculum specialty areas are presented in Appendix A, it is easier for the sake of descriptive presentation of results to avoid repeating sample sizes in each table of results. Results are omitted for any subgroup or time point for which sample size was less than 20.

Finally, we should offer an explanation as to why our reanalyses focus so heavily on descriptive cross-tabulations rather than on more complex multivariate analyses. First, we are of the school of data analysis which holds that thorough description of data should precede multivariate analyses. Second, there are at least eight dimensions on which outcome results might usefully be compared -- by high school curriculum area, by particular outcome measure, by number of years after high school graduation, by sex, by

race, by year, by data set, and by high school graduation versus early leaving. Cross-tabular descriptive results seemed to us to be the most efficient way of presenting results which would allow both the reader and ourselves to make comparisons along several of these dimensions.

Cohort time points for which descriptive results are generally presented are as follows:

	<u>Males</u>	<u>Females</u>
LME	Entry	--
	Year 4	--
	Year 10	--
YA	Ages 18-19	Ages 18-19
	Ages 20-22	Ages 20-22
NLS-72	Entry	Entry
	Year 1	Year 1
	Year 4	Year 4

The main exceptions to this general pattern for presenting descriptive results are: (1) YA data are not presented for blacks because their number when disaggregated by age group and curriculum area were too small to warrant analyses; and (2) data regarding certain outcome variables are not presented when there was no relevant variable for a particular data set.

Cohort time point represents years after high school graduation (actual or for early leavers, years after cohort graduation year). Descriptive results for the different data sets have been organized so as to represent a rough progression from entry level occupational outcomes to outcomes ten years after high school (for LME males only).

Regression Analyses. Regression analyses were performed exclusively on the NLS-72 data set. There are three reasons for this focus of the regression analyses. First, NLS-72 was the only data set for which we had sufficient sample sizes for all four sex-race groups (white males, white females, black males, and black females) to allow regression analyses. Second, the NLS-72 data set is the only one available which has course transcript information to allow us to examine directly the meaning of self-reports of high school curriculum in terms of actual pattern of course taken. Third, given the intent of this study to examine outcomes associated with both secondary and postsecondary vocational education programs, NLS-72 is the only data set that has a sufficient sample size to allow examining both educational levels. Thus, for comparability purposes the regression reanalyses of secondary outcomes in Chapters 4 and 5, and the regression reanalyses of postsecondary outcomes in later chapters will be based on the NLS-72 data set.

Our general strategy in regression analyses was to focus on curriculum contrasts between general program graduates and vocational specialty graduates. Specifically the contrasts employed were: for males T&I contrasted to general, and business to general, and for females commercial contrasted to general. We also included a residual "other vocational" category contrasted to general, but note that interpretation of the meaning of results for the residual other vocational category is problematical because it includes a variety of vocational specialties, and is different for males

and females. We first examine the difference between the groups contrasted without any adjustment (what may be called the raw contrast, and which may be derived directly from the NLS-72 descriptive results). Second, we examine results for regression analyses which adjust for individual SES. As noted in Chapter 3, for at least some sex-race groups (e.g., black females) there were substantial average SES differences in individuals in different curriculum groups.*

In addition to the basic SES adjusted regression analyses, we also conducted three other sets of regression analyses for each sex-race group for most outcome variables studied in the NLS-72 data set. The first set of supplementary regression analyses used six school and community contextual variables which might have affected gainful employment outcomes associated with participation in secondary vocational programs. These six variables were:

- Average hours of work outside school while a senior in high school.
- Percent of vocational enrollment in high school attended in senior year.

* It should be noted that we did not enter test scores in any of the regressions described in this chapter. We avoided using test scores as an adjustment variable in assessing gainful employment outcomes for two reasons. First, twelfth grade test scores themselves may to some extent be outcomes of the high school curriculum. To the extent this is so, adjusting for test scores would implicitly have meant adjusting for differences in outcomes associated with participation in secondary vocational programs. Second, since we are conducting a separate analyses of test score changes associated with participation in different secondary programs, we decided it would be best to avoid using test scores as adjustment variables in gainful employment outcome analyses, before conducting separate test score analyses. Also, we should note that as recounted in chapter 3, average grade 12 test scores are not substantially different between general and vocational curriculum groups anyway.

- Residence in South while attending high school.
- Size of community in which resided as senior in high school
- Average income of community in which resided as senior in high school.
- Percent unemployment of local community in which resided as senior in high school.

The second set of regression analyses was performed only on year four outcomes, and used the following job training and experience variables:

- A set of variables describing number of training programs begun of six types: on the job; military; manpower; apprenticeship; correspondence; others. These included cumulative number of months of longest program taken each year; and cumulative sum of longest completed program taken each year.
- Number of on-the-job training programs.
- Number of apprenticeship programs.
- Number of weeks in current job (job tenure).
- Number of hours worked weekly (for earnings outcome analyses only).

In both of these sets of regression analyses, that is the school and community contextual analyses, and the job training and experience analyses, variables were stepped into regression analyses after individual SES had been entered. By stepping in the variables individually, we were able to determine whether, with adjustments offered by these additional variables the curriculum contrast between T&I or business-commercial to general remained stable or changed. Thus, the intent of the introduction of these variables into the regressions is not to identify which variables contribute significantly to explaining differences in employment outcomes but to identify any which change the explanatory power of the curriculum classifications. In the description of findings which follow

we have presented only selected results of these two supplementary sets of regression analyses. The reason for such selective reporting is the simple reason that we found in the vast majority of cases, that school and community contextual variables and job training and experience variables did not change the explanatory power of self-reported high school curriculum, after adjustment for SES differences. Any exceptions to this general finding are noted in the discussion of results.

The third set of regression analyses sought to use course transcript information to explain employment outcomes. However, since these regression analyses, using course data proved to be both quite complex and somewhat perplexing, we do not present them in the main body of Chapter 4. Instead we relegate discussion of coursework regression analyses to a separate section at the close of Chapter 4.

4.1 Employment Status

In this section we review evidence concerning three indicators of employment status, namely,

- labor force participation rates
- unemployment rates
- number of weeks of unemployment in the last year

In conjunction with the last indicator we also will recap evidence from previous literature concerning spells of unemployment, even though our own reanalyses do not encompass this particular indicator of employment status.

As noted in the last section, a major consideration in calculating labor force participation rates is the population used as a base for calculations. Employment status statistics can vary markedly depending on the population base in terms of which they are calculated. Thus, to provide some consistency in calculating employment status indicators we have tried, to as great an extent as possible, to approximate the Census and Bureau of Labor Statistics approach to calculating these statistics. Specifically:

labor force participation rate (LFPR)
is defined as the ratio of the number in the labor force to the total population in the relevant group (those in and out of the labor force); and

unemployment rate
is defined as the ratio of the number unemployed in the labor force to the subtotal of the relevant population in the labor force.

Also, we have calculated average weeks of unemployment only on the basis of those defined as being in the labor force.

We were able to apply these definitions with some consistency in our own reanalyses, but it should be noted that in previous literature we have no

way in which to control for differences in calculating such employment status statistics. Moreover, previous literature often is unclear concerning the exact bases on which LFPR and unemployment rates have been calculated. Thus the reader should be aware of the fact that marked differences in research results often may derive simply from alternative bases for calculating such rates, rather than any real differences in employment outcomes of high school vocational or general programs.

Non-National Studies. In their review of non-national studies of the effects of vocational education, Mertens et al. (1980a,b) did not clearly identify studies which addressed all three of the employment indices reviewed in this section. No studies at all were identified as addressing LFPR or number of weeks of unemployment in the previous year in ways that approximated standard definitions. However, around fifty state or local studies providing evidence on unemployment rates for secondary vocational education graduates were located (Mertens et al., 1980a,b). These studies were subject to a range of methodological weaknesses, and moreover in most cases it was unclear whether standard approaches to calculating unemployment rates had been used. Nevertheless the general pattern of findings among relevant non-national studies is easy to summarize. Overall there tended to be no significant differences found between unemployment rates of vocational education graduates and graduates of general high school curriculum programs. This pattern tended to hold regardless of length of follow-up period after graduation. Overall, unemployment of vocational graduates ranged from 0 to 20%, although a few studies found unemployment rates to be considerably higher. It should be stressed that both the failure to

find differences in unemployment rates between vocational and general graduates and some of the unusually high unemployment rates may have resulted from calculating such rates in nonstandard fashion (see section 4.0).

Previous National Studies. Past analyses of three national data sets (NLS-72; NLS-LME; and NLS-YA) provide descriptive data on LFPR for vocational education graduates. Creech et al.(1977b, p. 124) provide the following data for the NLS Class of 1972:

<u>Labor Force Participation Rates</u>		
<u>Males</u>	<u>Oct 1972</u>	<u>Oct. 1973</u>
General	78%	80%
Vocational	84%	86%
<u>Females</u>		
General	65%	70%
Vocational	76%	80%

Using LME data for young males, Parnes et al. (1970, Vol.1, p. 55) report that for white males aged 16-17, labor force participation rates were exactly the same (64%) for participants in vocational, commercial and general secondary high school programs. For the same age cohort of young male blacks, however, the corresponding figures were 54%, 11% and 51%.

Grasso and Shea (1979b,p. 192), using LME data on young females report labor force participation rates by most recent high school curriculum and race for women in 1968 and 1972, not enrolled and who had completed 10-12 years of school, as follows: *

* See also Shea et al. (1971, p. 44, p.64).

	Labor Force Participation Rates			
	Female White 1968-1972		Female Black 1968-1972	
10-11 years of school (total or average)				
Vocational	a	a	a	a
Business and Office	46%	44%	48%	48%
General	40%	45%	60%	52%
12 years of school (total or average)				
Vocational	a	63%	61%	44%
Business or Office	70%	62%	74%	69%
General	63%	61%	70%	67%

a. Percent not reported, base less than 25

These data it should be noted, are somewhat unusual in that these labor force participation rates are based not on total cohorts of individuals, but instead only on those who are not enrolled. There is thus an obvious problem of comparability of LFPR reported in previous national studies. Nevertheless, these previous findings suggest that vocational graduates tend to be labor force participants in equal or higher proportions than general program graduates.

Three national longitudinal studies (LME, NLS-72, YA) reported unemployment rates for vocational education graduates as compared with general curriculum graduates.* Fairly consistently over the years covered by these data (1969-1979) a smaller percentage of young men who had participated in or graduated from a high school vocational education program were unemployed than those who had participated in or graduated from a general program (Parnes et al., 1970, p. 55; Grasso & Shea, 1979b, p. 193; Creech et al., 1977b, p. 260; and Borus et al., 1980, p. 261). This finding tended to hold for blacks as well as whites. Differences in

* In the LME studies, the vocational group does not include those enrolled in a commercial program; for the NLS-1972 and YA studies the vocational group does include all vocational programs.

unemployment rates for the vocational education and general curriculum graduates tended, however, to be fairly small, for the most part 1-2%. The Bureau of Labor Statistics (1978, p. 140) suggests that for unemployment rates in the .05-.10 range, standard errors of measurement can be expected to be of the order of .02-.04 (.95 level of confidence).*

The estimates for young men provided by NLS-YA data for 1979 deserve mention. Because of the special sampling efforts made for this data base to over-represent Blacks, Hispanics and disadvantaged whites, unemployment for these three groups from NLS-YA represent the most precise estimates of any of the studies mentioned. For nonenrolled high school graduates who would have been in the labor force from 1 to 3 years in spring 1979, the NLS-YA data indicate that black males who graduated from a vocational/commercial program incurred 11% less unemployment than black males who graduated from a general program (Borus et al., 1980, p. 261).**

The fact that the commercial (business and office) program accounts for the majority of female enrollment in vocational programs is an important factor to be considered in examining employment differences for females. Unfortunately, labor force outcomes have not been reported separately for commercial and other vocational programs in many previous

* This range of standard errors was based on sample sizes of between 500-1000. As the sample sizes grow smaller, these standard errors would increase in magnitude.

** However, reanalyses of the YA data set for black males (ages 18-22) with exactly 12 years of schooling showed vocational/commercial graduates incurred only 6% less unemployment than general graduates (see Table 4.1.2).

analyses. Only one of the studies based on NLS-LME reported unemployment rates separately for commercial programs. White or black females who enrolled in or completed a commercial program in high school incurred less unemployment (typically 3-15% less) than their female peers in a general program. Even in the NLS-LME 1968 comparison which includes in its subpopulation those who dropped out of school, the former commercial participants have a clear advantage (Shea et al., 1971, p. 105; Grasso & Shea, 1979b, p. 193).

For the 20-40 percent of females who graduate from a vocational program other than commercial, there is no clear pattern as to whether they incur less unemployment than those graduating from a general program. Results for the non-commercial programs are restricted to NLS-LME (Shea et al., 1971, p. 105; Grasso & Shea, 1979b, p. 193). For the NLS-LME comparison in 1968, which includes in its subpopulation those who dropped out of high school, the non-commercial vocational program participants did incur less unemployment than former general program participants. For high school graduates from non-commercial vocational programs, however, no consistent pattern emerges in the NLS-LME results which span the years 1968-1972.

Other studies have reported results for female graduates of both commercial and other vocational programs. The NLS-1972 results show vocational-commercial graduates incurring less unemployment than general graduates. The advantage seen in the NLS-1972 vocational group may be due to the fact that it is composed principally of commercial graduates (80% of whites, 64% of blacks). As noted above NLS-LME results suggested that females graduating

from a business or commercial program have an advantage over general program graduates.

Only limited data are available from previous national studies to examine how frequent and severe spells of unemployment were for graduates of vocational and general curricula. Data were available only for young males from the NLS-LME study. The cumulative numbers of spells of unemployment over a two-year interval (1966-1968) and a four-year interval (1966-1970) were compared for vocational and general program graduates with exactly 12 years of school (Kohen and Parnes, 1970, p. 57; Grasso and Shea, 1979b, p. 195). The total number of weeks unemployed over a five-year interval (1966-1971) was also compared for the same groups (Grasso and Shea, 1979b, p. 194). The results were mixed. For white males, vocational graduates incurred more spells of unemployment and were more likely than general graduates to incur two or more spells. However, the severity of the unemployment, as measured by number of weeks unemployed, was slightly less for white male vocational graduates than for general graduates. The results were similarly mixed for black males. In the earlier two-year interval black vocational graduates not only incurred fewer spells of unemployment but they were also less likely than general graduates to have incurred two or more spells. In the later four-year interval comparison, while black vocational graduates incurred more unemployment, their peers in the general program were still more likely to incur two or more spells. However, the severity of the unemployment, as measured by number of weeks unemployed, appeared to be slightly greater for black vocational graduates than general graduates.

Reanalyses. Reanalyses concerning employment status focused on three variables: labor force participation rates, unemployment rates and number of weeks unemployment in the previous year. Only cross-tabular reanalyses were performed for these outcomes, and results are presented separately by sex and race. Recall also that results are presented only for those with twelve years exactly, that is, for graduates with no postsecondary education, except for white males for whom limited data on early leavers are available.

Males. Summary data on labor force participation for males are presented in Table 4.1.1. Labor force participation rates generally are quite high, all in the .85-1.00 range with only two exceptions (both for blacks in the NLS-72 data set who graduated from general programs). For white males LFPR are quite similar for graduates of different curriculum areas. Rates for white vocational graduates are more often higher than for general graduates, but differences are too small (-0.01 to +0.05) to warrant strong conclusions. Note however, that LME early leavers of general programs show the lowest LFPR of any group, although older LME white males (i.e., 4 years out) show no difference in LFPR between early leavers and graduates. For black males, differences in LFPR rates across different curriculum groups appear larger in some cases, but these differences are restricted to one data set. NLS-72 data at entry, at year 1, and at year 4, all indicate black male graduates of T&I, business and rest vocational categories, as having higher LFPR than black male graduates of general programs. But for the one case in which sample sizes allow a comparison for black male graduates in the LME data set, rest vocational graduates show a slightly lower LFPR than general graduates. It is thus impossible to reach any strong conclusions for curriculum differences for black males.

TABLE 4.1.1: Summary of Average Labor Force Participation Rates for Males By Race, Data Set, Cohort Time Point and Curriculum (Weighted Results)

Race, Data Set and Cohort Time Point	12 Years Exactly				Early Leavers			
	General	T&I	Bus.	Rest Voc. ^e	General	Total Voc.		
WHITES								
LME	Entry Yr	1966-1971	.92	d	.97	.95	.75	.88
NLS-72	Entry Yr	1972	.91	.91	.94	.96	b	b
YA	Age18-19	1979	.87	.93	c	c	NA	NA
NLS-72	Yr 1	1973	.89	.91	.89	.93	b	b
YA	Age20-22	1979	.86	.87	c	c	c	c
LME	Yr 4	1966-1973	.96	d	.97	.96	.98	.99
NLS-72	Yr 4	1976	.91	.94	.93	.94	b	b
LME	Yr 10	1969-1976	.98	d	c	.97	c	c
BLACKS								
LME	Entry Yr	1966-1971	.93	d	c	.88		
NLS-72	Entry Yr	1972	.89	.91	.98	1.00		
NLS-72	Yr 1	1973	.80	.91	.98	.91		
LME	Yr 4	1966-1973	.99	d	c	c		
NLS-72	Yr 4	1976	.81	.90	.91	.88		
LME	Yr 10	1969-1976	.98	d	c	c		

- b. NLS-72 has no early leavers (at least prior to spring semester senior year in high school as represented by this data set)
- c. Insufficient sample size
- d. No T&I classification included in LME data collection
- e. LME - rest voc. includes all vocational programs except business. NLS-72 and YA - rest voc includes agriculture, distributive education, health, and home economics.

Given that labor force participation rates of general and vocational specialty graduates are not highly dissimilar, the natural next question to consider is whether unemployment rates are similar or different. Recall that according to Census and Bureau of Labor definitions, unemployment rates are based strictly on those who are determined to be in the labor force. Table 4.1.2 provides a summary of unemployment rates for male graduates (and for white early leavers). These data show that unemployment rates for white male graduates are fairly low (0-10%); this is true especially after the entry years or age 19, when unemployment rates do not exceed 7% for any white male graduate group. Unemployment rates appear to be somewhat higher for male early leavers than for male graduates, but differences are not large (8% is the largest difference apparent in unemployment rates between graduates and early leavers in the available comparisons). Curriculum differences are inconsistent and fairly small. In some cases, unemployment is higher for general graduates than for vocational specialty graduates but in a few cases the reverse is apparent. In most cases the difference in unemployment rates associated with different high school curricula does not exceed 5% (the only two exceptions are for NLS-72 entry where the business graduate unemployment rate exceeds that of general graduates by 7%, and for YA ages 18-19 where the unemployment rate of T&I graduates exceeds that of general graduates by 6%).

Unemployment rates for black graduates seem to be slightly higher than for white graduates but also seem fairly low; below 14% in all cases except for LMF entry rest vocational graduates (20%); LME Year 10 general graduates (20%) and YA age 18-22 general graduates (21%). Within the black group differences associated with curriculum are apparent but inconsistent across the three data sets.

TABLE 4.1.2: Summary of Average Unemployment Rates for Males By Race,
Data Set, Cohort Time Point and Curriculum. (Weighted Results)

Sex: Male	12 Years Exactly					Early Leavers		
	General	T&I	Bus.	Rest Voc. ^e	General	Total Voc.		
<u>WHITES</u>								
LME	Entry Yr	1966-1967	.07	d	.08	.05	.15	.10
NLS-72	Entry Yr	1972	.03	.03	.10	.03	b	b
YA	Age 18-19	1979	.07	.13	c	c		
NLS-72	Yr 1	1973	.01	.01	.00	.01	b	b
YA	Age 20-22	1979	.05	.00	c	c	c	c
LME	Yr 4	1966-1973	.02	d	.04	.03	.08	.05
NLS-72	Yr 4	1976	.04	.06	.07	.06	b	b
LME	Yr 10	1969-1976	.01	d	c	.05	c	c
<u>BLACKS</u>								
LME	Entry Yr	1966-1971	.14	d	.03	.20		
NLS-72	Entry Yr	1972	.04	.14	.11	.05		
NLS-72	Yr 1	1973	.03	.00	.00	.00		
LME	Yr 4	1966-1973	.06	d	c	c		
NLS-72	Yr 4	1976	.06	.11	.09	.09		
LME	Yr 10	1969-1976	.16	d	c	c		
YA	Age 18-22 ^f	1979	.21	Total Voc. ^f	.15			

- b. NLS-72 has no early leavers (at least prior to spring semester senior year in high school as represented by this data set's sample).
- c. Insufficient sample size
- d. No T&I classification included in the LME data collection.
- e. LME - rest voc. includes all vocational programs except business.
NLS-72 and YA - rest voc. includes agriculture, distributive education, health and home economics.
- f. The number of cases for YA blacks (12 yrs. exactly) required pooling ages 18-22 and all vocational specialty areas in order to report any results.

The employment status results discussed so far showed no consistent patterns across data sets in the labor force participation or unemployment rates associated with graduation from a secondary vocational program. Nevertheless, it should be explained that this finding may result in part from variability in the data sets with regard to the reference week which served as a base for calculating these employment status statistics. In the LME data set for young males, the reference period was "last week" or the week preceding the interview week. LME interviews of young males began in October and extended over a period of two or three months. In the NLS-72 data set the first week of October was used as the reference week in both 1973 and 1976, but the entry level data for 1972 was based on a reference period of the "month of October." In the NLS-YA data set the reference period was "last week" or the week preceding the interview week. Since YA interviews were conducted from late January through August 1979, there is a potential 8-month variation in the reference week. As Borus et al. (1980, p. 15) point out, those interviewed in the June-August period might include respondents counted as in the labor force who would have been counted as enrolled in high school or college (and hence out of the labor force) if interviewed in earlier months.**

* NLS-72 labor force questions for the "month of October" in 1972 were asked retrospectively in October 1973.

** Borus et al. dealt with this potential problem by assuming that those interviewed prior to the summer months were "distributed proportionately to those interviewed prior to the summer." While we have not been able to check on the severity of this potential problem, nor on evidence concerning the Borus et al. assumption, it is worth noting that only 6.1% of the YA sample were interviewed in the summer months.

Another potential problem in relying exclusively on the labor force participation and unemployment measures of employment status is that data concerning particular survey weeks do not necessarily reflect broader patterns of employment and unemployment. As Gras and Shea (1979b, p. 73) point out, "Survey week unemployment rates say nothing about the severity of unemployment."

For these reasons, we also examined a third indicator of employment status, namely, number of weeks of unemployment in the past year (in our review of past literature above we also examined data on number of spells of unemployment). For obvious reasons, number of weeks of unemployment in the past year was not considered at the entry level.

Summary data on average number of weeks of unemployment for males are shown in Table 4.1.3, from the YA and LME data sets. These data are somewhat spotty because of small sample sizes in several cells. The data that are available on weeks unemployed do not indicate any clear differences between curriculum groups. The only clear difference apparent in Table 4.1.3 is that white early leavers report consistently more weeks of unemployment than graduates. In the YA ages 18-19 data, early leavers reported 9-11 weeks of unemployment in the previous year as compared to only 2-3 weeks for graduates. In the LME year 4 data early leavers reported 3-4 weeks unemployment as compared to 1-3 weeks for graduates. Such differences appear, however, to be independent of high school curriculum program.

Females. Data concerning the employment status of female graduates were reanalyzed using two data sets, namely NLS-72 and NLS-YA.

TABLE 4.1.3: Summary of Average No. of Weeks of Unemployment for Males, By Race, Data Set, Cohort Time Point and Curriculum (Weighted Results)

			12 Years Exactly				Early Leavers	
			General	T&I	Bus.	Rest Voc.	General	Total Voc.
<u>WHITES</u>								
YA	Age 18-19	1971	2.0	2.2	c	c	9.2	10.6
YA	Age 20-22	1979	3.3	0.6	c	c	c	c
LME	Yr 4	1966-1973	2.0	d	2.7	1.5	3.9	3.4
LME	Yr 10	1969-1976	1.1	d	c	1.3	c	c
<u>BLACKS</u>								
LME	Yr 4	1966-1973	4.4	d	c	c		
LME	Yr 10	1969-1973	1.1	d	c	c		

c. Insufficient sample size

d. No T&I classification included in LME data collection

e. LME - rest voc. includes all vocational programs except business.

NLS-72 and YA - rest voc. includes agriculture, distributive education, health and home economics.

Table 4.1.4 provides a summary of labor force participation rates for female secondary graduates with no postsecondary schooling. The first notable pattern in these data is that LFP rates for white females tend to fall off with increasing years after occupational entry, from .83-.90 at entry to .63-.74 at four years after high school graduation for females in the NLS-72 data set. This pattern may reflect a tendency for female high school graduates who do not pursue postsecondary schooling to marry and to take on the role of mother and homemaker within a few years after high school graduation. Recall that, according to Census definitions, homemakers are counted as out of the labor force. The second pattern worth noting is that, while curriculum differences are not large for white females, there appears to be a consistent pattern for graduates of vocational programs (both commercial and rest vocational) to have slightly higher LFP rates than general female graduates. No consistent curriculum differences in LFPR are apparent for black females, but it is perhaps worth noting that black females LFPR appears roughly equal to that of white females immediately after high school graduation (i.e., at entry) and show not quite so clear a drop-off as that of white females with increasing years out of high school.

Table 4.1.5 summarizes average unemployment rates for female graduates. In the NLS-72 entry data female unemployment rates appear to be roughly similar to those shown for males in Table 4.1.3. With respect to YA data at both ages 18-19 and 20-22 note, however, that rates are noticeably higher for females than those shown for males in Table 4.1.3. Black female unemployment rates tend to be consistently higher than white female rates. There appear, however, to be no

TABLE 4.1.4: Summary of Average Labor Force Participation Rates for Female Graduates, By Race, Data Set, Cohort Time Point and Curriculum Group (Weighted Results)

<u>WHITES</u>			General	Comm.	Rest Voc. ^e
NLS-72	Entry Yr	1972	.83	.93	.90
YA	Age 18-19	1979	.88	.90	c
NLS-72	Yr 1	1973	.80	.90	.87
YA	Age 20-22	1979	.70	.81	c
NLS-72	Yr 4	1976	.63	.74	.71
<u>BLACKS</u>					
NLS-72	Entry Yr	1972	.86	.94	.92
NLS-72	Yr 1	1973	.93	.88	.90
NLS-72	Yr 4	1976	.79	.91	.85

c. Insufficient sample size

e. NLS-72 and YA - rest voc. includes agriculture, distributive education, health, and T&I.

TABLE 4.1.5: Summary of Average Unemployment Rates for Female Graduates, By Race, Data Set, Cohort Time Point and Curriculum Group (Weighted Results)

WHITE			General	Comm.	Rest Voc. ^e
NLS-72	Entry Yr	1972	.06	.05	.03
YA	Age 18-19	1979	.15	.04	c
NLS-72	Yr 1	1973	.04	.03	.06
YA	Age 20-22	1979	.05	.12	c
NLS-72	Yr 4	1976	.08	.08	.05
<u>BLACKS</u>					
NLS-72	Entry Yr	1972	.21	.10	.24
NLS-72	Yr 1	1973	.14	.08	.13
NLS-72	Yr 4	1976	.17	.17	.17
YA	Age 18-22 ^f	1979	.29	<u>Total Voc.^f</u> .23	

c. Insufficient sample size

e. NLS-72 and YA - rest voc. includes agriculture, distributive education, health, and T&I.

f. The number of cases for YA blacks (12 yrs. exactly) required pooling ages 18-22 and all vocational specialty areas in order to report any results.

consistent differences in unemployment rates for white females in terms of the three curriculum groups for which data are available, namely general, commercial and rest vocational categories. The results suggest that for black female graduates of commercial programs there may be an advantage in the early years out of high school.

Only limited data were available for addressing the issue of number of weeks of unemployment for female graduates. These were from the YA data set and for whites only. Samples of blacks in the YA data were too small to allow reanalyses. Thus the results for average number of weeks of unemployment for white female graduates can be summarized quite simply as follows:

	<u>Female graduates with 12 years exactly</u>	
	<u>General</u>	<u>Commercial</u>
YA Ages 18-19	4.6	2.8
YA Ages 20-22	3.1	2.0

Given the limited availability of data on number of weeks of unemployment for females, strong conclusions obviously are not warranted, but these data do suggest that graduation from a commercial program is associated with slightly lower average number of weeks of unemployment for white females, than is graduation from a general high school curriculum program.

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Summary. In sum, there is no consistent evidence that LFP rates are highly dissimilar for male graduates of vocational specialty programs and male graduates of general programs. This summary conclusion holds for both white and black males. Similarly for black females, we conclude that there is no clear evidence of different LFP rates for graduates of commercial vocational programs as compared with graduates of general programs. However, for white female graduates of commercial programs there are slight but consistent trends for them to have higher LFP rates than white female graduates of general secondary programs.

For unemployment rates, our summary conclusions from reanalyses are similar with respect to both black and white males; namely, that there are no consistent differences between unemployment rates of vocational specialty graduates as compared with general graduates. It should be noted that past national studies have shown unemployment rates for both black and white male vocational graduates to be slightly lower than unemployment rates for general graduates, but this difference in findings regarding male unemployment seems likely to derive from one or both of two characteristics of previous studies: 1) the lack of disaggregation of results by vocational specialty area; and 2) lack of distinction between those with twelve years of schooling exactly and those with some post-secondary schooling. For females, both black and white, reanalyses showed similar results with respect to unemployment, namely, no consistent differences between graduates of commercial and general programs. Though black females showed slightly lower unemployment rates for commercial graduates than general graduates at job entry, differences were not apparent after 4 years

4-1-20

out of high school. Nevertheless, it should be noted that past national research using the LME young female data indicated that unemployment rates for both white and black female graduates of commercial programs tended to be lower than corresponding rates for graduates of general programs. The trend apparent in the LME data set regarding unemployment for white females was not, however, replicated in the reanalyses of the NLS-72 and YA data sets.

Data on average number of weeks of unemployment indicate that for males no clear differences were apparent between business or T&I graduates and general graduates. For females, however, though available data are limited, findings indicate that white female graduates of commercial programs average one or so less weeks of unemployment than graduates of general programs, at least in the initial years after entry into the labor market.

Regarding data on number and spells of unemployment, we can conclude only that, given the relatively limited data available for all four sex-race groups, that no clear differences were apparent, and hence no strong conclusions regarding this outcome variable are warranted.

4.2 Extent of Labor Force Participation

Beyond general issues of labor force participation and unemployment, in this section we examine three indicators of extent of labor force participation, namely:

- number of hours worked per week
- full time versus part-time employment
- number of weeks employed in last year

In our reanalyses, the first two indicators will be calculated on the basis of those who are employed, and the third on the basis of all in the labor force. Before explaining exactly how each of these indicators were treated in our reanalyses, however, let us briefly review previous relevant literature.

Non-national studies. In their review of non-national studies of the effects of vocational education, Mertens et al. (1980a,b) did not clearly identify studies which addressed the extent of LFP indices reviewed in this section. Nevertheless, it appears that relatively few included such data. Conroy and Diamond (1976) report that for Massachusetts 1969 graduates of secondary vocational programs who did not pursue postsecondary education the average months employed was 56, as compared with 50 months for their nonvocational counterparts. For 1973 graduates, using the same comparisons they reported average months of employment was 26 for vocational graduates, and 23 for nonvocational graduates. Van Brame's (1979) data indicate that 79% of graduates of a Wisconsin Technical College worked 30-45 hours per week six months following graduation, but no clear comparison for general program graduates are provided.

Previous National Studies. Data from the NLS-72 (Peng and Holt, 1977, pp. 352-353; Peng et al., 1978, pp. 155-156) indicate that for both males and females, and blacks as well as whites, of those employed, former vocational education students tend to be employed 35 hours or more per week (84-94%) slightly more than former general program participants (74-89%). This pattern is apparent both 2 and 4 years out of high school, but differences 4 years out of high school (3-5%) tend to be smaller than differences 2 years out of high school (5-12%). Results were not reported by sex x race subgroups. However, in other analyses of the NLS-72 data in which average hours worked were reported by sex x race (Wiley and Harnischfeger, 1980, p. 110), no clear differences in hours worked per week between former general or vocational participants were shown. None of these analyses made a distinction in the population described between employed persons who were enrolled or not enrolled in postsecondary education.

In contrast, results for the NLS-YA reported by Borus et al. (1980, p. 265) are based on a subpopulation restricted to non-enrolled high school graduates who are employed. These data show only small and inconsistent differences in average hours worked per week across six sex-race groups (white, black and Hispanic males; white, black and Hispanic females).

Reanalyses. Reanalyses concerning extent of labor force participation were performed on three data sets: NLS-72, NLS-LME and NLS-YA. As usual, results of reanalyses concerning extent of labor force participation will be presented separately by sex, race, and curriculum group. However before presenting results, brief explanations of the bases for calculating these indicators are needed.

For all three data sets, number of hours worked per week was based primarily on answers to a question that asked "How many hours do you usually work each week at this [current] job?" *

In examining full-time versus part-time employment, we used the CPS definition:

The CPS currently defines 35 hours or more of work during the survey reference week as full-time employment; 34 hours or less constitutes part-time employment. (National Commission on Employment and Unemployment Statistics 1979, p. 54).

* In the LME data set, priority was given to using data concerning this question, but if no data were reported concerning this question, we sought to use responses to a question asking for total number of hours worked in the previous week, after adjusting for hours reported worked overtime, on a second job, and hours taken off during the previous week, as indicated in three other questions. Also, we should note that frequency distributions of number of hours worked per week indicated some data that might be considered outliers. YA data, for example, included four respondents who indicated they worked 96 hours per week. Similarly high responses were apparent in other data sets. While these values are certainly extreme, we know that some people do work such hours per week. Therefore such values have not been deleted from our analyses. Also, even if such values are inaccurate, they should not affect results as long as they are distributed relatively evenly among groups compared.

It should be noted that calculations of full-time employment were based on the same survey items as hours worked per week, but provide a different perspective on them.

Data on number of weeks worked per year were derived in slightly different ways in the three data sets reanalyzed. In the NLS-72 surveys this datum was derived from responses to a single question, but for LME, and presumably the YA data sets, data on weeks worked per year were derived from self-reports to more than a single question.*

Males. Table 4.2.1 provides a summary of the average number of hours worked per week by employed males in the various subgroups. The first point to be noted is that on average employed males in all groups are working a full 40-hour work week -- the only exception to this pattern is for early leavers who at entry work slightly less than 40 hours per week on average. Given this general pattern no differences in weekly hours associated with race or time after graduation are apparent. Also differences between weekly hours of general program and vocational specialty graduates are very slight. In only a single instance does a difference exceed two hours per week (in the YA data set for 18-19, T&I graduates had an average of 47.4 hours while general graduates showed an average of 43.0 hours).

Regression analyses were also performed on the weekly hours variable for males using the NLS-72 data set, adjusting for respondent SES and our

* The point is somewhat unclear in the YA data set because the "number of weeks worked in 1978, for any respondent 16 years or older" is located in section 25 of the YA public use tape file, which contains derived variables, but for which documentation is not yet available on the exact bases for calculating such derived data.

TABLE 4.2.1: Summary of Average Number of Hours Worked Per Week for Employed Males, by Race, Data Set, Cohort Time Point and Curriculum (Weighted Results).

			12 Years Exactly				Early Leavers	
			General	T&I	Bus,	Rest Voc. ^e	General	Total Voc.
<u>WHITES</u>								
LME	Entry Yr	1966- 1971	40.3	d	38.9	41.6	36.4	37.0
NLS-72	Entry Yr	1972	42.0	42.3	43.0	43.0	b	b.
YA	Age 18-19	1979	43.0	47.4	c	c	39.6	39.6
NLS-72	Yr 1	1973	43.9	44.3	43.2	43.8	b	b
YA	Age 20-22	1979	43.0	42.1	c	c	c	c
LME	Yr 4	1966- 1973	43.4	d	41.9	42.6	43.3	44.3
NLS-72	Yr 4	1976	43.7	43.3	44.4	44.7	b	b
LME	Yr 10	1969- 1976	44.9	d	c	43.8	c	c
<u>BLACKS</u>								
LME	Entry Yr	1966- 1971	40.0	d	c	39.0		
NLS-72	Entry Yr	1972	39.0	40.9	38.5	40.8		
NLS-72	Yr 1	1973	41.3	41.2	42.0	42.8		
LME	Yr 4	1966- 1973	41.1	d	c	c		
NLS-72	Yr 4	1976	39.8	41.3	41.8	41.8		
LME	Yr 10	1969- 1976	44.9	d	c	c		

- b. NLS-72 has no early leavers (at least prior to spring semester senior year in high school as represented by this data set's sample).
- c. Insufficient sample size.
- d. No T&I classification included in LME data collection.
- e. LME - Rest voc. includes all vocational programs except business. NLS-72 and YA - Rest voc. includes agriculture, distributive education, health, and home economics.

standard set of contextual variables. Regression results confirmed the pattern apparent in the descriptive data; namely that there were no significant differences in weekly hours worked associated with graduation from a vocational specialty program. Since none of the regression results proved significant they are not described here.

Table 4.2.2 shows average percentages of males working full-time for the various subgroups. Male early leavers from both general and vocational programs appear to work full-time in slightly lower proportions than high school graduates, with the difference seeming to decline with increasing time after entry (16-20% difference at entry to only 0-7% at four years). Also there appears to be a trend for graduates of all curriculum groups to work full-time in higher proportions with increasing years after high school graduation. Beyond these general patterns there appears to be no differences in regard to full-time employment of general versus vocational specialty graduates for males.*

Data on the third indicator of extent of employment, namely number of weeks worked in previous year, are shown in Table 4.2.3. These data are calculated for those in the labor force, one or more years after labor market entry. The first point worth noting with respect to these data is that at least at entry white male early leavers seem to work substantially fewer weeks per year (7-10 weeks less) than graduates. Second, it appears that

* Regression analyses were also performed on this outcome variable using the NLS-72 data set. Results are not presented, however, for two reasons. First, no significant differences associated with curriculum groups were identified. Second, given the relatively extreme values on this outcome variable (most in the .80-1.00 range) ordinary least squares regression analyses may not be the most appropriate means of analyses.

TABLE 4.2.2: Average Percentage of Employed Males Working Full-Time by Race, Data Set, Cohort Time Point, and Curriculum (Weighted Results).

			12 Years Exactly				Early Leavers	
			General	T&I	Bus.	Rest Voc. ^e	General	Total Voc.
<u>WHITES</u>								
LME	Entry Yr.	1966-1971	85	d	86	88	65	70
NLS-72	Entry Yr	1972	87	88	92		b	b
YA	Age 18-19	1979	93	88	c	c	85	85
NLS-72	Yr 1	1973	96	97	97	93	b	b
YA	Age 20-22	1979	89	88	c	c	c	c
LME	Yr 4	1966-1973	97	d	91	99	96	92
NLS-72	Yr 4	1976	96	98	100	95	b	b
LME	Yr 10	1969-1976	99	d	c	c	c	c
<u>BLACKS</u>								
LME	Entry Yr	1966-1971	85	d	c	87		
NLS-72	Entry Yr	1972	80	89	75	85		
NLS-72	Yr 1	1973	97	94	96	100		
LME	Yr 4	1966-1973	97	d	c	c		
NLS-72	Yr 4	1976	95	97	100	95		
LME	Yr 10	1969-1976	99	d	c	c		

- b. NLS-72 has no early leavers (at least prior to spring semester senior year in high school as represented by this data set's sample).
- c. Insufficient sample size.
- d. No T&I classification included in LME data collection.
- e. LME - Rest voc. includes all vocational programs except business.
NLS-72 and YA - Rest voc. includes agriculture, distributive education, health, and home economics.

TABLE 4.2.3: Summary of Average No. Weeks Worked in Previous Year for Males in the Labor Force, by Race, Data Set, Cohort Time Point and Curriculum (Weighted Results).

			12 Years Exactly				Early Leavers	
			General	T&I	Bus.	Rest Voc. e	General	Total Voc.
<u>WHITES</u>								
YA	Age 18-19	1979	40.6	43.4	c	c	33.8	32.5
NLS-72	Yr 1	1973	43.3	45.6	44.8	45.7	b	b
YA	Age 20-22	1979	44.4	49.2	c	c	c	c
LME	Yr 4	1966- 1973	47.1	d	45.6	46.5	44.2	48.3
NLS-72	Yr 4	1976	45.0	46.6	44.8	45.2	b	b
LME	Yr 10	1969- 1976	50.2	d	c	49.1	c	c
<u>BLACKS</u>								
NLS-72	Yr 1	1973	40.3	38.8	42.3	44.4		
LME	Yr 4	1966- 1973	43.6	d	c	c		
NLS-72	Yr 4	1976	43.8	41.9	47.9	44.5		
LME	Yr 10	1969- 1976	44.3	d	c	c		

- b. NLS-72 has no early leavers (at least prior to spring semester senior year in high school as represented by this data set's sample).
- c. Insufficient sample size.
- d. No T&I classification included in LME data collection.
- e. LME- Rest voc. includes all vocational programs except business.
- NLS-72 and YA - Rest voc. includes agriculture, distributive education, health, and home economics.

at least in the early years after job entry (specifically YA ages 18-19, NLS-72 Year 1, and YA ages 20-22), male graduates of T&I programs work slightly more weeks per year (2-4 weeks more) than general program graduates. Note, however, that this does not appear to be so for black graduates of T&I programs, and the difference for whites appears smaller at NLS-72 Year 4 than for earlier years.

How do these apparent contrasts hold up when adjustments are introduced for SES, using regression analysis?* Answers are suggested in Table 4.2.4. Specifically results appear largely the same. At year 1, white male graduates of T&I programs worked 2-3 weeks more than general graduates, but the difference is smaller at year 4, and not significant for blacks.

* Additional regression analyses were also performed for this variable controlling variously for the regular set of contextual variables (avr. hours per week worked outside of high school; high school in South; community size, % unemployment in community and occupational training since high school for year 4 only). However, since results of these analyses did not substantially differ from those for the simpler model controlling only for SES, they are not reported here.

TABLE 4.2.4: Summary of Regression Results for No. of Weeks Worked in Previous Year for Males at Two Time Points (NLS-72 Year 1, Year 4) by Race (Weighted Results).

	Yr 1			Yr 4		
	T&I to Gen. ^a	Bus. to Gen. ^a	R ²	T&I to Gen. ^a	Bus. to Gen. ^a	R ²
<u>WHITES</u>						
Raw contrast to general	+2.3	+1.5		+1.6	-0.2	
Contrast controlled for SES	+2.6*	-1.6	.0096*	+1.7*	+0.8	.0046
<u>BLACKS</u>						
Raw contrast to general	-1.5	+2.0	-	-1.9	+4.1	-
Contrast controlled for SES	-1.6	-2.0	.0156	+1.4	+3.5	.0117

* p < .05

^a Contrasts of voc to general: + = voc. greater than general.
- = voc. less than general.

Females. Table 4.2.5 presents data showing average number of hours worked per week in the various subgroups. Our first observation is that (with one notable exception), employed female graduates of all curriculum groups, on average, tend to work fewer hours per week than employed male graduates. Comparing Table 4.2.1 with Table 4.2.5, it is apparent that while male graduates work on average 38-47 hours, females tend to work 34-38 hours. The one notable exception is for female commercial graduates at year 1 in the NLS-72 data set who show an average of 51 hours worked. This figure is clearly anomalous and we are not certain of its cause, though we suspect that it may have been caused by a few outlying values, associated with individuals who represent more heavily weighted cases.* Differences in weekly hours worked associated with different curricula are not large, though white female graduates of a commercial program appear to work very slightly more hours per week than general graduates, while the reverse is true for female graduates in the rest vocational category.

Regression results for females shown in Table 4.2.6 help to illuminate the descriptive results shown in Table 4.2.5. When the raw contrasts between weekly hours of commercial and general graduates are adjusted for SES, the anomalously large difference for NLS-Year 1 decreases to a much more reasonable figure. Also, these results indicate that at entry and year 1, commercial graduates tend to work 2-3 hours more than general graduates. The entry-year result for black females, though similar in magnitude does not quite reach

* Recall that as described in the introduction all descriptive results reported in this section are based on weighted samples.

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TABLE 4.2.5: Summary of Average Number of Hours Worked for Employed Female Graduates by Race, Data Set, Cohort Time Point and Curriculum (Weighted Results).

			General	Comm.	Rest Voc. ^e
<u>WHITES</u>					
NLS-72	Entry Yr	1972	37.1	37.6	34.4
YA	Age 18-19	1979	36.3	37.4	c
NLS-72	Yr 1	1973	38.1	51.4	36.9
YA	Age 20-22	1979	35.1	36.8	c
NLS-72	Yr 4	1976	38.1	38.2	37.8
<u>BLACKS</u>					
NLS-72	Entry Yr	1972	36.3	36.0	35.4
NLS-72	Yr 1	1973	38.2	37.7	35.4
NLS-72	Yr 4	1976	37.7	38.4	38.3

c. Insufficient sample size.

c. NLS-72 and YA - Rest voc. includes agriculture, distributive education, health, and T&I.

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TABLE 4.2.6: Summary of Regression Results for Female Graduates for No. of Hours Worked Per Week at Three Time Points (NLS-72 Entry, Year 1, Year 4) by Race (Weighted Results).

	Entry Year		Year One		Year Four	
	Com. to Gen. ^a	R ²	Com. to Gen. ^a	R ²	Com. to Gen. ^a	R ²
<u>WHITES</u>						
Raw contrast to general	+0.5	-	+13.3	-	+0.1	-
Contrast controlled for SES	+3.1 [*]	.0163 [*]	+2.0 [*]	.0036	+1.6	.0033
<u>BLACKS</u>						
Raw contrast to general	+0.3	-	-0.5	-	+0.7	-
Contrast controlled for SES	+2.6	.0124	+3.5 [*]	.0311	+0.4	.0058

* p < .05

a. Contrasts of voc to general: + = voc.greater than general.
 - = voc. less than general.

the level of statistical significance.*

Table 4.2.7 presents summary data on full-time employment of females. These data, in contrast to those shown for males in Table 4.2.2, indicate that females are generally employed full-time in slightly lower proportions than males. Also, the data for females indicate a fairly clear curriculum difference, with white female graduates tending to be employed full-time 5-15% more than female graduates of general high school programs. Parallel results are not, however, apparent for black females.**

Turning to our third indicator of extent of employment, Table 4.2.8 shows the average number of weeks worked during the previous year for females in the labor force. Comparing these data with those shown for males in Table 4.2.3, it seems that female graduates tend to work slightly fewer weeks per year than male graduates, regardless of high school curriculum or race. Also unlike males, there is no apparent increase in weeks worked per year with increasing years out of high school. Nevertheless, there is a relatively clear and consistent curriculum difference apparent. Female graduates of commercial programs tend to work 4 to 8 more weeks per year than graduates of general high school programs. This pattern is apparent for black females

* Additional regression analyses were also performed for this variable controlling variously for the regular set of contextual variables (avr. hours per week worked outside of high school; % of vocational enrollment in high school; high school in South; community size, % unemployment in community and occupational training since high school for year 4 only). However, since results of these analyses did not substantially differ from those for the simpler model controlling only for SES, they are not reported here.

** Regression results seemed to confirm the pattern apparent in the descriptive results of a significantly greater percentage of white female commercial graduates being employed full-time than white female general graduates, but again we do not present results of regressions for full-time employment because we are suspicious of ordinary least squares regression results given the skewed distribution of percentage full-time employment values (see Appendix D-2).

TABLE 4.2.7: Average Percentage of Employed Female Graduates Working Full-Time, by Race, Data Set, Cohort Time Point and Curriculum (Weighted Results).

			General	Comm.	Rest Voc. ^c
<u>WHITES</u>					
NLS-72	Entry Yr.	1972	76	84	71
YA	Age 18-19	1979	72	89	c
NLS-72	Yr. 1	1973	83	89	85
YA	Age 20-22	1979	68	81	c
NLS-72	Yr. 4	1976	83	88	88
<u>BLACKS</u>					
NLS-72	Entry Yr.	1972	80	79	76
NLS-72	Yr. 1	1973	80	80	80
NLS-72	Yr. 4	1976	87	92	8

c. Insufficient sample size.

e. NLS-72 and YA - Rest voc. includes agriculture, distributive education, health, and T&I.

TABLE 4.2.8: Summary of Average Number of Weeks Worked in Previous Year for Females (Weighted Results).

			General	Comm.	Rest Voc. ^e
<u>WHITES</u>					
YA	Age 18-19	1979	38.8	42.9	c
NLS-72	Yr.1	1973	37.8	43.9	40.2
YA	Age 20-22	1979	39.4	47.2	c
NLS-72	Yr.4	1976	38.4	42.2	41.3
<u>BLACKS</u>					
NLS-72	Yr.1	1973	31.3	37.5	30.7
NLS-72	Yr.4	1976	37.2	42.4	33.4

c. Insufficient sample size.

e. NLS-72 and YA - Rest voc. includes agriculture, distributive education, health, and T&I.

as well as whites.

Regression results for female weeks worked per year are shown in Table 4.2.9. These results indicate that after adjusting for SES, the adjusted difference in number of weeks worked by female graduates is not always statistically significant but its magnitude does remain in the range of 3-6 weeks greater for graduates of commercial programs than graduates of general programs. *

* Additional regression analyses were also performed for this variable controlling variously for the regular set of contextual variables (avr. hours per week worked outside of high school; % of vocational enrollment in high school; high school in South; community size, % unemployment in community and occupational training since high school for year 4 only). However, since results of these analyses did not substantially differ from those for the simpler model controlling only for SES, they are not reported here.

TABLE 4.2.9: Summary of Regression Results for No. Weeks Worked Previous Year for Female Graduates in the Labor Force at Two Time Points (NLS-72 years 1 and 4) by Race (Weighted Results).

	Year One		Year Four	
	Comm. to Gen. ^a	R ²	Comm. to Gen. ^a	R ²
<u>WHITES</u>				
Raw contrast to general	+6.1	-	+3.8	-
Contrast controlled for: SES	+3.4 [*]	.0397 [*]	+2.8	.0161 [*]
<u>BLACKS</u>				
Raw contrast to general	+6.2	-	+5.2	-
Contrast controlled for: SES	+4.7	.0366	+8.0 [*]	.0967 [*]

^a Contrasts of voc to general: + = greater than general; - = voc less than general

* p < .05

Summary. Findings regarding curriculum differences in weekly hours worked are easy to summarize for males. For both black and white males, as evidenced in both our reanalyses and past analyses of nationally representative data sets, graduation from vocational specialty areas as opposed to general programs is associated with no clear differences in hours worked per week. Results for females regarding this outcome are slightly more complex. Reanalyses showed that white female graduates of commercial programs tend to work slightly more hours per week than white female general program graduates. Regression analyses adjusting for individual SES showed these differences to be statistically significant. For black females unadjusted curriculum differences were slight, but regression analyses indicated that black female graduates of commercial programs tended to work 2-3 more hours per week on average than black female graduates of general programs. Findings from previous studies regarding hours worked per week do not show such differences for females, but this may be a result of the lack of distinction of commercial specialty graduates from other female vocational specialty graduates.

Results regarding full-time employment are similar. Results of reanalyses showed no clear differences for males with regard to percentages employed full-time (i.e., 35 hours per week or more). While previous analyses showed male vocational graduates to be employed full-time in slightly higher proportion than general graduates, this finding was based on a pooled vocational category rather than vocational specialty areas. However, for females, reanalyses were consistent in showing white female commercial graduates to be employed full-time 5-15% more than female graduates of general programs.

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This trend was not evident for black females however. Past research, undisaggregated by race or vocational specialty area, showed the pooled female vocational group to be employed full-time, slightly more frequently than general female graduates.

Reanalyses of data on number of weeks employed per year, showed white male graduates of T&I programs to be employed slightly more (2-3) weeks per year than graduates of general programs. However no consistent differences were found for either white male business graduates or black T&I or business graduates. Female graduates of commercial programs were found in reanalyses to be employed some 3-6 weeks more per year (with differences depending on race and SES adjustments) than general program graduates. No results on this outcome variable were located in previous national studies, but the very limited data available from previous non-national studies though not disaggregated by sex, race, or vocational specialty were not inconsistent with the findings of our reanalyses.

4.3 Wages and Earnings

Hourly wages and weekly earnings have been addressed in a variety of relevant studies. Before reviewing the available evidence concerning the hourly wages and weekly earnings of vocational education graduates, several points should be noted. First is that we focus in this section on these indicators rather than on earned annual income, for two reasons. Earned income is dependent on hours and weeks worked as well as hourly wages. Previous research indicates that determinants of hours worked are not the same as hourly wages (Jencks et al., 1979), and we already reviewed evidence on such employment outcomes in section 4.2. Also, as a practical matter, most previous research on vocational education has focused on hourly wages or weekly earnings rather than on annual earned income.

Second, hourly wages and weekly earnings in recent years can vary substantially across time simply because of inflation. Thus, in reviewing previous evidence on these outcomes, it should be kept in mind that findings from different years can vary simply because of the effects of inflation. In our own reanalyses, wage and earnings outcomes all have been adjusted to a common base of comparison, namely 1978 dollars.

Third, it is widely known that earnings of females tend to be lower than those of males even in the same job categories, even though training and experience of females may be the same as those of males. This pattern, of course, represents significant and continuing societal inequality between the sexes in economic remuneration, but what it means for the present study is that to as great an extent as possible wages and earnings outcomes

associated with participation in secondary vocational education should be considered separately for males and females.

Non-National Studies. Mertens et al. (1980 a,b) located forty non-national studies dealing with earnings of secondary vocational graduates. It was concluded that these studies could be divided into three groups on the basis of their results:

- (1) those studies that found no difference between the earnings of vocational and nonvocational education graduates;
- (2) studies that identified higher earnings for vocational graduates early after graduation but showed the differences dissipating over a period of time, and
- (3) studies that reported higher earnings for male than female graduates.

(Mertens et al., 1980b, p.30)

Regarding the second finding, for example, Conroy and Diamond (1976), Hu et al. (1968) and Market Opinion Research (1973) concurred in the conclusion that vocational education students earn more than nonvocational students soon after graduation from high school, but that this apparent earnings advantage disappears within two to six years.

Two non-national studies reported earnings separately for graduates of different vocational education specialty areas. Both Iowa (1977) and Ohio (1979) reported earnings to vary by specialty area, with graduates from trades and industry and agricultural specialty areas tending to earn more than other vocational education graduates. Nevertheless, it should be noted that in the Ohio (1979) study differences in earnings among graduates of different specialty areas tended to be smaller than the male-female earnings differential.

Previous National Studies. Analyses of three national longitudinal data sets (NLS-LME, NLS-72, and NLS-YA) spanning the period 1966-1979, have reported earnings separately by curriculum classification, sex and race.

For males, these analyses showed that both black and white male graduates of secondary vocational education received higher hourly wages than their peers who graduated from general curriculum programs. Although the hourly wage differential tended to be small, ranging generally from \$.10 to \$1.00, as long as four years out of high school, employed male vocational graduates appeared to retain a slight hourly wage advantage over their general program graduates (Kohen and Parnes, 1970, p.76; Lewin-Epstein, 1979, p.257; Harnischfeger and Wiley, 1980; Wiley and Harnischfeger, 1980, p.110; and Borus et al., 1980, p.265).

Results reported separately by race for females were not as consistent. Analyses of NLS-LME and NLS-YA data based on a household sample showed females (black, white and Hispanic) who graduated from high school vocational programs as earning slightly more per hour than those who graduated from a general program (Roderick and Davis, 1974, p.25; Borus et al., 1980, p.265). The reverse is apparent in analyses of NLS-72 data, with the trend for variously defined subpopulations generally showing hourly wages of general graduates slightly higher than those of vocational education graduates for both white and black females (Lewin-Epstein, 1979, p.257; Harnischfeger and Wiley, 1980; Wiley and Harnischfeger, 1980, p.110).

Average weekly earnings were reported by high school curriculum group for males in analyses of two of the national longitudinal data sets (Talent and NLS-72). Analyses of Project TALENT data on students five years (1965) after high school graduation, though dated, are interesting in the breakdowns by ability and SES used in reporting results. These breakdowns provide only weak support for the proposition that earnings are differentially

related to ability or SES background for vocational education and general curriculum students. A similar finding was reported by Lewin-Epstein (1979, pp. 254-255) for the NLS-1972 data.

More recent data for males from NLS-1972 show vocational graduates from entry to four years out of high school having slightly but consistently higher weekly earnings (\$5-\$26 in 1978 dollars) than their general peers (Entry year and Year 1: Creech et al., 1977b, p. 2.66; Year 4: Wiley and Harnischfeger, 1980, p. 110). Because of possible heterogeneity in the postsecondary experiences reflected in the subpopulations used in these analyses, it is difficult to know whether the advantage of the vocational graduates is an artifact of more of them being employed full-time versus more general graduates being enrolled and working only part-time. The Project TALENT results for males indicated that the more able vocational graduates (excluding commercial program graduates) have slightly higher weekly earnings than the general graduates as of five years out of high school. TALENT results reported for males by race indicate that nonwhite vocational graduates did not do as well in weekly earnings as their general peers; however, the sampling design for Project TALENT did not over-represent nonwhites so that estimates for nonwhites can be assumed to be less accurate than those for whites. Results for the males in the Project TALENT sample who had graduated from a commercial program were also reported (Vincent, 1969, pp. 38, 39, 42). In separate breakdowns by ability, SES and race, the general program graduates tend to earn slightly more (\$1-\$13) than the commercial program graduates.

Average weekly earnings for females have been reported only in analyses of NLS-1972 data. As in the case of the hourly wages, female vocational graduates at entry tended to have slightly higher weekly earnings than

general graduates (Creech et al., 1977b, p. 2.66). The picture at four years out of high school is less consistent (Wiley and Harnischfeger, 1980, p. 110). Black female vocational graduates had a slight advantage over black female general graduates. The opposite was true for white females.*

In summary, the findings on hourly wages indicate that though males graduating from high school vocational programs consistently tend to have higher hourly wages and weekly earnings than those from general programs, differences also tend to be slight and vary depending on subpopulations compared. The findings for females are more mixed across the studies. Results from LME and YA show slight hourly wage advantages for both white and black females who graduate from a vocational program rather than a general program. In contrast, NLS-72 results suggest the reverse. However, NLS-72 results based on weekly earnings indicated an advantage in the entry years that dissipates by four years out of high school for black female vocational graduates and an advantage for white female vocational graduates only in the entry year. The fact that females graduating from commercial vocational programs were found to work, on the average, 2-3 more hours weekly than graduates of a general program (see section 4.2) resolves the apparent inconsistency in the NLS-72 findings for hourly wages versus weekly earnings.

Reanalyses. As in the last section, our reanalyses on earnings are of two types: cross-tabular analyses for NLS-72, NLS-LME and NLS-YA, and regression analyses for the NLS-72 data set. As usual, results are

* The slight advantage for black female vocational graduates in weekly earnings may be due principally to the greater number of hours worked each week on the average by black female vocational graduates than general graduates in the NLS-1972 sample.

presented separately for males and females.

Before describing results of these reanalyses, several introductory remarks are required. First, results are reported strictly in terms of weekly earnings.* While both weekly earnings and hourly wages were examined in our reanalyses, the weekly earnings measure appears to be the more reliable of the two. Weekly earnings were reported in the NLS-72 surveys as a direct response to a question asking for typical weekly earnings**; thus, hourly wages had to be derived from both the typical weekly earnings and typical number of hours worked each week reported for the primary job. An examination of the distribution of estimated hourly wages for NLS-72 disclosed a sufficient number of cases with extremely low or high wages to suggest derived estimates of hourly wages were less reliable than directly reported weekly earnings.

Second, our earnings data were adjusted to constant 1978 dollars. This was necessary because the survey data analyzed span the years 1966 to 1979. If data had not been adjusted to constant dollars, results from different years might have varied simply as a result of inflation.***

* Examination of the NLS-72 weekly earnings distribution at the respective time point indicated some possible deviant values. NLS-72 respondents who reported weekly earnings in excess of \$500 were considered to be "outliers" and were deleted from reanalyses. Selby (1980) reported use of this same cut-off value.

**Both the LME and YA surveys permitted each respondent to report earnings using any time unit he or she wished. The majority reported their earnings in weekly or hourly units.

***It should be noted that our adjustment for inflation appears to have made results for different survey years more comparable. For example, with adjustment, entry-level salaries across the different years represented in LME and NLS-72 appear far more similar than they do without.

Third, because of possible effects of hours worked per week on weekly earnings, hours per week was entered in one regression as an adjustment variable. This was intended to help disentangle earnings from hours worked per week which was examined as an employment outcome in section 4.2.

Fourth, for all regression analyses of earnings, we conducted parallel analyses using the natural logarithm of earnings. The log of earnings has analytical advantages over raw earnings, in that it is less sensitive to variations at the high end of the earnings distribution (this is particularly important since the earnings distribution is typically positively skewed). While results for the logarithm regression results are not presented in the text of the report, we do indicate instances in which log results differed from raw 1978 dollar results.

Fifth, for males, cross-tabular results are presented separately for those with less than twelve years of schooling (early leavers) and those with twelve years of school exactly (who can be presumed to be high school graduates with no postsecondary education as of four years out of high school). There were insufficient numbers of female early leavers to permit examination of this subgroup.

Males. Cross-tabular results regarding male earnings are presented in Table 4.3.1. As these data indicate there appear to be no clearcut or stable differences in average earnings between vocational specialty graduates and general graduates, for either black or white males. For white early leavers, average results appear to favor former general program

TABLE 4.3.1 Male Average Weekly Earnings from Labor Market Entry to Ten Years Out of High School, for High School Graduates Without Postsecondary Education and Early Leavers (NLS-72, LME and YA) (1978 Dollars) (Weighted Results).

		-----12 Years Exactly-----				-----Early Leavers-----	
		General	T&I	Bus.	Rest Voc. ^c	General	Total Voc.
WHITES							
LME	Entry Yr.	170	.	164	159	150	121
NLS-72	Entry Yr.	176	176	181	183	b	b
YA	Age 18-19	173	149	c	c	c	127
NLS-72	Yr 1	204	208	184	217	b	b
YA	Age 20-22	202	207	c	c	c	c
LME	Yr 4	233	d	216	242	220	209
NLS-72	Yr 4	226	236	232	236	b	b
LME	Yr 10	310	d	c	291	c	c
BLACKS							
LME	Entry Yr.	152	d	132	152	c	c
NLS-72	Entry Yr.	151	167	158	144	c	c
NLS-72	Yr 1	172	192	185	165	c	c
LME	Yr 4	198	d	c	c	c	c
NLS-72	Yr 4	208	216	213	190	c	c
LME	Yr 10	239	d	c	c	c	c

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- b NLS-72 has no early leavers (at least prior to spring semester senior year in high school as represented by this data set's sample)
- c Sample size less than 20
- d No T&I classification included in LME data collection.
- e LME - rest voc. includes all vocational programs except business. NLS-72 and YA - rest voc. includes agriculture, distributive education, health, and home economics.

participants rather than former vocational participants, but the available data on early leavers are so few that no firm conclusions are warranted. Nevertheless, apart from vocational specialty vs. general program contrasts, three other patterns in these data are worth noting. First, for both black and white male high school graduates, there appears to be an increasing average weekly earning with increasing years out of high school. Given that these earnings data are adjusted to constant 1978 dollars, this trend is especially striking, and likely determined by increasing work experience of individuals regardless of high school program. Second, note that within corresponding categories black earnings are almost without exception lower than white earnings, and such race differences appear to be larger than any curricular differences. Third, note that though data on early leavers are limited, those that are available suggest that regardless of high school curriculum or time out of high school, earnings of early leavers are lower than those of graduates regardless of high school curriculum.

Results of regression analyses for white males with twelve years of school exactly are summarized in Table 4.3.2. Results are reported only for two basic types of regressions, namely, those in which earnings differences are adjusted for (1) SES, and (2) SES and hours worked per week. Additional regression analyses were performed controlling for other variables, but since results of these analyses did not differ substantially from those for the simpler model controlling only for SES, they are not reported in Table 4.3.2.*

* Other variables controlled for included: average hours per week worked outside of high school; % of vocational enrollment of high school; high school in South; community size; % unemployment in community; and occupational training since high school for year 4 only.

TABLE 4.3.2: Summary of White Male Regression Results for Weekly Earnings at Three Time Points (Entry, Year 1, Year 4) for NLS-72 Respondents With Exactly Twelve Years (Weighted)

Regression Model Contrast	Entry Year			Year 1			Year 4		
	T&I to Gen.	Bus. to Gen.	R ²	T&I to Gen.	Bus. to Gen.	R ²	T&I to Gen.	Bus. to Gen.	R ²
<u>Raw Contrast to General</u>	-0.08	+4.61	-	+4.60	-20.11	-	+9.20	+5.85	-
<u>Variables Controlled</u>									
SES	-2.22	-0.10	.0014	+0.66	-34.66**	.0080	+8.82	-4.47	.0064
SES, Hours worked/week	-3.14	-0.78	.1872**	-0.59	-33.33**	.0781*	+9.39	-3.63	.0481**

All Contrasts are of vocational specialty to general

* Significant (p<.05) but corresponding natural log result not significant.

** Significant (p<.05) and corresponding natural log result significant.

As the data in Table 4.3.2 indicate, there were few significant differences between vocational and general white males. The only significant result was for the year 1 time point at which business graduates earned less than general program graduates. The result, at least in raw contrast terms, of course, might have been anticipated by the cross-tabular data reported in Table 4.3.1. The fact that the contrast does not change appreciably when adjusted for hours worked each week indicates that the higher average earnings for general graduates are not due to more hours worked each week than the vocational graduates.

Table 4.3.3 provides a summary of regression results for black males. For each of the raw contrasts, as indicated also in Table 4.3.1, earnings are higher for black T&I and business graduates than for the general graduates. Also, when SES is introduced as a control variable, differences for business graduates tend to be magnified. Note however that in only a single instance, namely for T&I graduates one year after graduation, does the adjusted difference estimate reach the level of statistical significance. This difference for T&I graduates one year after graduation remains stable, even when adjusted for differences in hours worked each week. Note too that introduction of the hours worked per week tends to increase the R^2 for blacks substantially as it did for white males.* The relatively positive adjusted differences for black males as opposed to white males should also be viewed in light of the data shown in Table 4.3.1, which indicated that black male average earnings in all categories were lower than those of white males.

* One other intriguing finding emerged from our additional regression analyses. When the Southern residence variable was introduced into the basic SES equations, it showed greater impact in changing b-weights and R^2 for black males, than for any of the other three sex-race groups.

TABLE 4.3.3: Summary of Black Male Regression Results for Weekly Earnings at Three Time Points (Entry, Year 1, Year 4) for NLS-72 Respondents With Exactly Twelve Years (Weighted)

Regression Model Contrast	Entry Year			Year 1			Year 4		
	T&I to Gen.	Bus. to Gen.	R ²	T&I to Gen.	Bus. to Gen.	R ²	T&I to Gen.	Bus. to Gen.	R ²
<u>Raw Contrast to Gen</u>	+15.71	+6.22	-	+20.28	+13.05	-	+7.85	+5.07	-
<u>Variables Controlled</u>									
SES	+14.97	+14.53	.0219 *	+19.74 **	+30.34	.0456 **	-3.55	+19.56	.0473
SES, Hours worked/week	+17.16	+7.24	.2999 **	+20.07 *	+30.09	.0856 **	-10.25	+14.95	.1354 **

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All contrasts are of vocational specialty to general

* Significant (p<.05) but corresponding natural log result not significant.

** Significant (p<.05) and corresponding natural log result significant.

Females. Table 4.3.4 presents the cross-tabular results for females from two data sets, namely NLS-72 and NLS-YA. Specifically this table shows average weekly earnings for three categories of white and black female high school graduates, namely, those identified as general program, business (or commercial-office) program, and rest or other vocational program participants.* With one exception the pattern of results is quite clear, across both race and periods of time after high school graduation. Commercial graduates tended to earn more than general program graduates, and both these groups tended to earn more than other vocational graduates. Note that the race difference apparent for males in Table 4.3.1 has no parallel for females. The average weekly earnings for black females tend to be about the same as those for white females -- both across curriculum categories and across periods of time after graduation. The average earnings of females do, however, tend to be substantially below that of males, across races, curriculum groups and periods of time after high school graduation. The earnings gaps between males and females in corresponding rows in Tables 4.3.1 and 4.3.4 range from roughly \$40-\$90 or 30-45% of corresponding male earnings for general graduates, and from \$20-70 or 13-30% of corresponding male earnings for business-commercial graduates.

Regression results for females are reported separately by race in Tables 4.3.5 and 4.3.6. As was the case with respect to males, these summary tables present results only for two basic types of regressions, namely, those in which earnings differences between commercial graduates and general graduates are adjusted for 1) SES, and 2) SES and hours

* This residual category included agriculture, distributive, health, and T&I for the NLS-72 and the YA data sets. Home economics majors are excluded from this category.

TABLE 4.3.4: Female Average Weekly Earnings from Labor Market Entry to Four Years Out of High School for High School Graduates Without Postsecondary Education (NLS-72 and YA) (1978 Dollars) (Weighted Results).

		<u>General</u>	<u>Bus.-Comm.</u>	<u>Rest Voc.</u> ^e
<u>WHITES</u>				
NLS-72	Entry Yr.	111	128	105
YA	Age 18-19	109	108	c
NLS-72	Yr. 1	126	141	123
YA	Age 20-22	112	126	c
NLS-72	Yr. 4	143	161	140
<u>BLACKS</u>				
NLS-72	Entry Yr.	115	137	109
NLS-72	Yr. 1	135	146	110
NLS-72	Yr. 4	141	170	140

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c. Insufficient sample size

e. NLS-72 and YA - rest voc. includes agriculture, distributive education, health, and T&I.

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worked per week. A variety of other regression models were run, but since results rarely differed substantially from those in the basic SES model, we will not review them in the text. As Table 4.3.5 indicates, white female commercial graduates showed a weekly earnings advantage over general graduates, after adjustment for SES, of about \$20, and this advantage seemed to hold at all three time points, namely entry and 1 and 4 years out of high school. Note, however, that when hours worked per week were included in the regression equation the adjusted difference dropped somewhat, particularly at the entry and year 1 time points.* This suggests that some of the apparent weekly earnings advantage for the white commercial graduates is due simply to the fact that they work more hours per week than general graduates, as noted in section 4.2.

Regression results for black females are shown in Table 4.3.6. Like whites, black female commercial graduates show a weekly earnings advantage over general graduates of about \$20 at job entry, but the results at year 1, though similar in magnitude, are not statistically significant. Adjusted results at year 4 are both smaller in magnitude and nonsignificant. Though this evidence is not terribly strong, it does suggest the earnings advantage for black female commercial graduates at job entry may diminish somewhat over time.**

* In another regression analysis not reported in Table 4.3.5 it was also found that the adjusted difference for white female graduates of commercial programs dropped from \$21 to \$18 at year 4 when job tenure was added to the basic SES model.

**When job tenure was added to the basic SES model for year 4, the adjusted difference for black females dropped even more sharply from 16.6 to 8.3.

TABLE 4.3.5: Summary of White Female Regression Results for Weekly Earnings at Three Time Points (Entry, Year 1, Year 4) for NLS-72 Respondents With Exactly Twelve Years (Weighted).

Regression Model Contrast	Entry Yr.		Year 1		Year 4	
	Comm. to Gen.	R ²	Comm. to Gen.	R ²	Comm. to Gen.	R ²
<u>Raw Contrast to Gen.</u>	+17.29	-	+14.90	-	+18.43	-
<u>Variables Controlled</u>						
SES	+21.77 **	.0421 **	+19.68 **	.0262 **	+21.38 **	.0415 **
SES, Hours worked/week	+13.10 **	.3536 **	+14.45 **	.2331 *	+18.81 **	.3003 **

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All contrasts are of vocational specialty to general

* Significant (P<.05) but corresponding natural log result not significant.

** Significant (p<.05) and corresponding natural log result significant.

TABLE 4.3.6: Summary of Black Females Regression Results for Weekly Earnings at Three Time Points (Entry, Year 1, Year 4) for NLS-72 Respondents with Exactly Twelve Years (Weighted)

Regression Model Contrast	Entry		Year 1		Year 4	
	Comm. to Gen.	R ²	Comm. to Gen.	R ²	Comm. to Gen.	R ²
<u>Raw Contrast to Gen</u>	+21.95	-	+10.79	-	+28.85	-
<u>Variables Controlled</u>						
SES	+24.79**	.0494*	+28.04	.0291	+16.58	.1043**
SES, Hours worked/week	+19.37**	.2285*	+18.74	.1731*	+15.10	.2353**

All Contrasts are of vocational specialty to general.

* Significant (p<.05) but corresponding natural log result not significant.

** Significant (p<.05) and corresponding natural log result significant.

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Summary. Findings regarding reanalyses of weekly earnings data showed no consistent differences for white males graduating from T&I or business vocational specialty areas. However, reanalyses for black males showed somewhat higher weekly earnings for graduates of T&I and business specialty areas than black male graduates of general programs. While the findings for previous national studies are consistent with these findings for black males, they are not with those for white males. Similar to previous studies, results of reanalyses indicated slight differences in earnings among curricula, but unlike previous studies that found white male vocational graduates tending consistently to have slightly higher hourly and weekly earnings, the reanalyses found no clearcut advantage in weekly earnings for either curriculum with respect to white males.

For females, commercial graduates appear consistently to earn somewhat more than female general graduates, and the earnings difference appears to hold up even in regression analyses adjusting for weekly hours worked. The earnings advantage of female commercial graduates appears to diminish somewhat between occupational entry and four years after graduation. Findings from both previous national studies and non-national studies are not inconsistent with results of reanalyses regarding earnings for females. Nevertheless, it is worth noting in summary that earnings differences associated with curriculum groups are relatively small compared with earnings differences associated with sex.

4.4 Occupational Level and Status

Secondary school vocational education programs are intended not just to prepare students for gainful employment, but more specifically to enable graduates to enter semi-skilled and skilled occupations. Thus, another indicator of whether vocational education graduates were successfully prepared for gainful employment is whether or not they entered semi-skilled or skilled occupations instead of unskilled ones.

In the research literature on occupational outcomes two different approaches to evaluating occupational status and level are common. First, job descriptions and titles can be analyzed using a standard occupational typology to determine what types of jobs different people enter. Second, occupational status indicators can be analyzed to compare the occupational statuses of different types of people. How these two approaches might be applied in studying occupational status outcomes associated with participation in vocational education is discussed below.

Three classification systems are commonly used in analyses of jobs and occupations: (1) the Census Occupational Classification (COC) system, (2) the Dictionary of Occupational Titles (DOT), and (3) the Occupational Employment Statistics (OES) system (Wool, 1979, pp.558-562). The development of a new system -- Standard Occupational Classification (SOC) -- was undertaken in order to provide a statistical bridge between the Census and DOT systems and was completed in 1977. Wool (1979, p. 564) compares the major occupational groupings provided by each of these four systems. Though in future years the new SOC system may replace the other systems, we rely on the Census System because it is the one typically employed in the national longitudinal studies reviewed.*

* To be more specific, in literature reviewed and in our own reanalyses, both the 1960 and 1970 Census Occupational Codes are employed. The 1970 version is essentially a refinement of the 1960 Codes, and as such is highly similar. Thus, use of the 1970 version as opposed to the 1960 one should not affect results significantly.

The major Census occupational groupings are based primarily on socio-economic classes. The twelve major occupational groupings of the COC system are as follows:

- Professional-technical
- Managers-administrators (except farm)
- Sales workers
- Clerical workers
- Craftsmen
- Operatives, except transport
- Transport equipment operatives
- Laborers, except transport and farm
- Farmers and farm workers
- Farm supervisors and laborers
- Service workers, except private household
- Private household workers

The level of skill requirements for occupations under most of these rubrics is relatively clear: the jobs under craftsmen are those commonly considered to be skilled; those under operatives, semi-skilled; and those under nonfarm laborers unskilled. The service worker category, however, covers a heterogeneous mixture of jobs. On the one hand, it includes busboys, cleaners and dishwashers; on the other, police officers, detectives, welfare service aides and dental assistants, to name a few. In other words, it groups a number of jobs that require little or no skills with others that presume competencies at a level usually associated with semi-professional or professional occupations. Given such an occupational classification scheme, we would expect that at entry to the labor market male vocational graduates would have a different occupational profile than male general graduates on these four groupings; namely, a smaller percentage of the vocational graduates than the general graduates would be in the unskilled groupings and a larger percentage would be in the semi-skilled (operatives) and skilled (craftsmen) groupings.

The second approach to analyzing occupational status outcomes of vocational education graduates is to use a standard index of occupational status. The most commonly used index is Duncan's (1961) socioeconomic (SES) index, ranging from 0 to 96, which is based on the percentage of men working in an occupation who had completed high school and the percentage with incomes of more than \$3,500 in 1950. Although the Duncan index is somewhat dated and may be somewhat insensitive to the status of female-dominated occupations, it is a standard measure which is commonly used in studies of occupational mobility and of economic returns to schooling (e.g., Jencks et al., 1979; Featherman and Hauser, 1976). Moreover, the Duncan index has been shown "to capture both inter- and intragenerational occupational stability better than any other system in common use" (Jencks et al., 1979, p. 8) and to be closely related to independent ratings of the "general standing" of occupations (Jencks and Rainwater, 1977, Chapter 11).

Of these two broad approaches to analyzing the occupational status of vocational education graduates -- namely, analyses based on standard occupational classification systems, and analyses based on the Duncan index -- the former is the one used primarily in past research. Nevertheless, both are explored in our reanalyses.

Non-national Studies. In their review of the literature on the effects of vocational education, Mertens et al. (1980a,b) did not attempt to differentiate findings pertaining to occupational status and level of vocational education graduates from those pertaining to the job relevancy of training (reviewed in the next section). Nevertheless, it was noted that in only a few non-national studies were standard job classification systems such as the Dictionary of Occupational Titles used to assess the employment outcomes

of vocational education students (Mertens et al., 1980b, p. 23). Felstenhausen (1973) reports that 46% of the 1972 secondary vocational graduates from selected Illinois schools found employment in the clerical/sales category. Market Opinion Research (1973) reports that 51% of secondary vocational graduates who were 19-20 years old in 1973 found employment in the clerical/sales category versus 41% of secondary non-vocational graduates in the same Ohio age cohort. Interestingly however, Market Opinion Research also reports that only 20% of secondary vocational graduates and 22% of non-vocational graduates who were 25-26 years old in 1973 were employed in the clerical/sales area.

Previous National Studies. The occupational status of vocational education graduates has been reported in terms of occupational status of entry-level jobs or jobs held within a few years out of high school in analyses of NLS-72 and NLS-LME data. For the NLS-LME subpopulation of 16-19 year olds (including early leavers as well as those with 12 years of schooling), Parnes et al. (1970, p. 85) reported data showing that for both black and white males, higher proportions of former vocational education students tended to be employed in semi-skilled (operatives) and skilled (craftsmen) job categories, whereas former general curriculum students were more often employed in unskilled (laborer and service worker) job categories. Also using NLS-LME data, and focusing on occupational status at entry, for those with exactly 12 years of schooling, Grasso and Shea (1979 b,p. 219) found less clearcut results. For white males aged 18-24 in 1966, approximately equal percentages of vocational and general graduates reported entering jobs classified as laborers, service workers or operatives, but 7% more vocational education graduates reported entering

jobs classified as craftsmen. For black male vocational education graduates, the picture was more mixed; although 20% fewer of them (as compared with black general graduates) reported entering jobs classified as laborers (unskilled), fewer also reported jobs as operatives (semi-skilled) or craftsmen (skilled).

More recent findings based on NLS-72 data, undifferentiated by race, and including persons who were pursuing or had completed post-high school studies, show slight differences, roughly in accordance with what might be expected. Specifically for males aged 22-23 in 1976, 5% more former vocational participants than general program participants reported holding operatives (semi-skilled) jobs and 8% more former vocational than general participants reported holding craftsmen (skilled) jobs (Peng and Holt, 1977, pp. 135-138).

Only limited data for females are available from previous national studies. Grasso and Shea (1979b, p.78) reported NLS-LME data relating occupational level to high school curriculum for females, but collapsed the occupational categories of interest into a single category. Results from the NLS-72 surveys were reported for females for two time points, two and four years out of high school. These data showed much larger percentages of female vocational-commercial graduates than general curriculum graduates in clerical positions (Peng and Holt, 1977, pp. 336-339; Peng et al., 1978, pp. 135-138) and more female general graduates in either service-worker or white-collar pooled categories.

Reanalyses. Reanalyses on the topic of occupational level and status were performed on NLS-72, NLS-LME and NLS-YA data sets. These reanalyses encompassed both simple cross-tabulations and regression analyses. As

usual all reanalyses treated the four sex-race groups separately and where available data permitted, vocational specialty areas separately.

Occupational classifications were based mainly on the Census Occupational Codes, the 1960 version for the LME data, and the 1970 version for both the NLS-72 and the NLS-YA data sets. The main exception to straightforward reliance on the Census codes was in regard to the service worker category. As noted, this rubric, under the Census coding scheme, covers a disparate collection of jobs, ranging from ones that obviously are skilled or semi-skilled (such as policemen, barbers, practical nurses, and cooks) to others that are just as obviously unskilled jobs (e.g. bus-boys, bootblacks, elevator operators and crossing guards). Thus, for the purpose of cross-tabular analyses, the general service worker category was divided into two: semi-skilled/skilled service workers and unskilled service workers.

For descriptive purposes only, cross-tabulations were calculated on the Census occupational categories. Both cross-tabular and regression analyses were calculated on the Duncan socioeconomic index. The Duncan index was provided directly on the public use tapes of each of the three data sets.

* Altogether the Census occupational classification scheme lists 37 specific jobs under the service worker category (excluding private household workers). Of these jobs, all coded 900, the following were treated in our reanalyses as service worker semi-skilled: 912 cooks, except private household; 921 dental assistants; 914 lay midwives; 926 practical nurses; 931 airline stewardesses; 935 barbers; 942 child care workers, except private household; 944 hairdressers and cosmetologists; 954 welfare service aides; 961 firemen, fire protection; 963 marshalls and constables; 964 policemen and detectives; and 965 sheriffs and bailiffs. The remaining Census service worker jobs were treated as service-unskilled occupations.

Occupational Categories. In tabulating the occupations in which high school graduates (and for males only, early leavers) found employment, we used essentially the following ten job categories:

- Farm
- Nonfarm labor unskilled
- Service worker -- unskilled
- Service worker -- semi-skilled
- Operatives -- semi-skilled
- Crafts -- skilled
- Clerical
- Sales
- Managers and administrators
- Professional, technical workers

As noted already, the broad occupational categories are exactly those used in the Census Occupational Codes except that the service worker category has been broken up into two groups, to differentiate unskilled service workers from those which are either semi-skilled or skilled. *

The major occupational categories of jobs held by high school graduates with no postsecondary schooling (i.e., with exactly 12 years of schooling) are shown in Tables 4.4.1 for males and 4.4.2 for females. So as to highlight the broad patterns of results, we have entered data in these tables only if the weighted percentage of individuals for the occupational category for the relevant sex, race, data cohort time point, and high school curriculum group amounted to 10% or more. Cohort time point represents years after high school graduation (actual or for early leavers cohort graduation year)

* The only general exception to this classification scheme was with the NLS-72 data set which included a separate job category for military. However, since individuals in this category accounted for no more than 1% of the individuals in any of the sex-race curriculum groups we examined, this exception obviously would not affect results markedly. We should note that the reason for the percentage being so low was because these analyses were based on those employed and in the labor force. The CPS procedures used for the labor force classification classifies those in the active military as "out" of the labor force. Thus, any who had identified themselves elsewhere as in the military would have been excluded from these analyses. Those in the military were purposively excluded from the IML sampling plan.

TABLE 4.4.1: Major Occupational Categories for Male High School Graduates with No Postsecondary Schooling, and Early Leavers, by Race, Data Set, Cohort Time Point, and High School Curriculum Group (Weighted Results).

Data Set, and Race,	Cohort Point	Curric. Group	Non		Serv. Unsk.	Oper Semi- Sk.	Crft Sk.	Cler- ical Sales	Mngr. Admin.
			Farm Unsk.	Labor Unsk.					
WHITES									
LME	Entry	Gen		18		33	15	10	
		Bus		15		47	11	16	
		OthrVoc	14	18		36	22		
NLS-72	Entry	Gen		23		32	20		
		Bus		30		18	11	22	
		T&I		14		36	32		
		RestVoc		27		31	15		
YA	Ages 18-19	Gen	10	18		46	16		
		T&I				35	27	18	
NLS-72	1 Yr.	Gen		21		30	25		
		Bus		15		33	18	17	
		T&I		13		35	31		
		RestVoc		21		32	26		
YA	Ages 20-22	Gen		16		29	25		
		T&I		21		42	25		
LME	4 Yr.	Gen				38	25		
		Bus				37	20	23	
		OthrVoc		11		35	33		
NLS	4 Yr.	Gen		11		31	27		
		Bus				36	29		
		T&I		11		33	36		
		RestVoc		12		35	26		
LME	10 Yr.	Gen				28	32		12
		Bus				20		15	34
		OthrVoc				21	37		10
BLACKS									
LME	Entry	Gen		20	14	29		16	
		Bus		29		34		29	
		OthrVoc		18		26	28	10	
NLS-72	Entry	Gen		28	16	24		18	
		Bus		14		50		37	
		T&I		11	32	26	16		
		RestVoc		36		28	12		
NLS-72	1 Yr.	Gen		19	15	38		14	
		Bus		25		35		20	
		T&I		14	10	53	15		
		RestVoc				62	10	11	
LME	4 Yr.	Gen				42	14	14	
		Bus				83	10		
		OthrVoc				50		27	

TABLE 4.4.1: (cont.)

Data Set, and Race,	Cohort Point	Curric. Group	Farm	Non Farm Labor Unsk.	Serv. Unsk.	Serv. Semi- Sk.	Oper Semi- Sk.	Crft Sk.	Cler- ical	Sales	Mngr. Admin.
<u>BLACKS</u>											
NLS	4 Yr :	Gen		14			33	19	12		
		Bus					26	31	21		
		T&I		16			42	16			
		RestVoc		20	12		46				10
LME	10 Yr.	Gen		11			54	16			
		Tot.Voc		19			33	22	19		
<u>WHITE EARLY LEAVERS</u>											
LME	Early	Gen		22			28	18			
		Tot.Voc	11	11	17		36	16			
YA	Ages 18-19	Gen		19	12		47	10			
		Tot.Voc		32	14		30	23			
LME	4 Yrs.	Gen		15			38	29			
		Tot.Voc		18			31	31			
LME	10 yrs.	Gen		10			36	34			
		Tot.Voc		11		11	60	18			

for NLS-72 and LME, and age group, for NLS-YA. Results for the different data sets have been organized so as to constitute a rough progression from entry level job to job ten years out of high school (for LME males only).

Examining the broad pattern of results for males in Table 4.4.1, one fact is most readily apparent. It is that almost without exception, and irrespective of race, curriculum group or time after graduation, a majority of males are employed in jobs within just three occupational categories; namely, nonfarm labor (unskilled), operatives (semi-skilled) and crafts (skilled). There appears to be a slight tendency for graduates of T&I groups to be employed in skilled crafts jobs more often than general graduates but differences are small (i.e., generally less than 10%) and inconsistent even in direction. Similarly there appears to be a slight, but again inconsistent, trend for white male graduates self-reported as having participated in business vocational programs to go into clerical jobs. In light of small and inconsistent curricular differences, other patterns show up as considerably more striking. Black male graduates, for example, tend more often to have jobs classified in the unskilled service category. Similarly black more often than white graduates appear in the clerical category. Both of these race differences appear to be largely independent of self-reported curriculum program. Finally, at least in the LME data set where data are available for longer periods after high school, it appears that by 10 years out, white males show up in higher proportions in the manager-administrator job category, and in somewhat higher proportions for business vocational graduates, than for general and other vocational graduates.

Major occupational categories for female high school graduates with exactly 12 years of schooling, (i.e., with no postsecondary education) are shown in Table 4.4.2. Again so as to highlight broad patterns of results, data are given only for those occupational categories in which at least 10% of the sample of females were found. As with males, a major portion of females (circa 50-80%) are found in just three occupational categories, but two of the three categories are different. In all data sets, high school curriculum groups and cohort time points, a clear majority of employed females were in the following occupational categories:

- unskilled service workers
- semi-skilled operatives
- clerical workers

Between entry point and one year after graduation fair numbers of females were also found in the sales category.

Comparing graduates of commercial+office vocational programs with general graduates, a sharp curricular difference is apparent with respect to those employed in the clerical category. Across data sets, cohort time points, and races, female commercial graduates substantially more often tended to be employed in the clerical category. Differences ranged from 12-39% more commercial graduates than general graduates employed in this occupational category. This trend pattern was equally strong for black commercial graduates as for white commercial graduates. In an apparent reflection of this trend general graduates more often than commercial graduates tended to be employed in unskilled service jobs. However, with respect to unskilled service employment, there also appears to be a cohort time trend, with females tending as they get older and further out of high school to be employed in unskilled service jobs in smaller proportions. This trend seems

TABLE 4.4.2: Major Occupational Categories for Female High School Graduates with No Postsecondary Schooling (12 Years Exactly) by Race, Data Set, Cohort Time Point, and High School Curriculum Group (Weighted Results).

Data Set, and Race,	Cohort Point	Curric. Group	Non Farm Labor Farm	Unsk.	Serv. Unsk.	Serv. Semi- Sk.	Oper Semi- Sk.	Crft. Sk.	Cler. ical	Sales	Mgr. Adm.	Tech. Prof.
WHITES												
NLS	Entry	Gen		23			14		30	19		
		Comm		13					61	10		
		RestVoc		18	16	15			16	26		
YA	Ages 18-19	Gen		18			18		35	10		
		Comm							74	15		
		RestVoc										
NLS-72	1 Yr.	Gen		17			10		41	10		
		Comm		12					68			
		RestVoc		14		12			39	15		
YA	Ages 20-22	Gen		27			4		44			
		Comm		18			11		56			
		RestVoc										
NLS	4 Yrs.	Gen		14			22		39			
		Comm							64			
		RestVoc					10		50	12		
BLACKS												
NLS-72	Entry	Gen		48			23		18			
		Comm		34					49			
		RestVoc		26		19		15	24			
NLS-72	1 Yr	Gen		18			34		28			
		Comm							66			
		RestVoc		14		32			32			
NLS-72	4 Yrs.	Gen		14			39		32			
		Comm		11					71			
		RestVoc		12		35			21			

to hold for both black and white females and to be pretty much independent of high school curriculum group. One anomaly in the Table 4.4.2 results should be noted. The only case in any of the data sets, in which more than 10% of either males or females were found to be employed in the technical-professional category was for black female rest vocational graduates four years out of high school in the NLS-72 data set. *

Duncan Socioeconomic Index Results. A second means of examining the occupational status of vocational program graduates is the Duncan Socioeconomic Index (SEI). As noted the SEI was provided directly on the public use tapes of all three data sets that were reanalyzed, namely, NLS-72, NLS-LME, and NLS-YA. Reanalyses were of two types: 1) cross-tabulations of SEI scores by sex, race, data set, cohort time point and curriculum program (and for white males only, early leavers, as opposed to graduates); and 2) regression analyses of SEI scores for the NLS-72 data set only. Results for both types of reanalyses will be presented for males first and then for females.

Table 4.4.3 shows the average Duncan SEI scores for males across the various data sets and curriculum groups. Three broad patterns are apparent in these data. First, SEI scores tend to be lower for male early leavers than for high school graduates regardless of curriculum program and across both data sets on which data on white male early leavers are available, namely LME and YA. Second, black male SEI scores

* We do not know exactly which occupations this figure represents, but it should be noted that the technical-professional category includes occupations such as health technologists and other technicians, of the sort who might be trained by vocational programs in the rest vocational category.

TABLE 4.4.3: Average Duncan Scores for Males, by Race, Data Set, Cohort Time Point and Curriculum Group (Weighted Results).

Race, Data Set and Cohort Time Point			Graduates (12 Years Exactly)				Early Leavers	
			General	T&I	Bus.	Rest Voc. ^e	General	Total Voc.
<u>WHITES</u>								
LME	Entry Yr.	1966-71	24.1	d	24.8	19.2	20.9	20.1
NLS-72	Entry Yr.	1972	21.7	23.4	24.4	24.0	b	b
YA	Age	18-19 1979	18.8	24.1	c	c	20.3	16.7
NLS-72	Yr.	1 1973	22.1	23.3	26.8	21.9	b	b
YA	Age	20-22 1979	25.6	23.8	c	c	c	c
LME	Yr.	4 1966-73	29.6	d	30.7	27.8	24.2	19.4
NLS-72	Yr.	4 1976	26.8	27.0	29.1	27.4	b	b
LME-72	Yr.	10 1969-76	34.3	d	c	35.5	c	c
<u>BLACKS</u>								
LME	Entry Yr.	1966-71	19.7	d	22.6	22.2		
NLS-72	Entry Yr.	1972	21.2	22.0	24.5	19.2		
NLS-72	Yr.	1 1973	21.2	19.4	21.3	21.7		
LME	Yr.	4 1966-73	26.9	d	c	c		
NLS-72	Yr.	4 1976	26.6	23.7	29.0	21.5		
LME	Yr.	10 1969-76	24.9	d	c	c		

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250

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- b. NLS-72 has no early leavers (at least prior to spring semester senior year in high school as represented by this data set sample).
- c. Insufficient sample size
- d. No T&I classification included in LME data collection.
- e. LME - Rest voc. includes all vocational programs except business.
 NLS-72 and YA - Rest voc. includes agriculture, distributive education, health, and home economics.

are consistently lower than white male scores in corresponding groups. Differences are slight but the direction of differences (with those of whites higher) appears consistent across data sets, time points and curriculum groups. Third, with increasing age and years out of high school (and presumably more work experience), males tend to have higher SEI scores. This trend is not altogether consistent and time trend differences tend to be small (a maximum difference of 16 SEI points between LME rest vocational graduates at entry and at 10 years out of high school), but is apparent in most cases. Against this backdrop, SEI differences associated with participation in vocational specialty programs show up as relatively small. For both blacks and whites, business graduates tend to have slightly higher SEI scores than general graduates (with differences ranging from 0.1 to 4.7) and T&I graduates tending generally but not always to have higher SEI scores than general graduates (with differences across race groups ranging from -2.9 for NLS-72 blacks in year 4 to +5.3 for YA whites aged 18-19).

A summary of results of regression analyses of Duncan SEI scores for males is provided in Table 4.4.4. As usual a considerably greater number of regression analyses (controlling for a range of school and community characteristics, and for year 4 a range of types of experience since high school) were conducted than are reported in the summary table. Specifically, the summary table shows only raw contrasts between vocational and general graduates and contrasts adjusted for 1) SES, 2) residence in the South while in high school, and 3) a set of seven occupational training variables (for 4 years out of high school only). For both blacks and whites, adjusting for

TABLE 4.4.4: Summary of Regression Results for Males for Duncan SEI for Three Time Points (Entry, Yr. 1, Yr. 4) (Weighted).

	-----ENTRY YR-----			-----YR 1-----			-----YR 4-----		
	T&I to General ^a	Bus. to Gen. ^a	R ²	T&I to Gen. ^a	Bus. to Gen. ^a	R ²	T&I to Gen. ^a	Bus. to Gen. ^a	R ²
<u>WHITES</u>									
Raw contrast to General	+1.7	+2.7	-	+1.2	+4.7	-	+1.0	+2.3	-
Contrast controlled for: SES	+0.7	+0.6	.0034	+1.5	+4.3*	.0202*	-0.2	+1.2	.0229*
SES, Resid. South HS	+0.7	+1.1	.0111*	+1.5	+4.7*	.0286*	-0.2	+1.4	.0281*
SES, Occup. Training Set	--	--	--	--	--	--	-0.3	+1.6	.0432*
<u>BLACKS</u>									
Raw Contrast to General	+0.8	+3.3	-	-1.8	+0.1		-2.9	+2.4	-
Contrast controlled for: SES	+1.0	+5.8	.0161	-1.8	-1.8	.0097	-1.5	+3.6	.0112
SES, Resid. South HS	+1.1	+5.7	.0171	-1.9	-1.8	.0097	-2.7	+3.4	.0398
SES, Occup. Training Set	--	--	--	--	--	--	-0.3	+4.9	.1022

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253

* P < .05

Contrasts of voc to general: + = voc greater than general; - = voc less than general.

SES changed the curricular contrasts somewhat, but note that very few contrasts were statistically significant. Not a single adjusted contrast was significant for black males, and for white males the only adjusted contrast reaching statistical significance was for business graduates at year one, with business graduates having SEI scores 4-5 points higher than general program graduates.

Table 4.4.5 shows average Duncan SEI scores for female graduates across two data sets, and years (there are no year 10 data for females since LME data were not reanalyzed for females) and curriculum groups. Sample sizes were too small to allow a separate analysis of female early leavers. Three general points can be noted regarding these data. First, the female SEI scores tend to be higher than those shown for males in Table 4.4.3. Second, black females invariably have lower SEI scores than white females though differences are sometimes slight. Third, as for males, there appears to be a trend for females to increase in SEI scores as they are out of school more years and presumably have more work experience. This trend is not altogether consistent however. Note, for example, that the highest average female SEI score (49.0) is for the YA sample at ages 13-19. Beyond these general trends one other clear difference is apparent in the Table 4.4.5 data; namely, female commercial graduates tend to have substantially higher SEI scores than general graduates. Differences range from 10 to 17 points and are consistent across race, data sets and time points. Results for the rest vocational category are smaller and less consistent but the pattern appears to be that other female vocational graduates tend to have higher SEI scores

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TABLE 4.4.5: Average Duncan Scores for Female Graduates by Race, Data Set, Cohort Time Point and Curriculum Group (Weighted Results).

Race, Data Set, and Cohort Time Point	Curriculum Group		
	General	Comm.	Rest. Voc. ^e
<u>WHITES</u>			
NLS-72 Entry Yr. 1972	31.7	41.8	29.1
YA Age 18-19 1979	32.2	49.0	c
NLS-72 Yr. 1 1973	33.8	43.7	37.2
YA Age 20-22 1979	33.7	41.0	c
NLS-72 Yr 4 1976	36.6	47.4	41.0
<u>BLACKS</u>			
NLS-72 Entry Yr. 1972	22.1	37.6	29.0
NLS-72 Yr 1 1973	27.1	42.8	29.8
NLS-72 Yr 4 1976	30.3	46.5	32.2

c Insufficient sample size

c NLS-72 and YA - Rest voc. includes agriculture, distributive education, health, and T&I.

than general program graduates (recall, however, that this analysis excludes home economics graduates). The only exception to this pattern is for the female rest vocational category in the NLS-72 data set at entry point.

How are the sizeable differences between female commercial and general graduates affected when adjustments are introduced? The answer to this question is given in Table 4.4.6 which provides a summary of regression results for female graduates for the Durcan SEI at three time points using NLS-72 data. In brief, the answer is that the advantage for commercial graduates appears to hold up very well. When adjustments are introduced for a variety of variables, the SEI score advantage remains around ten points or higher for both black and white females, and is invariably statistically significant. The only sharp change in the estimated difference is for black females at year one and year 4 when the introduction of SES reduces the raw contrast of 15.7 to 9.5 (year 1) and 16.2 to 9.8 (year 4). This change is not unexpected, however, since as explained in Chapter 3, in this subsample, black female commercial graduates showed higher SES than corresponding general graduates. The only other general point to be noted regarding Table 4.4.6 is that there appears to be a trend for adjusted differences in SEI scores to decline slightly between entry point and year 4. This decline in adjusted differences is apparent for black females as well as white females, though the drop is different for the two races (from 12.7-13.7 at entry, to 8.7-9.5 at year 1, to 7.6-8.5 at year 4 for whites; and from 17.7-19.4 at entry, to 8.3-9.7 at year 1, to 8.5-9.9 at year 4 for black females).

TABLE 4.4.6: Summary of Regression Results for Female Graduates for Duncan SEI at Three Time Points (Entry, Yr 1, Yr 4) (Weighted).

	Entry Year		Year One		Year Four	
	Comm. to Gen. ^a	R ²	Comm. to Gen. ^a	R ²	Comm. to Gen. ^a	R ²
WHITES						
Raw contrast to General	+10.1	-	+9.9	-	+10.8	-
Contrast controlled for:						
SES	+12.9*	.1014*	+8.8*	.0803*	+ 8.0*	.1032*
SES, Avr. Hrs. Worked Outside H.S.	+13.7*	.1060*	+9.5*	.0844*	+ 8.5*	.1055*
SES, % Enrollment VocH.S.	+12.7*	.1032*	+8.7*	.0806*	+ 8.0*	.1032*
SES, Resid South H.S.	+13.2*	.1074*	+9.1*	.0848*	+ 8.2*	.1088*
SES, Community Size	+12.7*	.1121*	+8.4*	.0962*	+ 7.6*	.1222*
SES, Avr. Income Community	+13.0*	.1069*	+8.8*	.0804*	+ 8.0*	.1040*
SES, % Unemployment	+13.2*	.1111*	+8.9*	.0838*	+ 8.0*	.1039*
SES, Occup. Training Set	--	--	--	--	+ 8.2*	.1236*
SES, On-the-Job Training	--	--	--	--	+ 7.6*	.1144*
SES, Apprenticeship	--	--	--	--	+ 8.1*	.1036*
SES, Job Tenure	--	--	--	--	+ 7.3*	.1252*
BLACKS						
Raw Contrast to General	+15.5	-	+15.7	-	+16.2	
Contrast controlled for:						
SES	+18.0*	.2165*	+9.5*	.1575*	+ 9.8*	.2713*
SES, Avr. Hrs. Worked Outside H.S.	+18.0*	.2166*	+9.5*	.1581*	+ 9.9*	.2715*
SES, % Enrollment VocH.S.	+18.1*	.2167*	+9.7*	.1695*	+ 9.9*	.2716*
SES, Resid South H.S.	+18.4*	.2420*	+9.0*	.1867*	+ 9.8*	.2737*
SES, Community Size	+17.7*	.2213*	+9.4*	.2149*	+ 9.8*	.3011*
SES, Avr. Income Community	+19.4*	.2464*	+8.3*	.1795*	+ 8.5*	.2929*
SES, % Unemployment	+18.1*	.2217*	+9.1*	.1798*	+ 9.8*	.2758*
SES, Occup. Training Set	--	--	--	--	+10.2*	.3492*
SES, On-the-Job Training	--	--	--	--	+ 9.8*	.2713*
SES, Apprenticeship	--	--	--	--	+ 9.7*	.3130*
SES, Job Tenure	--	--	--	--	+ 9.5*	.2721*

* p < .05

Contrasts of voc to general: + = voc greater than general; - = voc less than general

Summary. Findings regarding occupational level outcomes for males tended to be small and somewhat inconsistent. Both white and black graduates of T&I programs tended more often than general graduates to report employment in skilled occupational categories, but general graduates appeared to do as well as male vocational specialty graduates in finding employment in semi-skilled occupations. Past national studies, though not disaggregated in the same way as our reanalyses, are not inconsistent with these findings. For females both white and black graduates of commercial programs show a clear trend to be more employed in the skilled clerical category than female graduates of general programs. Again previous research, though limited, is not inconsistent with these findings.

The above findings are confirmed in analyses of differences apparent with respect to Duncan's socioeconomic index. For males, large differences associated with curriculum were not apparent, but there appeared a slight tendency for male graduates of both T&I and business vocational specialty areas to be employed in occupations with slightly higher SEI's. However regression analyses showed only one comparison for this outcome variable to be significantly greater (for male white business graduates) than general graduates. For female graduates, however, for both blacks and whites, there appeared to be a significantly larger SEI for commercial graduates than general graduates, though the advantage in SEI for female commercial graduates appears to diminish slightly with increasing years after high school graduation (from 13-18 SEI points at entry to 8-10 points at four years after graduation). This finding regarding SEI advantage of female commercial graduates,

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it should be noted, is the largest and most consistent gainful employment difference associated with vocational education participation found in any of our reanalyses. It appears to derive from the tendency for both black and white female graduates of commercial vocational programs more often than female general graduates to enter clerical occupations.

4.5 Employment Related to Training

One of the two standards for assessing the effectiveness of vocational education explicitly mentioned in the Educational Amendments of 1976 is whether vocational education graduates find "employment related to their training" (Section 112 (b)(1)(B)). Since employment in specific jobs is dependent on a tremendous number of factors and conditions besides training (see Venn, 1978, p. 189), a strict interpretation of training-related employment clearly would be inappropriate. For this reason, we first reviewed the evidence in the previous section as to whether secondary vocational graduates tend to find employment above the unskilled level. In this section we take a narrower, but still quite broad view of the job-relatedness criterion. Specifically in this section we review evidence concerning the extent to which vocational education students find employment in jobs related to their vocational specialty area. Two types of evidence are available on this point: namely, self-reports of job-relatedness and analyses based on occupational classification systems mentioned in section 4.4.

Non-national Studies. In their review of the literature on vocational education, Mertens et al. (1980a, b) located nearly fifty non-national studies which addressed the relationship between secondary vocational education programs and occupations entered by graduates. In almost all such cases, it was addressed through self-reports of job-relatedness. The problem with such self-reports is that questions pertaining to job relatedness are often posed in quite different fashion. Brice and Brown (1973), for example, asked vocational education graduates: "On your present job, how much do you use the vocational

training you received in high school or area vocational center?" and respondents were to answer "a lot, some, hardly any, or none." Other studies asked respondents to rate whether their jobs were related to their training in a strictly bipolar manner, yes or no. Thus in summarizing this literature, Mertens et al. were able only to combine "response categories indicating any degree of relationship between job and training . . . into one category, employment in an occupation related to training" (1980a, p.41). Using this approach these investigators concluded that

A majority of secondary-level vocational students find employment in at least their first jobs after completing their programs, that is related to the occupational areas in which they were trained.

(Mertens et al., 1980a, p.159; 1980b, p.77)

Several points should be noted regarding this conclusion. First, 30 of the 48 non-national studies reporting data on this question were classified by Mertens et al. as being less rigorous. Second, there is little information available on the reliability or validity of such self-reports of job relatedness. As noted in Chapter 2 (section 2.3), indefinite survey questions employing ambiguous terms from everyday language tend to exhibit lower reliability than clearly stated factual questions. Questions concerning relatedness of job to training would seem to be of the former variety rather than the latter. While we have been unable to locate any specific data on the reliability and validity of graduate respondents' reports of job relatedness, one non-national study provides data which clearly raises doubts about the meaning of this type of report. In a follow-up study on subsequent employment of vocational education graduates,

Arkansas (1975) compared teachers' reports of job-relatedness of graduates' jobs with systematic comparisons of jobs and training based on the Dictionary of Occupational Titles and the USOE publication Vocational Education and Occupations. This latter publication provides codes relating instructional programs to DOT occupational titles. Thus the Arkansas study provided two independent measures of whether vocational graduates' jobs were related to their vocational training: teachers' judgment and analyses based on DOT job titles as they relate to vocational specialty areas. Teachers' judgment indicated that 55% of graduates were working in the same field as their vocational training, and 21% in fields related to training. Analyses based on job titles indicated that only 22% of graduates were working in the same field as their vocational training. However, cross-tabulations indicated that in only 102 of 321 or 32% of cases was there exact agreement between job-relatedness indicated by teacher judgment and the job title analyses, and partial agreement in 75 or 23% of responses. In other words, in only 55% of the cases was there either full or partial agreement between these two independent means of assessing job relatedness. It should be noted that neither of these means were students' own judgments of job relatedness, but these findings clearly raise doubts about the meaning of subjective methods of assessing job relatedness.

Previous National Studies. In the first follow-up of the National Longitudinal Study of the High School Class of 1972, respondents were asked three questions regarding whether they had been able to apply what they learned from their training in high school.

Question 61: Since leaving high school, have you worked in a job where you expected to use this training?

Question 61a: I have been able to apply almost everything I learned in my high school training.

Question 61g: I could have gotten my job without the training.

With regard to the latter two statements, respondents were asked to indicate whether or not the statement applied to respondents' work experience. These questions were asked not only of vocational graduates but of all respondents who indicated that they had received specialized job training in high school. Thus, comparisons between vocational and general program graduates were possible and were reported by Tabler (1976). Results from these three questions for respondents self-reported to have taken general or vocational-technical curriculum programs while in high school are summarized in Table 4.5.1. Results are reported separately for males and females, blacks and whites. A majority of respondents in almost all categories reported that they had worked in a job where they expected to use their training. In all categories vocational graduates (51-68%) more often than general program graduates (43-56%) had worked in jobs where they expected to use their high school training. but the vocational-general differences in response to this question were substantially larger for females (14%) than for males (3%). Similarly majorities of respondents in all categories indicated that they had been able to apply almost everything they had learned in their high school job training. General-vocational differences (5-7%) with respect to this question, though modest, consistently indicated that vocational respondents more often than general had been able to apply their training. Some 23-40% of respondents in the sex or race

TABLE 4.5.1: NLS-72 First Follow-Up Questions Pertaining to Relationship of High School Training to Jobs.

		<u>Total</u>		<u>Male</u>		<u>Female</u>		<u>White</u>		<u>Black</u>	
		Gen	Voc	Gen	Voc	Gen	Voc	Gen	Voc	Gen	Voc
Q. 61: Work in job where expected to use training?	Yes	53	64	52	55	54	68	56	65	43	51
	No. Did not look.	16	17	14	17	17	16	15	16	24	25
	No	31	20	34	28	29	16	30	19	32	25
Q. 62a Able to-apply almost everything I learned in high school training	Apply	68	74	65	70	71	76	67	74	71	77
	Not apply	32	26	35	30	29	24	33	26	29	23
Q. 62g Could have gotten my job without training	Apply	36	29	46	43	30	23	38	28	28	27
	Not apply	64	71	54	57	70	77	62	72	72	73

Source: Tabler, 1976, pp.662-3, 664-65, 676-77. All figures given are percentages based on weighted samples.

categories indicated that they would have been able to get their jobs without high school training. Vocational participants more often than general indicated that they would not have been able to get their jobs without the training they received, but curriculum program differences on this question were greater for females (7%) than for males (3%) and greater for whites (10%) than for blacks (1%).

Reanalyses. Reanalyses concerning relevance of training for jobs taken by vocational education graduates were based on NLS-72 data for graduates at two time points -- at entry into the labor market and one year after graduation. The sample on which this reanalysis was based were those with exactly twelve years of schooling, that is excluding those with any postsecondary schooling as of four years out of high school. As usual, vocational specialties were based on self-reports and grouped into the four major types, namely business-office, trade-industry, home economics, and other or rest vocational.

Relevance was determined on the basis of the Educational Occupational Cross-Code Index prepared by the Massachusetts Postsecondary Education Commission (James, 1978). This Cross-Code Index is essentially a refined and expanded version of USOE's (1969) Vocational Education and Occupations, used in the Arkansas study described above. The Cross-Code Index relates USOE programs and codes (and the HEGES programs and codes used nationally by postsecondary institutions) to codes of Census occupations and relevant DOT occupations.* Table 4.5.2 shows the percentages of individuals in jobs

* The Massachusetts Cross-Code index is refined and expanded over the USOE index in that it. (1) provides a link to Census occupational codes as well as DOT job titles; (2) uses a consistent coding scheme relevant to postsecondary educational programs as well as secondary ones; and (3) is based on the updated fourth edition of the DOT (1977). In using this coding scheme we considered unskilled jobs as not representing matches with any vocational specialty areas.

TABLE 4.5.2: Relevance of Training to Jobs at Entry and One Year After Graduation by Vocational Specialties Grouped NLS-72: Percentages of Individuals in Jobs Matched to Vocational Specialty Areas (Weighted Results).

	M-W	M-B	F-W	F-B
<u>Entry</u>				
Business (M) & Office (F)	17%	26%	47%	47%
Trade & Industry	54%	33%	--	--
Home Economics	--	--	2%	21%
Rest Vocational ^a	16%	24%	35%	8%
Total Vocational	37%	29%	42%	30%
<u>One Year Out</u>				
Business	14%	4%	58%	51%
Trade & Industry	53%	43%	--	--
Home Economics	--	--	5%	5%
Rest Vocational ^a	15%	8%	23%	7%
Total Vocational	38%	25%	50%	34%

^a Rest vocational for males includes agriculture, distributive education, health occupations and home economics; for females it includes agriculture, distributive education, health occupations, and trade and industry occupations.

whose occupational codes match those of their secondary vocational specialty. As usual results are presented for the four sex-race groups. For white males, the only specialty area in which more than 20% of graduates were employed in matched occupations was trade and industry, for which 54% were matched occupations at job entry and 53% at one year after high school graduation. Results for black males appear less consistent across the two time points. For example, only 33% of black male graduates specializing in trade and industry were employed in matched jobs at job entry, but this figure rises to 43% one year after graduation. For white females, the highest job-training match is apparent for vocational graduates who specialized in business-office; 47% at job entry, and 58% one year after graduation, were employed in relevant or matched jobs. The extremely low percentages of home-economics vocational graduates who are in matched occupations, 2% at job entry and 5% one year after graduation for white females, should be noted. Specifically, these data should not be taken simply as an indication of the failure of home economics vocational programs to prepare graduates for relevant work. As noted in Chapter 3, there is no indication in the NLS-72 data set (or any other national data sets for that matter) to distinguish between those in the two home economics subspecialties, namely, consumer and homemaking education which aims at preparing individuals for unpaid employment as homemakers, and occupational home economics which aims at preparation for paid employment. Thus the low percentages of training-job matches for home economics very likely are an indirect reflection, at least in part, of the fact that many home economics graduates find unpaid work relevant to their training.

In this regard it is worth noting that according to data on secondary vocational enrollments, individuals enrolled in the consumer and home-making education subspecialty outnumbered those enrolled in occupational home economics in 1972-73 by a factor of six to one (Wiley and Harnischfeger, 1980, pp. 3-5, citing data from Osterndorf, 1975, and U.S. Department of Health, Education and Welfare, 1974).

Results for black females are roughly similar to those for white females -- namely, substantial proportions of business-office graduates in matched occupations at both job entry (47%) and one year after graduation (51%) and much lower proportions of other vocational specialty graduates in matched occupations.

Summary. This review of evidence concerning relevance of vocational educational training for subsequent jobs of graduates leads us to the following conclusions. First, relevance itself appears to be an ambiguous term in much of the relevant literature. Self-reports of job relevance of vocational training to jobs generally indicate that in excess of 50% of vocational graduates indicate such relevance. However, as noted in Table 4.5.1, similar proportions of general program graduates who indicate that they received specialized job training in high school also report such job-training relevance. These findings carry considerable ambiguity, however, because of clear, though indirect, evidence of disagreements among subjective reports of job training relevance on the basis of judgments made by teachers or former vocational students themselves.

Analyses of relevance based on systematic occupational code-instructional code indices tend to indicate lower proportions of vocational graduates in jobs relevant to their training, for example, 25 to 50% across all vocational

graduates as shown in Table 4.5.2. Relevance of training to jobs appears, however, to vary substantially across vocational specialty areas, with the highest proportions of job-training matches apparent for white males who were trade and industry graduates, and for white and black females who were business-office graduates. Results for blacks tended, as in so many other cases, to be different from those for whites, especially for males.

4.6 Employer Satisfaction

Employer satisfaction is a relatively indirect indicator of outcomes of vocational education. Nevertheless, giving attention to employer satisfaction is relevant because it represents one of the evaluation criteria included in federal vocational education regulations. In a section discussing standards for assessing the effectiveness of vocational education programs, the 1976 Amendments specifically mentioned:

. . . the extent to which program completers and leavers find employment in occupations related to their training, and are considered by their employers to be well-trained and prepared for employment, except that in no case can pursuit of additional education or training by program completers or leavers be considered negatively in these evaluations. (Section 112 (b)(1)(B))

There is, however, relatively little information available on this sort of outcome. All that is available comes from non-national studies which, as we have noted previously, often are relatively weak from a methodological point of view.

Non-national Studies. Mertens et al. (1980a,b) located about twenty studies providing information on employer satisfaction with graduates of secondary vocational education. According to Mertens et al.'s criteria, more than half (specifically 12 of 22) were rated as being less rigorous. Nevertheless, even for the so-called more rigorous studies three basic problems were apparent. First, details of the samples of employers surveyed typically were not thoroughly documented. Employers surveyed apparently were most often identified from previous follow-up studies of vocational education graduates. Such a sampling procedure obviously could lead to a biased sample of employers. Vocational graduates who know their employers were dissatisfied with their work likely would not identify the employers in follow-up surveys and employers who might be altogether dissatisfied with vocational

education graduates, and hence not hire any, obviously would not be identified via such a process. Second, different frames of reference often were employed in such follow-up studies. In some cases, employers were simply asked in the abstract whether they were satisfied with various aspects of the preparation of vocational education graduates, and other times they were asked about vocational education graduates as compared with general curriculum or academic track graduates. Third, we have been unable to locate any direct evidence on the validity or reliability of such satisfaction ratings. Nevertheless, we know from other evidence on the quality of survey data reviewed in section 2.3, that attitudinal questions dealing with attributes such as satisfaction tend to be less reliable than more specific factually based survey questions. With these caveats in mind, here is a brief review of the findings of non-national follow-up studies on employer satisfaction.

Although several studies reported little difference between employer satisfaction with vocational and nonvocational graduates (e.g. Division of Educational Services, Florida, 1979, Schowalter, 1974), others found that vocational graduates were judged more highly by their employers than college preparatory or general curriculum program graduates on criteria including skills for entry level employment, willingness to learn new job skills, work habits, attitudes toward employers and productivity (e.g., Iowa Department of Public Instruction, 1979; Market Opinion Research, 1973). One of these studies (Iowa Department of Public Instruction, 1979) also reported that secondary vocational education graduates were rated more highly than post-secondary graduates on job skills, technical knowledge and basic reading and verbal skills.

In sum, employers surveyed in a limited number of non-national studies expressed general satisfaction with vocational education graduates. In some cases, employers expressed more satisfaction with secondary vocational education graduates as compared with other entry level workers, but in other cases no differences in employer satisfaction were evident. Nevertheless, for the reasons outlined above (limited non-national data, possible bias in employers surveyed, and problems in assessing satisfaction), these findings should be viewed as highly tentative. The uncertainty of the meaning of employer satisfaction ratings is well-illustrated in a discussion by Asche and Vogler (1980). Discussing the problem that some employer satisfaction studies may be asking questions which respondents are simply unable to answer accurately, they observe:

One study, on an item asking the employer to compare vocational with nonvocational graduates, included "have no objective basis for comparing" and "don't know" as possible responses. Sixty-one percent of the respondents elected one of these two responses. Such a finding calls into question the number of other studies which asked for comparisons between vocational and nonvocational students, but did not provide a "don't know" response option. (Asche and Vogler, 1980, p.8)

To the extent that available literature on employer satisfaction with secondary vocational education graduates permits summary, results are not unfavorable. Nevertheless, as Asche and Vogler (1980, p.17) note "Little methodological research has been done on employer opinions." Very little systematic research on this outcome is available, and virtually none of it provides data disaggregated to the level of sex-race groups or vocational education specialty areas. Thus, we conclude that no firm conclusions regarding this possible outcome of vocational education can be drawn.

4.7 Self-Employment

Numerous observers have noted that the effects of education on occupational outcomes generally, and in particular the effectiveness of vocational education programs in preparing students for gainful employment, depend not just on the quality of educational programs but also on the availability of jobs and more generally on the state of the economy. Adopting this line of reasoning, a recent report of the National Advisory Council on Vocational Education (1979) has suggested that "preparation for self-employment" represents a new dimension in vocational education. Specifically the Council suggested that "entrepreneurship activity is a by-product of the vocational education experience which should be more strongly encouraged." Similarly Bottoms (1979) has suggested that entrepreneurial activity may be one of the most important effects of vocational education on society as a whole. Thus, it is relevant to examine the evidence on the degree to which vocational education students are subsequently self-employed. In doing so, however, we must keep in mind the point noted by Grasso and Shea (1979b, p.79) that it is unrealistic to expect any substantial fraction of young men and women who have been out of school only a short time to be self-employed. Thus an examination of the hypothesis that vocational education prepares individuals for self-employment is most appropriately tested not immediately after secondary school completion, but several years beyond.

Previous National Studies. In the Mertens et al. (1980a, b) reviews of non-national studies of vocational education, no studies were identified as bearing on the self-employment outcomes of vocational education graduates. This should not be surprising since self-employment has only recently been identified as a possible outcome of interest of vocational training.

National studies do, however, provide some evidence on this hypothesis. Based on an examination of 1972/1973 NLS-LME follow-up information, Grasso and Shea (1979b, p. 79) concluded that there was no evidence in the NLS-LME data that former vocational students are more likely than their general program peers to be self-employed. In contrast, based on an examination of the type of employment of NLS-1972 respondents four years out of high school (1976), Lewin-Epstein (1979, p.261) concluded that vocational education graduates generally were more likely to be self-employed. It should be noted, however, that percentages of both former vocational education and general program students who were self-employed were small (0.5-5.0%) and that the differences were small (only 1.1% more vocational education graduates overall were self-employed than general graduates) and inconsistent in direction when data were disaggregated by race and sex. Lewin-Epstein's analysis thus seems to provide no support for a strong conclusion that there are significant differences in the percent of self-employed between these two groups. Further, in an earlier comparison (Vincent, 1969, p.40) based on 5-year follow-up data for males in one of the Project TALENT cohorts, contrasts of the percent of graduates who were self-employed (between the general curriculum and selected vocational programs) indicated that any overall advantage to the vocational curriculum may be due principally to the graduates from agricultural vocational education programs.

Reanalyses. Opportunities for reanalyses concerning self-employment outcomes associated with participation in vocational education are limited in the available data sets. Nevertheless, two data sets, namely, NLS-72 and LME, did provide us with some data for examining the extent to which

former vocational education students were subsequently self-employed. Given the proposition that it is unrealistic to expect any substantial fraction of young men and women to be self-employed after being out of school only a short time, our attention was restricted to high school graduates who were out of school either four or ten years. Further LME data indicated that zero percent of male early high school leavers, regardless of whichever high school program they had participated in, were self-employed. Thus our reanalyses on this point were restricted exclusively to those with exactly twelve years of schooling, that is, to those without any postsecondary education as of four years after high school graduation. Also, since no more than 2% of females in the NLS data set, either black or white, were found to be self-employed, we present data only for males.

Table 4.7.1 shows the percentage of males in the labor force in the NLS-72 and LME data sets who were self-reported to be self-employed. No regression analyses were performed on the self-employment outcome variable because the number of individuals self-employed was so few. Note that in the LME data no males were found to be self-employed as of four years out of high school, and only 2% of the rest vocational and 1% of general graduates as of 10 years out of high school. The NLS 72 data indicated that for white males as of four years out of high school, 5-7% of all graduates were self-employed. The 7% figure was for the rest vocational category which includes agricultural graduates. For black males in the NLS-72 data set, only 1-2% in any category were self-employed. Why the LME results on self-employment differ from NLS-72 is unclear, but may simply reflect vagaries of sampling error since the LME sample sizes were considerably smaller than NLS-72 sample sizes.

TABLE 4.7.1: Percent Male High School Graduates (12 Years Exactly) Who Reported They Were Self-Employed as of Four and Ten Years out of High School (Weighted Results)

	Data Set	Time Point	High School Program (Self-Report)			
			Gen.	T&I	Bus.	Res Voc.
<u>Males</u> <u>Whites</u>	LME	Yr. 4	0	NA	0	0
	NLS-72	Yr. 4	5	5	4	7
	LME	Yr. 10	1	NA	-	2
<u>Blacks</u>	LME	Yr. 4	0	NA	-	-
	NLS-72	Yr. 4	2	1	0	0
	LME	Yr. 10	0	NA	-	-

Summary. We conclude simply that there is no clear evidence to suggest that graduates of any vocational specialty areas are more often self-employed than general program graduates. Nevertheless, it is perhaps worth noting that patterns in the NLS-72 data do correspond with the previous findings regarding self-employment; that self-employment is less common among blacks than whites (Freedman, 1976, p.47)

4.8 Job Satisfaction of Employees

Another type of indicator of the effectiveness of vocational education in preparing students for gainful employment is the subsequent job satisfaction of vocational education graduates. Those who are gainfully employed in productive jobs presumably will express more satisfaction with their jobs than those who are not. Before reviewing evidence on this sort of outcome measure, let us point out that the connection between gainful employment and job satisfaction is not as simple and clear-cut as the foregoing sentence suggests. First, previous research has shown job satisfaction clearly depends on far more than educational preparation. Job satisfaction has been shown to be related to a range of variables extending from rates of pay to control over one's working conditions, to degree of unionization (Freeman, 1977; Billings, 1978). Also, as we noted in section 2.3, survey questions dealing with attitudes such as job satisfaction tend to be less reliable than more factually based questions. Nevertheless, Freeman (1977) has shown that job satisfaction questions have power to predict future overt behavior (e.g., likelihood of quitting). Also, Billings (1978) has hypothesized that vocational education may affect job satisfaction in several different ways. Thus, despite potential problems, a review of the evidence on job satisfaction clearly is pertinent.

Non-national Studies. Mertens et al. (1980a,b) located 14 non-national studies providing evidence on the job satisfaction of former vocational education students. Eight of these studies were rated as more rigorous, and six as less rigorous. From a review of these studies it was concluded

that "Former secondary-level vocational students are satisfied with their jobs," but it was also noted that "the satisfaction of both vocational and nonvocational former students is usually found to be in the upper ranges of the measures that are used" (Mertens et al., 1980a, p. 160).*

Previous National Studies. Data on the job satisfaction of vocational education students are available in five previous analyses of two national longitudinal data sets (Grasso and Shea, 1979b, p. 110 using NLS-LME; and Creech et al., 1977b, p. 2.56; Peng and Holt, 1977, pp. 374-375; Peng et al., 1978, pp. 193-194; and Tabler, 1976, all using NLS-72). The pattern revealed in these studies is remarkably consistent. Former vocational education students, from 1 to 10 years out of high school, indicated that they were in higher proportion satisfied with their jobs than general program students. Percentage differences in vocational education students expressing satisfaction with their jobs as compared with general students ranged from 2 to 21%, but the direction of the difference was almost entirely consistent, favoring vocational education, regardless of breakdowns by race or sex.** Three points should be noted regarding this overall pattern in previous data regarding job satisfaction. First, in the different national surveys, questions pertaining to job satisfaction are worded in different ways. In the LME and

* The conclusion in Mertens et al. (1980b, p. 78) is virtually identical.

** The only exception was for the sample of black males and females aged 20-21 in 1974, from NLS-72 reported by Peng and Holt, 1977, pp. 374-375, for which 79% of both former vocational education and general program students indicated that they were satisfied with their jobs.

YA survey, respondents were asked to indicate how much they liked their jobs, with response categories being "like it very much"; "like it fairly well"; "dislike it somewhat"; and "dislike it very much." In the NLS-72 survey, respondents were asked more directly, "How satisfied were you with the following aspects of your job?" There may also be a contextual effect: while both surveys asked the global job satisfaction question after a sequence of questions concerned with a number of aspects of their job, the content and response options of the sequence varied. Also, it should be noted that the results, at least with respect to extreme response categories, to the responses worded in terms of how much the respondents like their jobs tend to be higher (e.g., 30-66% like it very much, Grasso and Shea, 1979, p. 110) than those worded in terms of satisfaction (e.g., 14-30% "very satisfied" with job as a whole, Peng et al., 1978, pp. 193-194). Third, it should be noted that apparent patterns of change in job satisfaction can differ depending on how response categories are grouped. Examining LME data from four cohorts including middle-aged men and women, Andrisani et al. (1977) concluded that job satisfaction declined during the 1966-72 period, but noted that virtually all of the decline was from highly satisfied to satisfied categories.

Reanalyses. Data on job satisfaction were reanalyzed using only the NLS-72 and NLS-YA data sets. Table 4.8.1 summarizes cross-tabular results on this variable for males and Table 4.8.2 for females. Sample sizes for blacks in the NLS-YA data set were too small to report results. The job satisfaction data are of course based only on those who were employed. Also both Tables 4.8.1 and 4.8.2 report results for general

satisfaction, that is, aggregated across both extreme and moderate response categories. The data indicate that relatively high proportions of all groups (i.e., 70-95%) indicate at least moderate amounts of job satisfaction. Data indicate that equal or higher percentages of former participants in vocational education programs are satisfied with their jobs than general program participants, though percentage differences are not large. The NLS-YA data indicate, however, that early leavers are about as satisfied with their jobs as graduates of either vocational or general program graduates.

Table 4.8.3 summarizes data across only the extreme response categories, that is "very satisfied" for NLS-72 and "like very much" for NLS-YA. Patterns of results are quite similar with vocational program graduates generally indicating extreme job satisfaction in equal or higher proportions than general program graduates. The only clear exception as with the general satisfaction data is for black male T&I graduates one year out of school in the NLS-72 data set. Note, however, that there appears to be a difference in percentages choosing the extreme response categories in the NLS-72 and NLS-YA category. Thus it appears that quite apart from curriculum program, respondents are more likely to indicate that they very much like their jobs (as opposed to liking them only "fairly well") than to indicate that they are "very satisfied" with their jobs as a whole (as opposed to saying that they are merely "satisfied"). Such apparent differences obviously make it difficult to interpret the real meaning of differences in responses to differently worded job satisfaction questions.

TABLE 4.8.1: Percentages of Respondents Indicating Job Satisfaction -- Male High School Graduates (Exactly 12 Years of School) and Early Leavers^a (Weighted Results).

<u>Graduates (12 years exactly)</u>		<u>High School Curriculum Program</u>				
		<u>Gen.</u>	<u>T&I</u>	<u>Bus.</u>	<u>Rest Voc^e</u>	<u>Total Voc</u>
<u>White</u>						
NLS-YA	Ages 18-19	81	84	-	-	85
NLS-72	Yr. 1	77	81	85	83	
NLS-YA	Ages 20-22	86	94	-	-	92
NLS-72	Yr. 4	81	82	82	81	
<u>Black</u>						
NLS-72	Yr. 1	79	69	81	76	
NLS-72	Yr. 4	77	78	84	96	
<u>Early Leavers</u>						
NLS-YA	Ages 18-19	88	NA	-	-	73
NLS-YA	Ages 20-22	92	NA	-	-	86

^a Response categories collapsed together and treated as indicating job satisfaction are "satisfied" and "very satisfied" for NLS-72 and "like very much" and "like fairly well" for NLS-YA.

^e NLS-72 and YA - Rest voc. includes agriculture, distributive education, health, and home economics.

TABLE 4.8 2: Percentages of Respondents Indicating Job Satisfaction --
 Female High School Graduates (12 Years Exactly)^a
 (Weighted Results).

<u>Females</u>		<u>High School Curriculum Program</u>			
		<u>Gen.</u>	<u>Comm.</u>	<u>Rest Voc.^e</u>	<u>Total Voc.</u>
<u>White</u>					
NLS-YA	Ages 18-19	85	-	-	95
NLS-72	Yr. 1	80	83	86	
NLS-YA	Ages 20-22	82	-	-	82
NLS-72	Yr. 4	85	87	83	
<u>Black</u>					
NLS-72	Yr. 1	79	91	78	
NLS-72	Yr. 4	84	79	87	

^a Response categories collapsed together and treated as indicating job satisfaction are "satisfied" and "very satisfied" for NLS-72 and "like very much" and "like fairly well" for NLS-YA.

^e NLS-72 and YA - Rest voc. includes agriculture, distributive education, health, and T&I.

TABLE 4.8.3: Percentages of Respondents Indicating Extreme Job Satisfaction^a
(Weighted Results).

<u>Males</u>	<u>High School Curriculum Program</u>			
	<u>Gen</u>	<u>T&I</u>	<u>Bus-Comm</u>	<u>Rest Voc</u>
<u>Graduates (12 Years Exactly)</u>				
<u>White</u>				
NLS-YA Ages 18-19	29	41	-	-
NLS-72 Yr. 1	22	22	19	30
NLS-YA Ages 20-22	33	47	-	-
NLS-72 Yr. 4	20	24	24	32
<u>Black</u>				
NLS-72 Yr. 1	16	4	19	15
NLS-72 Yr. 4	11	13	25	36
<u>Early Leavers</u>				
<u>White</u>				
NLS-YA Ages 18-19				
NLS-YA Ages 20-22				
<u>Females</u>				
<u>Graduates (12 Years Exactly)</u>				
<u>Whites</u>				
NLS-YA Ages 18-19	46	NA	58	-
NLS-72 Yr. 1	24	NA	27	27
NLS-YA Ages 20-22	33	-	49	-
NLS-72 Yr. 4	25	NA	29	32
<u>Blacks</u>				
NLS-72 Yr. 1	16	NA	22	32
NLS-72 Yr. 4	12	NA	15	15

^a Extreme response categories are "very satisfied" for NLS-72, and "like very much" for NLS-YA.

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Summary. Data regarding job satisfaction are limited and differences in responses to job satisfaction questions may derive partially from the way in which questions and response options are posed. Nevertheless, insofar as available evidence allows generalization, it seems reasonable to conclude from reanalyses, previous national research, and non-national studies, that graduates of the major vocational specialty areas express roughly equal satisfaction with their jobs as compared with general graduates. This general conclusion is, however, tempered by a methodological problem apparent in the job satisfaction data. Results appear to differ depending on whether data are summarized in terms of general satisfaction (lumping together moderate and extreme response options or in terms of extreme response options only). In the former case, data from both the NLS-72 and YA data sets both indicate no large consistent differences in job satisfaction expressed by general or vocational graduates. However, when results are summarized in terms of extreme response options, results from the two data sets appear quite different. In the NLS-72 data set, proportions of respondents indicating that they were "very satisfied" with their jobs were similar across curriculum groups. In the YA data set, percentages of vocational graduates indicating that they "like [their jobs] very much" were consistently more than 10% greater than corresponding percentages of general graduates. We suspect that the different pictures emerging from these two data sets derives from the different wording of the "job satisfaction" questions, but other explanations could easily be hypothesized (e.g., time trends, sampling differences, etc.).

4.9 Summary of Gainful Employment Outcome Differences

In the preceding eight sections we reviewed evidence concerning gainful employment outcomes associated with participation in vocational education, as indicated by student self-reports. We focused mainly on the three largest vocational specialty areas; namely, business and trade and industry (T&I) for males and commercial or office for females (although identification of these vocational specialty areas was not available in some of the previous literature reviewed). Since our review of previous literature and our own reanalysis of three national longitudinal data sets has been fairly extensive, in this section we simply summarize the overall findings from both our literature review and data reanalyses. Following the procedure adopted throughout this chapter, we summarize results separately for the four sex-race groups. Summary results are depicted in Table 4.9.1. X's indicate cases in which comparisons revealed consistent and notable differences between vocational graduates and general graduates.* Dashes indicate cases in which either 1) no clear or consistent differences in gainful employment outcome between these groups were apparent; or 2) insufficient evidence was available to warrant drawing a conclusion. Question marks indicate instances in which there is fairly clear but not altogether consistent evidence regarding differences in outcomes. It should be noted that Table 4.9.1 represents only a crude summary of overall findings because it ignores differences over time

* Section 2.6 describes the criteria used in identifying notable differences; section 2.7, the weight given to the several sources of evidence.

TABLE 4.9.1. Summary of Gainful Employment Outcomes for Vocational Students with Twelve Years of Schooling Exactly.*

	Males				Females		Page
	Business		T&I		Comm	Off	Reference
	W	B	W	B	W	B	
1 <u>Employment Status</u>							
LFPR	-	-	-	-	X	-	4-1-17, 20
Unemployment	-	-	-	-	-	-	4-1-18, 20
No. Weeks Unemployment in Previous Year	-	-	-	-	X	-	4-1-19, 20
No. Spells Unemployment in Previous Year	-	-	-	-	-	-	4-1-21
2 <u>Extent of Labor Force Participation</u>							
Hours per Week	-	-	-	-	X	X	4-2-13, 19
Full Time Employment	-	-	-	-	X	-	4-2-15, 19
No. Weeks Worked in Previous Year	-	-	X	-	X	X	4-2-10, 18, 20
3 <u>Hourly Earnings</u>	-	?	-	?	X	X	4-3-9, 17, 19, 20
4 <u>Occupational Level & Status</u>							
Skilled Jobs	-	-	-	-	X	X	4-4-12, 21
SEI	X	-	-	-	X	X	4-4-18, 20, 21
5 <u>Relevance of Training to Job</u>	-	-	-	-	-	-	4-5-7, 10
6 <u>Employer Satisfaction</u>	-	-	-	-	-	-	4-6-3
7 <u>Self-Employment</u>	-	-	-	-	-	-	4-7-4
8 <u>Job Satisfaction of Employee</u>	-	-	-	-	-	-	4-8-8

* Dashes indicate no clear or consistent differences in outcomes associated with vocational specialty programs as compared with general programs. X's indicate consistent differences (i.e., consistent across data sets reanalyzed, types of reanalyses, and time points after graduation, but not necessarily completely consistent in terms of statistical significance of outcome differences. Question marks indicate relatively clear, but not altogether consistent, differences associated with vocational specialty program graduation.

after high school graduation. Nevertheless, as Table 4.9.1 indicates, the only case in which there tends to be consistent gainful employment differences, associated with graduation from a major vocational specialty program, is the commercial program for females. Differences were most commonly apparent for white female commercial graduates but were apparent on a number of outcomes for black female commercial graduates as well. For black and white male graduates of both T&I and business programs, relatively few outcome differences were apparent. Given that overall summary of results, let us briefly recap some of the specific findings.

White Female Commercial Graduates. Graduation from a commercial program appears to give white females an advantage over white female general graduates in terms of a number of gainful employment outcomes. Specifically as compared with their general program peers, white female graduates of commercial programs who do not go on for postsecondary schooling tend to:

- show labor force participation rates 2-11% higher

This conclusion is drawn from our reanalyses of NLS-72 and YA national longitudinal data sets (see p. 4-1-17) and is substantiated by findings from Grasso and Shea's (1979) reanalysis of the LME data set (see p. 4-1-3).

- show slightly less unemployment

This finding was not entirely consistent in terms of unemployment rates (p. 4-1-18) but did show up in data on number of weeks unemployed in the previous year (p. 4-1-19) and seems to be substantiated in previous research which disaggregates data by sex, race and vocational specialty area (see p. 4-1-6).

- work some 1-3 hours more per week

This finding was not clear in descriptive contrasts (p. 4-2-12) but is more apparent in regression analysis (p. 4-2-12). While previous research (e.g., Wiley and Harnischfeger, 1980) did not reveal such differences, this appears to have been due to failure of this research to disaggregate data by vocational specialty areas (see p. 4-2-2),

- work full-time as opposed to part-time some 5-17% more

This finding was evident in reanalyses of two national longitudinal data sets (see p. 4-2-15). Findings from previous research are not inconsistent with this result of our reanalysis, but no direct comparisons are available because of the lack of disaggregation of results by sex-race-vocational specialty groups in previous research on this outcome measure (see p. 4-2-2). Nevertheless there is some indication from both our own reanalyses and previous research that the full-time employment advantage of white female commercial graduates may diminish with increasing years after graduation.

- work 3-6 weeks more per year

This finding was apparent in both descriptive analyses of two national data sets (see p. 4-2-16) and regression analyses of the NLS-72 data set (see p. 4-2-18). No directly comparable data are available from previous studies.

- earn some \$10-20 more per week

Again this finding was apparent in both descriptive reanalyses (see p. 4-3-15) and regression reanalyses (see p. 4-3-17) and the difference is maintained even after adjusting for hours worked per week. Findings regarding earnings are not as clear in previous research but this may be due to 1) lack of disaggregation by vocational specialty area, and 2) failure to treat the group with twelve years of schooling exactly separately from those with some postsecondary education.

- be employed some 12-37% more in clerical jobs

This finding was apparent in descriptive reanalyses of two data sets (see p. 4-4-12). In contrast white female general graduates tend more often to be employed in unskilled service jobs. Past research on one of these same data sets similarly showed larger percentages of female commercial graduates than general graduates employed in clerical positions (see p. 4-4-5).

- have jobs with Duncan SEI scores some 7-17 points higher

This finding was apparent in both descriptive (p. 4-4-18) and regression (p. 4-4-20) reanalyses. There appears to be a tendency, however, for SEI score differences to diminish from some 10 to 17 points at job entry to only 7 to 10 points at four years after graduation. No comparable data are available in previous research.

For the other four categories of gainful employment outcomes--namely, employment related to training, employer satisfaction, self-employment, and job satisfaction--no similarly strong differences associated with graduation from a commercial program were apparent for white females--though it is worth noting that 50% of white female graduates of commercial-office programs were found to be employed in jobs matched to their secondary school vocational training (see p. 4-5-7).

Black Female Commercial Graduates. While outcome differences for black females were less widely apparent than for white females, where evident, results for black female commercial graduates paralleled those for white females. Specifically, in comparison with black female general graduates, black female commercial graduates were found to:

- work 0.5 - 3.5 more hours per week

As with white females the hours worked per week difference for black female commercial graduates tended to be greater at job entry (2.6 hours) than at the four-years-after-graduation time point (0.4 hours, see p. 4-2-13).

- work 5 - 8 weeks more per year

This contrast was apparent in both descriptive reanalyses (p. 4-2-16) and regression reanalyses. There was no indication in regression results that this outcome difference tended to diminish with increasing years after graduation.

- earn \$15 - 30 more per week

This finding was apparent in both descriptive analyses (p. 4-3-15) and regression analyses (p. 4-3-19). Outcome differences tended to diminish slightly (from \$17 - 28 to \$15 - 18) after controlling for hours worked per week.

- be employed some 35 - 40% more in clerical jobs

See p. 4-4-12 for details of descriptive reanalyses and p. 4-4-5 for pertinent previous research.

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- have jobs with Duncan SEI Scores 8 - 16 points higher

See pp. 4-4-18, and 4-4-20. Unlike the case for white females, the introduction of SES into regression analyses for black female commercial graduates did tend to reduce the magnitude of contrasts on the SEI outcome variable. In part, this is due to the fact noted in Chapter 3 that for black females, unlike white females, those enrolled in commercial-business vocational programs tend to have higher SES than those in the general program (see p. 3-3-5 and appendix table C-1.1).

Males. Outcome differences were less widely apparent for male than for female vocational graduates. The only cases in which consistent significant differences were found for male business graduates in comparison to general graduates were the following:

- white male T&I graduates tend to be employed 2 - 3 weeks more per year

This trend was apparent in both descriptive analyses (p. 4-2-8) and regression reanalyses (p. 4-2-10), though the difference appears to be greater in the first year after job entry than four years or more after job entry. No comparable data were available among previous national studies.

- black male graduates of T&I and business programs tend overall, but not without exception to earn slightly more per week

Both descriptive analyses (p.4-3-9) and regression analyses (p. 4-3-13) indicate that black males graduating from T&I tend to earn slightly more (\$5 - 30) per week than their general program peers, but descriptive contrasts in this regard are not altogether consistent in direction, nor are regression results always statistically significant. These results from reanalyses are largely consistent with those of previous research which indicated that black male graduates of secondary vocational programs receive slightly higher hourly wages than their peers graduating from general curriculum programs (see p. 4-3-3).

- white male graduates of business programs tend to go into jobs having very slightly higher (1 - 5 points) Duncan SEI scores

The magnitude of differences in this regard were not large in either descriptive analyses (p. 4-4-14) or regression reanalyses (p. 4-4-16) but they were consistent in direction even though regression results attained a level of statistical significance only at the year one data point and not at either job entry or year 4 (see p. 4-4-16).

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Beyond these results, gainful employment outcomes for male vocational graduates of both races tended to be small and inconsistent in direction across both data sets and time points after graduation from high school. Also, in regression analyses outcome differences for male vocational graduates tended far less often than for females to reach the level of statistical significance.

In closing, a word of explanation should be offered concerning outcome areas for which no summary results have been mentioned. Concerning whether employment is related to training, we observe that results appear to vary substantially depending on whether general subjective assessment of relevance are used, or whether relevance is determined by using standard education-occupational matching codes. Nevertheless it is worth noting that when the latter approach is used white male graduates of T&I programs appear to enter jobs for which their secondary training was relevant in roughly the same proportion (i.e., circa 50%) as for female commercial graduates (see p. 4-5-7) but for males this does not appear to translate as much as for females into gainful employment outcome advantages. Regarding employer satisfaction, self-employment and job satisfaction of vocational graduates, we conclude in summary that no differences between outcomes for vocational and general graduates are apparent. It should be noted, however, that in large measure the lack of clear conclusions regarding differences associated with employer satisfaction and employee satisfaction stems from two factors extraneous to the nature or quality of high school programs -- namely, the lack of research data on these outcomes and the ambiguities inherent in trying to interpret the data that are available.

4.10 Regression Analyses Using Coursework Data

As noted in chapter 3, the courses taken by self-reported vocational students do not seem to differ substantially from those taken by general students. Nevertheless, using NLS-72 data we did find that:

- male business students averaged 1-2 semester courses more than general students in both business and commercial courses
- white male T&I students averaged 2 1/2 semesters more in T&I courses and one more in industrial arts than general students
- female commercial students averaged 3-3 1/2 more semesters in both business and commercial courses than general students

For this reason and also because the three specialty areas noted account for the largest numbers of high school vocational enrollments, in examining gainful employment outcomes in Chapter 4, we have focused attention mainly on individuals self-reported to have participate in the major specialty areas of business and T&I for males, and commercial for females. In the absence of course data in the LME and YA data sets, these results from the NLS-72 data set can be assumed to hold, at least roughly, for the other two data sets.

Hence, the logic of Chapter 4 has been that the self-reported curriculum identifications used in reanalyses of all three data sets, and the outcome differences associated with them, reflect differences in the coursework taken by students while in high school. This logic, of course, represents a rough and ready sort of reasoning, based not on any sophisticated analyses, but simply an effort to piece the information available in different data sets together in a way that, though highly imperfect, seems plausible.

Given this logic, akin to fitting half the piece of a puzzle together to show the outlines of a picture, we sought to check on our reasoning as best we could, given the available evidence. Hence, we tried to use the NLS-72 course

data in regression analyses to check on whether vocational specialty courses seem to explain variation in gainful employment outcomes apparent in analyses based on student self-reports. Before we explain the analyses performed, and their results, let us offer two sorts of prefatory remarks; the first concerning the nature of the NLS-72 course data and the second concerning how these data have been used in previous analyses.

As noted in Chapter 3, the NLS-72 course data were derived from student transcripts by having school administrators classify students' courses into fourteen different content areas. This classification was based on two questions in the NLS-72 School Report Information Form. The first question (SFFQ4) asked simply:

How many semester courses will the student have taken in each of the following subjects between July 1, 1969 and the date he or she graduates?*

There followed a listing of the seven types of courses:

- Science
- Foreign Languages
- Social Studies
- English
- Mathematics
- Industrial Arts
- Commercial
- Fine Arts or Performing Arts

The next question on the school report information form (SRFQ5) asked the administration to "indicate the total number of semester courses this student will have taken in each of the following vocational-technical subjects

* The question went on to ask administrators to indicate also the numbers of class periods per week, but since we report analyses based exclusively on semester courses, we will not explain this part of the question.

by the time he or she graduates." The types of vocational-technical courses listed were:

- Agriculture
- Business or Commercial
- Distributive Education
- Health Occupations
- Home Economics
- Trade or Industrial Occupations

Course information derived from these two NLS-72 survey questions had been used at the time of performing our reanalyses in one previous analysis concerning vocational education, namely, in a study by Wiley and Harnischfeger (1980).*

The study by Wiley and Harnischfeger, sponsored by the National Center for Educational Statistics, was an attempt to use the NLS-72 data to estimate effects of vocational education on labor market outcomes. We will not attempt to summarize the whole Wiley and Harnischfeger (1980) study here, but before describing how they used the NLS-72 course information, we should at least point out three fundamental differences between their approach and our own. First, Wiley and Harnischfeger included academic or college preparatory students in their analyses, while we have based all of our analyses on vocational and general program high school students, thus excluding academic program students. Second, Wiley and Harnischfeger treated vocational education as a single entity, while we have attempted as much as possible to treat the major vocational education specialty areas (i.e., business and T&I for

* More recently, two other studies have related NLS-72 course data to labor market outcomes, namely, Gustman and Steinmeier (1981) and Meyer (1981).

males, and commercial for females) separately. Third, Wiley and Harnischfeger did not restrict their analyses to graduates with no postsecondary education (exactly 12 years of schooling), the restriction used by us for all the analyses reported in this chapter.

Given this brief introduction here is how Wiley and Harnischfeger used the NLS-72 course data in their labor market outcome analyses. In a section describing analyses of high school experience and labor market outcomes, Wiley and Harnischfeger report (pp. 98-99) using hours of school exposure to academic and vocational instruction and other variables in analyses of three indices of work activity (hours, wages, and wage rates). Wiley and Harnischfeger simply treated all eight course types listed in the NLS-72 SRFQ4 (including industrial arts and commercial courses) as academic courses, and all six listed under SRFQ5 as vocational.

Our use of the NLS-72 course data differed from this previous analysis in two important respects. First, in accordance with our general decision not to treat vocational education as a single undifferentiated entity, we did not employ data on total vocational coursework in any of our analyses, but instead treated the six types of vocational courses separately. Second, it seemed to us that two of the six course types listed under SRFQ4, namely, industrial arts and commercial, ought not be treated simply as "academic" courses as was done in analyses by Wiley and Harnischfeger (1980) (see section 3.4).

Starting with this rationale we tried three different sets of regression analyses using the NLS-72 course data. Since the results of these three separate sets of analyses would take considerable time and space to explain, let us simply describe the first two sets of course regression analyses in general terms, and present only the results of the third set of analyses in any detail. The results of this third set of analyses show more clearly than those of the first two sets the surprising results we obtained using course data.

Coursework Regression 1: Analyses Using Full Set of Course Data in Basic Outcome Analyses

As noted in section 4.0, our basic regression analyses for labor market outcomes provided contrasts between general and vocational specialty graduates (specifically T&I and business for males, and commercial for females) after adjusting for individual student SES. The curriculum contrasts were, of course, based on student self-reports. Such basic regression analyses provided most of the regression results reported in sections 4.1 through 4.8 above (though in some cases we also reported results from supplementary regression analyses which adjusted for a variety of contextual variables in addition to student SES). Having performed these basic regression analyses for all pertinent outcome variables, our first task in using course data was simply to add a set of course variables to these basic regression analyses. Specifically, these regressions took the form

$$Y_i = a + b_v + b_s x_{ses} + b_1 c_1 + \dots + b_n c_n + e$$

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where Y_i = a particular outcome variable

b_y = contrast between vocational specialty areas
(i.e. T&I, and business for males, and commercial for females) and general program students.

b_s = regression coefficient for individual student SES

x_{ses} = individual student SES

$c_1, c_2, \text{ etc.}$ = semester courses of different types

b_1, b_2, \dots = regression coefficients for semester
courses of different types

e = error term

Such regressions were performed on four outcome variables, namely

- hours worked per week
- number of weeks worked in previous year
- weekly earnings (in both raw and natural log form)
- Duncan SEI.

As indicated in Table 4.9.1, these four outcome variables were the ones concerning which we most often found outcome differences associated with participation in the three major vocational specialty areas. Regression analyses were performed separately for the four sex-race groups.

In our first set of coursework regressions, we entered ten course variables, one each for number of semester courses in

- English
- Math
- Science & Foreign Language
- Social Studies and Fine Arts
- Business or Commercial (SRFQ5)
- Commercial (SRFQ4)
- T&I
- Industrial Arts
- Home Economics
- Agriculture, Distributive Education, and Health.

Our strategy was to look at b_y in results of these regressions and to compare it with the corresponding b_y in the basic regression analyses (that

is regressions excluding the course data). Our expectation was that if the outcome differences identified in the basic regression analyses reflected not just student self-reports of curriculum participation but actual differences in high school courses of study and actual numbers of courses taken in the relevant vocational specialty areas, then the addition of course information in the regression analyses would cause the b_v based on self-reports to diminish. This expectation was not borne out by the results. The addition of the course data changed the curriculum contrasts by very little. With the addition of course data, the b_v appeared to increase as often as they decreased. And in any case, very few of the course variables entered into regression analyses at levels of statistical significance.

These results were perplexing. If the outcome differences associated with student self-report of curriculum specialization do not reflect coursework taken, what do they represent? Faced with this question we sought to explore another type of regression analyses using course data, to verify the results of the first set of regressions.

Coursework Regressions 2: Analyses Using Vocational Course Data in Basic Outcome Analyses

Our second approach to coursework regression analyses was to use only data on vocational courses, and to exclude data on general or academic high school coursework. Our rationale for this approach was as follows: We reasoned that in employing the full set of high school course data, we were implicitly using redundant information. This is so for the simple reason that amount of coursework of one type is not independent of coursework of other types. The total number of semester courses which a student takes

in the last three years of high school is limited. In terms of the descriptive data on coursework recounted in Chapter 3 (see also Table B-1.2, it appears in the NLS-72 data that the total number of semester courses taken in the last three years of high school is generally between 20 and 24. Thus to the extent an individual takes more of one type of course, the less he or she must take of some other type of course. It was hypothesized that such interdependence in course-taking of different types might have obscured relationships among vocational coursework, self-reported high school curriculum and gainful employment outcomes in the first set of coursework regression analyses. Thus we tried a second set of coursework regressions entering only the four types of courses relevant to the major vocational specialty areas, namely, numbers of semester hours in business, commercial, trades and industry and industrial arts. Results were, however, largely the same as in the first set of coursework regressions. The addition of the vocational coursework data to the basic regression analyses changed the curriculum contrasts hardly at all. So again we were left with the perplexing question: If the gainful employment outcome differences associated with self-reported participation in the major vocational specialties do not reflect vocational coursework taken, what do they represent?

Coursework Regressions 3: Analyses Using Vocational Course Data in Outcome Analyses Without Self-Report Curriculum

Still perplexed by the question above, we tried one more type of regression analyses using the NLS-72 course data. In the first two sets of coursework regression analyses, we were attempting to build on the basic regression analyses reported previously in Chapter 4. Thereby we were simply adding course data to self-reported curriculum data which were

previously used. But since we were looking in these regression analyses at how addition of course data changed the relationship between outcomes and self-reported curriculum, these analyses provided only an indirect test of the relationship between course data and outcomes. Thus in the third set of coursework regression analyses we excluded the self-reported curriculum data and regressed outcomes on SES and course data directly, without entering self-reported curriculum into the regression equations. Specifically, we performed these regressions for three time points (entry, year 1 and year 4) and for four outcome variables:

- Hours worked per week
- Weeks worked previous year*
- Weekly earnings
- Duncan SEI

Results are shown in Table 4.10.1. Specifically this table shows only the vocational coursework regression coefficients which were statistically significant at the 0.05 level. Relatively few coursework regression coefficients reached this level of statistical significance, specifically 41 out of 176, or 23%. Note too that around one-third of the significant coefficients are negative, meaning that taking more vocational courses was associated with a lower outcome variable. In other words the clear implication remains that vocational coursework is very weakly associated with gainful employment outcome differences. Note, however, that in rough respects the coursework regression results shown in Table 4.10.1 do parallel some of the results of regressions based on self-reported curriculum presented previously in Chapter 4 and summarized in Table 4.9.1. These rough correspondences

* The weeks worked in previous year variable was of course not applicable at the job entry time point.

TABLE 4.10.1: Regression Coefficients for Semesters of Vocational Coursework after SES Entered But Without Controlling for Self Reported Curriculum Outcome Variables by Sex-Race Groups.*

Cohort Time Point and Type of Vocational Coursework	Hours Worked/wk		Weeks Worked Previous Year				Weekly Earnings		Duncan SEI			
	Males		Females		Males		Females		Males		Females	
	White	Black	White	Black	White	Black	White	Black	White	Black	White	Black
Entry												
Bus	-0.28		NA	NA	NA	NA	-2.31	+0.97			+0.32	
Comm			NA	NA	NA	NA	-2.23	+1.03			+0.50	+1.53
T&I			-0.46		NA	NA	NA	NA		-0.38	-1.26	
Indus Arts			-1.87		NA	NA	NA	NA		-0.53	-1.52	
Year 1												
Bus							+0.20	-2.33	-5.22		+0.32	+1.50
Comm					+0.37		+0.24				+0.39	+1.08
T&I	+0.16									-0.28		
Indus Arts								+1.60				
Year 4												
Bus							+0.33	-2.48	+1.13	+2.22	+0.64	+1.59
Comm							+0.24		+1.74	+0.56	+0.62	+1.39
T&I								+1.71				
Indus Arts							-0.86					

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*Coefficients are shown only if they reached the 0.05 level of significance.



are that: 1) significant coursework regression coefficients tend to show up more often for females than for males, 2) they are more often apparent for commercial and business coursework than for T&I and industrial arts coursework, and 3) they are more frequent for whites than for blacks. These correspondences are very rough, of course. The magnitude of the regression coefficients in Table 4.10.1 cannot be compared directly with regression coefficients shown previously in Chapter 4. The coursework coefficients represent the difference in outcomes associated with a single semester course difference, while the self-reported curricula which formed the basis of regression contrasts reported previously, clearly tend to represent more than a single semester course difference in vocational study since, for example, as noted in Chapter 3, female commercial students averaged some 3-3 1/2 more semester courses in the business and commercial categories than did general students. Thus, in order to provide more direct comparability between the two types of regression results, we multiplied the coursework regression coefficients by the average difference in relevant vocational courses taken by students self-reported to be vocational participants and by ones reported to be general students. This was done for each of the three major vocational specialty groups, namely, commercial for females, and business and T&I for males. A weighted course difference could then be compared to the original curriculum contrasts derived from the basic regression analyses reported previously in Chapter 4. Results of this comparison are shown in Table 4.10.2.

For each sex-race group and outcome variable; Column 1 shows the curriculum contrast derived from basic regression analyses based on student self-reports of high school curriculum program; and column 2 shows the analogous

TABLE 4.10.2: Curriculum Contrasts Based on Student Self Reports and on Vocational Coursework.

	F-W Commercial			F-B Commercial		
	(1) Self- Report	(2) Coursework	(3) Difference	(1) Self- Report	(2) Coursework	(3) Difference
Duncan SEI						
Entry	+12.9	+1.77	+11.13	+18.0	+2.66	+15.34
Year 1	+ 8.8	+1.53	+ 7.27	+ 9.5	+5.21	+ 4.29
Year 4	+ 8.0	+2.60	+ 5.4	+ 9.8	+5.74	+ 4.06
Weekly Earnings						
Raw						
Entry	+21.77	+4.20	+17.57	+24.79	+4.20	+20.59
Year 1	+19.68	+0.42	+19.26	+28.04	+1.77	+26.27
Year 4	+21.38	+4.68	+16.7	+16.58	+8.31	+ 8.27
# Hrs Worked/Wk						
Entry	+ 3.1	+0.14	+ 2.96	+ 2.6	+ 0.15	+ 2.45
Year 1	+ 2.0	-0.10	+ 2.10	+ 3.5	+ 0.24	+ 3.26
Year 4	+ 1.6	+0.03	+ 1.57	+ 0.4	- 0.07	+ 0.47
# Wks Worked						
Year 1	+ 3.4	+0.97	+ 2.43	+ 4.7	+ 1.33	+ 3.37
Year 4	+ 2.8	+1.15	+ 1.65	+ 8.0	+ 1.35	+ 6.65

	M-W Business			M-B Business		
	(1)	(2)	(3)	(1)	(2)	(3)
Duncan SEI (4.0)						
Entry	+ 0.6	+0.27	+ 0.33	+ 5.8	+ 1.24	+ 4.56
Year 1	+ 4.3	+1.06	+ 3.24	- 1.8	+ 0.08	- 1.88
Year 4	+ 1.2	+1.59	- 0.39	+ 3.6	- 0.15	+ 3.75
Weekly Earnings						
Raw						
Entry	- 0.10	-6.87	+ 6.77	+14.53	+ 0.27	+14.26
Year 1	-34.66	-4.48	-30.18	+30.34	- 3.94	+34.28
Year 4	- 4.47	-2.98	- 1.49	+19.56	- 1.56	+21.12
# Hrs Worked/Wk						
Entry	+ 0.2	-0.45	0.65	- 0.7	+ 0.41	- 1.11
Year 1	- 0.5	-0.37	- 0.13	+ 0.1	- 0.05	+ 0.15
Year 4	- 0.4	+0.36	- 0.76	+ 1.1	- 0.23	+ 1.33
# Wks Worked						
Year 1	- 1.6	+0.83	- 2.43	- 2.0	+ 1.04	- 3.04
Year 4	+ 0.8	+0.56	+ 1.36	+ 3.5	+ 0.49	+ 3.01

TABLE 4.10.2: Curriculum Contrasts Based on Student Self Reports and on Vocational Coursework.

	M-W (T&I)			M-B (T&I)		
	(1) Self Report	(2) Coursework	(3) Difference	(1) Self Report	(2) Coursework	(3) Difference
Duncan SEI						
Entry	+ 0.7	-1.27	+ 1.97	+ 1.0	-0.54	+ 1.54
Year 1	+ 1.5	-0.36	+ 1.86	- 1.8	-0.56	- 1.24
Year 4	- 0.2	-0.50	+ 0.3	- 1.5	-0.57	- 0.93
Weekly Earnings						
Raw						
Entry	- 2.22	+1.06	+ 3.28	+15.71	+3.53	+12.18
Year 1	+ 0.66	+2.24	- 1.58	+20.28	+0.33	+19.95
Year 4	+ 8.82	+4.60	+ 4.22	+ 7.85	+1.66	+ 6.19
# Hrs Worked/Wk						
Entry	+ 0.3	+0.06	+ 0.24	+ 2.2	+0.06	+ 2.14
Year 1	+ 0.5	+0.28	+ 0.22	- 0.2	-0.01	- 0.19
Year 4	- 0.3	-0.33	+ 0.03	+ 1.6	-0.24	+ 1.84
# Wks Worked						
Year 1	+ 2.6	+0.28	+ 2.32	- 1.6	+0.33	- 1.93
Year 4	+ 1.7	+0.13	+ 1.57	+ 1.4	-0.39	+ 1.79

Note: For each sex-race group and outcome variable: column 1 shows the curriculum contrast derived from basic regression analyses based on student self-reports of high school curriculum program; and column 2 shows the analogous curriculum contrast based on a weighted average of relevant vocational coursework. Courses treated as relevant to the three specialty areas were as follows.

<u>Vocational Specialty</u>	<u>Relevant Courses</u>
Female - Commercial	Business Commercial
Male - Business	Business Commercial
Male - T&I	T&I Industrial Arts

The coursework contrast is a weighted sum of the coursework regression coefficients for these corresponding courses (specifically, for each vocational specialty the sum of the differences in relevant coursework between general and vocational students times the coursework regression coefficients derived from analyses excluding self-reported curriculum). Column 3 shows the difference between the curriculum contrasts based on self-reports and on the weighted sum based on coursework corresponded to each of the three major vocational specialties.

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contrast based on a weighted average of relevant vocational coursework, Courses treated as relevant to the three specialty areas were as follows.

<u>Vocational Specialty</u>		<u>Relevant Courses</u>
Female-Commercial	~	Business Commercial
Male-Business	~	Business Commercial
Male-T&I	~	T&I Industrial Arts

The coursework contrast is a weighted sum of the coursework regression coefficients for these corresponding courses (specifically, for each vocational specialty the sum of the differences in relevant coursework between general and vocational students times the coursework regression coefficients derived from analyses excluding self-reported curriculum). Column 3 shows the difference between the curriculum contrasts based on self-reports and on the weighted sum based on coursework corresponding to each of the three major vocational specialties.

These results confirm the results of the first two sets of coursework regression analyses, namely, that vocational coursework explains very little of the outcome differences associated with self-reported high school vocational specialty program. In other words, self-reports of high school vocational program are associated with at least some subsequent gainful employment outcomes, but vocational course-taking is not associated with such differences nearly as much as self-reported vocational program.

4.11 Comparison of Findings with Previous Regression Results

The purpose of this section is to compare our findings with previous regression analyses of employment outcomes associated with vocational education. Some previous results based on national longitudinal data sets related to gainful employment outcomes were reviewed in sections 4.1-4.8. However, these reviews were limited to descriptive results reported in previous studies; that is, those in which means or percentages were presented by curriculum groups (and by sex and race). Such descriptive breakdowns incorporate no adjustments for initial differences between pairs of curriculum groups in socioeconomic background, ability or other variables that might be related to gainful employment outcomes. Multiple regression procedures are typically used to make such adjustments. The results of our multiple regression reanalyses of the NLS-72 data set using curriculum self-report were reported in sections 4.1-4.8 for various gainful employment outcomes. The summary of findings presented in section 4.9 was based on an assessment of the overall patterns indicated by the descriptive results reported in previous non-national and national studies, as well as our descriptive and regression reanalyses.

The summary of findings provided in section 4.9 identified four gainful employment outcome variables that were most often found to be related to participation in vocational education programs, namely, weekly earnings, weeks worked annually, Duncan SEI scores, and hours worked weekly. In section 4.10 the results of regressing each of these four outcome variables on an alternative definition of vocational education participation were reported. Specifically, the self-reported curriculum classification was replaced with vocational education participation defined as the amount of semester courses

in vocational courses relevant to either the business-commercial or T&I specialty area. From comparisons of the results of regressions based on the curriculum self-report and those based on commercial-business or T&I-industrial arts coursework, we concluded that while the coursework did show some relationships to subsequent labor market outcomes, the relationships shown were not nearly as strong as those shown by the curriculum self-report.

In this section we compare these findings with those of previous regression analyses of outcomes of secondary vocational education. The criteria used for inclusion of any previous study in this review were that it:

- was based on a national longitudinal data set;
- employed multiple regression procedures, regressing some indicator of gainful employment on participation in vocational education at the secondary level; and
- provided a contrast either of participation in vocational education to participation in a general curriculum or of varying amounts of vocational education coursework. (Thus studies in which educational experience was represented as number of years of schooling or in which an academic curriculum group was contrasted to a nonacademic group formed by combining general and vocational curriculum groups are not reviewed).

We found nine studies met these criteria. These were based on two of the three national longitudinal data sets used in our reanalyses, namely, the NLS-72 and LME data sets.* These studies include several as recent as June

* A study based on the third data set (YA) by Daymont and Rumberger (June 1981) was available in preliminary form but had not been cleared for citation in September 1981 by the Department of Labor. This was unfortunate since this is the first study available based on the YA data set in which course transcript data have been used. The course transcript data for the YA sample who were 17 years or older in the baseyear 1979 were collected and coded in a supplementary effort by the National Center of Research in Vocational Education. As of September 1981 the coded course data had not been released to the Center for Human Resource Research (CHRR), Ohio State University, for addition to a YA public use file; CHRR estimated a YA public use file with the course data may not be available until September 1982.

and July 1981, which were not available when plans for our reanalyses were completed in October, 1980. Table 4.11.1 identifies five previous regression studies based on the NLS-72 data set; Table 4.11.2, four previous regression studies based on the LME data sets for young males and females. These tables indicate which of the gainful employment outcomes were examined in each of these studies and summarize other salient characteristics of the studies.

Appendix F provides tables summarizing specific results of these nine studies. Here in the text of section 4.11, we provide verbal summaries of the findings of these studies, organized in a manner parallel to that of section 4.9, with differences most commonly apparent for females in commercial programs summarized first and then those for males in business and T&I programs. First presented are summary statements of the overall pattern indicated by previous non-national and national descriptive studies, as well as our descriptive and curriculum self-report regression reanalyses (section 4.9). Results based on our coursework regression reanalyses (Table 4.10.2) and previous regression studies are then compared to these summary statements.

* Any relationships between vocational education participation and a gainful employment outcome which attained a significance level of .05 are noted. In our summary of the findings indicated by previous non-national and national studies, as well as our own descriptive and regression reanalyses (section 4.9), we did not rely solely on statistical tests of significance (see section 2.6). They also are not relied on solely in this section in identifying discrepancies between the findings summarized in section 4.9 and those indicated by previous regression results. In addition to indicators of statistical significance, we note consistency in the direction of any outcome differences, whether they were significant or not. In many cases of black males and females, small sample sizes make it difficult for even consistently large outcome differences to attain statistical significance.

TABLE 4.11.1: Identification and Description of Regression Studies Based on NLS-72 Data Set.

Study ^a	Source(s) Used to Define Vocational Participation				Identification of Gainful Employment Outcomes Examined							
	Pop. Restriction on Educ. Level	Categ. Classification	Curr. Course Representations	Data Separate or pooled regressions-sex-race	Follow-up Yr. Represented by Outcome Varbls.	Earnings		#Hrs		#Weeks		
						Hr	Wk	Yr	Wk	Yr	Emp	Unemp.
Nolfi, et al (1977, 1978)	12 yrs. & postsec.	Curr. source not ident.	No	Race & Sex Pooled	1973	X						
Wiley & Harnischfeger (1980)	12 yrs. & postsec.	Sch. admin. ^b	Yes	Separate Sex - whites only	1972, 1976	X	X		X			
Meyer & Wise (1980)	12 yrs. & postsec.	h.s. job training	No	Males only - race pooled	1972, 1973, 1974, 1975, 1976	X					X	
Meyer (1981)	12 yrs. exactly	Self-report; Sch. Admin; h.s. job training	Yes	Sex separate - race pooled	1974, 1976	X	X				X	
Gustman & Steinmeier (1981)	12 yrs. exactly	Self-Report ^b	Yes	Sex and race Separate	1976	c	X	c			X	c

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a. The regression results reported by Creech et al. (1977) are excluded from this list due to the definition used for the curriculum contrasts represented in the regressions. In the first set of regressions based on ordinary least squares procedures, the academic curriculum was contrasted to a pooled group formed by both the general and vocational curricula. In the second set of regressions based on maximum likelihood procedures, the vocational curriculum was contrasted to a pooled group formed by both the academic and general curricula.

^b The source of the curriculum classification was not identified in report, but was learned from a personal inquiry to authors.

^c Regression solutions were not reported, but findings were summarized in text for at least one sex-race subgroup.

TABLE 4.11.2: Identification and Description of Regression Studies Based on LME Data Sets.

Study	LME Cohort	Pop. Restriction on Educ. Level	Separate or Pooled Regression-sex-race	Follow-up Yr. Represented by Outcome Vrbls.	Identification of Gainful Employment Outcomes Examined						
					Earnings			# Hrs		# Wks	Occup Status
					Hr	Wk	Yr	Wk	Yr	Emp Unemp	
Grasso (1975)	Yng M	12 Yrs.Exctly	Separate race (males only)	1969	X		X				X X
Grasso & Shea (1979b)	Yng M	12 Yrs.Exctly	Separate sex & race	M,1971	X		X				X
	Yng F			F,1972							
	Yng M	10-11 Yrs. 12 Yrs. 13-15 Yrs.	Race Pooled (males only)	M,1971 F,1972	X		X				X
Hofferth (1980)	Yng M Yng F	12 Yrs. <u>or less</u>	Separate race and sex	3,5 & 10 Yrs. out of h.s. (as of 1976)	X				X		X
Gustman & Steinmeier (1981)	Yng M Yng F	12 Yrs.Exctly	Separate race & sex	4 Yrs. out of sch., as of 1972		X					X

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Females

- Female commercial graduates earn more weekly than general graduates (even after adjusting for hours worked each week).

This relationship appears stronger for white females; for black females, differences tend to diminish slightly from one to four years after graduation.

The regression reanalyses based on commercial-business coursework indicated that, while the earnings for female commercial graduates were consistently greater than female general graduates, the differences attained statistical significance in 1972 and 1976 for whites but only in 1976 for blacks. The results of two recent regression studies for females with exactly 12 years of schooling also offer support for this finding for white females but no clearcut support for black females. On the basis of both curriculum self-reports and percentage of commercial-business coursework, Meyer (1981) found that female commercial graduates (or females with more commercial coursework) in an NLS-72 sample earned more weekly as of 1974 and 1976.* However, since Meyer's regressions were performed on a pooled sample of whites, blacks and Hispanics, it is impossible to determine from the reported results whether the "net" curriculum differences varied by race. Thus, while it is reasonable to conclude that this finding is representative of white females, who represent over 90 percent of the sample, it is not clear whether this finding holds for black females. In

* Meyer found no relationship between the school administrator curriculum classification and weekly earnings. The commercial program, however, was not represented separately in the school administrator classification. However, the differences in results appear to be due not simply to the pooling of the vocational group into one classification. For several outcome areas in which the pooled vocational self-report classification showed significant differences, the pooled vocational school administrator classification showed nonsignificant differences for the exact same NLS-72 sample and exact same set of independent variables.

contrast, Gustman and Steinmeier (1981) did perform separate regressions for white females and black females. On the basis of curriculum self-reports, they found white commercial graduates in both an NLS-72 sample and a sample of LME young females (who were 21 years old in 1972) earned more weekly four years after graduation than white general graduates.* In the case of black females, though commercial graduates in both samples earned more, the differences did not attain statistical significance. Nevertheless, the Gustman-Steinmeier findings for both black female analyses are in our view somewhat suspect. First, Gustman and Steinmeier's LME analyses are based on a total of only 13 black females: 5 black female commercial graduates and 8 black female general graduates.** Second, their NLS-72 analyses are based on black females who had test scores, but those that had test scores tended to underrepresent small rural, Southern schools in the nation (Creech, 1974, p. 1). The problem this presents is shown by an example provided by Gustman and Steinmeier. They reported that when they dropped the test score criterion in supplementary analyses performed on white females, the estimated difference between white female commercial and general graduates increased from \$8 to about \$16 in 1976 weekly earnings (p. 14). One other previous study in which weekly earnings were regressed on some indicator of vocational education participation was located. In a sample of NLS-72 graduates which was not restricted to those with exactly 12 years of

* For the same NLS-72 sample, Gustman and Steinmeier found no apparent relationship for white females between weekly earnings and vocational education participation defined as the total semesters of vocational education coursework. However, commercial and industrial arts (SRIFQ4) coursework were excluded from the vocational education classification.

** Recall that in our reanalyses we used a criterion of a minimum of 20 individuals representing a particular curriculum group in order to report separate results for that group.

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schooling, Wiley and Harnischfeger (1980) found no consistent relationship for white females on the basis of total class hours in vocational education coursework.*

• Female commercial graduates work more weeks annually than general graduates.

This finding is supported by the regression reanalyses based on commercial-business coursework; however, the differences attained statistical significance only for white females. The results of two recent regression studies for females with exactly 12 years of schooling offer support for this finding for white females but no clearcut support for black females. On the basis of both curriculum self-reports and percentage of commercial-business coursework, Meyer (1981) found that female commercial graduates (or females with more commercial coursework) in an NLS-72 sample worked more weeks in both 1974 and 1976. Since, as noted previously for weekly earnings, regressions were not performed separately by Meyer for race, these findings are obviously more likely pertinent to white than black females. Gustman and Steinmeier (1981) performed their regressions separately by race. They found white commercial graduates in an NLS-72 sample worked more (.10 level of statistical significance) in 1976 than white general graduates. Though they found white commercial graduates in a sample of LME females (who were 21 years old in 1972) worked more weeks during the fourth year after graduation than white general graduates, the differences did not attain statistical significance.** For both the NLS-72 and LME samples, Gustman and Steinmeier found no apparent difference in weeks worked between

* Commercial and industrial arts (SRIFQ4) coursework were both excluded from the vocational education classification.

** Gustman and Steinmeier's LME analyses was based on only 11 white and 5 black female commercial graduates and 23 white and 8 black female general graduates. White commercial graduates were estimated to work 4 more weeks (adjusted for independent variables) and black commercial graduates 7 more weeks than comparable general graduates. Small sample sizes made it impossible for even these large adjusted differences to attain statistical significance.

black commercial and general graduates. However, for the reasons noted previously for weekly earnings, Gustman and Steinmeier's findings for black females are in our view somewhat suspect.

- Female commercial graduates have jobs with higher Duncan SEI scores than general graduates.

This relationship attained statistical significance consistently across all three time points for both white and black females in the regression reanalyses based on commercial-business coursework. Only one previous regression study was located that examined this relationship, though it was based on a different measure of occupational status (i.e., the Bose). For females with exactly 12 years of schooling, Grasso and Shea (1979b) found that white self-reported commercial graduates in an LME sample had higher Bose scores than white general graduates. However, their results showed no apparent differences between Bose scores for black commercial and general graduates.

- Female commercial graduates work more hours each week than general graduates.

This relationship appears stronger for white females. For black females differences are greater at job entry than four years after graduation.

No support for this relationship for either white or black females was found in the regression reanalyses based on commercial-business coursework. Though not directly comparable to results by specialty area or specialized coursework, Wiley and Harnischfeger (1980) regressed hours worked each week on total class hours of vocational education coursework for white females; no consistent relationship was found. No previous study based on a sample of black females was located.

Males

- Black male graduates of business or T&I programs tend overall to earn slightly more per week than general graduates.

No consistent differences were found for white male business or T&I graduates.

These results were based on self-reports, but the regression reanalyses based on commercial-business coursework showed that black males who took more semesters of commercial-business coursework earned significantly less in 1973. Previous regression studies based on males with exactly 12 years of schooling provide similarly inconsistent evidence. Meyer (1981) found that self-reported business graduates in an NLS-72 sample earned significantly more weekly than general graduates in 1976, but also found, on the basis of percentage of vocational, occupational or commercial coursework taken, no apparent difference for the same time point. On the basis of both curriculum self-report and coursework, he found no apparent differences in 1974 weekly earnings. Since, as noted previously, Mayer did not perform the regressions separately by race, these findings are more likely pertinent for white than for black males. Gustman and Steinmeier (1981) did perform their regressions separately by race. They found no apparent difference in 1976 weekly earnings between black male self-reported commercial and general graduates in an NLS-72 sample.*

For black male T&I graduates, the regression reanalyses based on T&I-industrial arts coursework showed black males who took more semesters of such coursework earned consistently more, though statistical significance was limited to one time point (1976). Meyer (1981) found that self-reported T&I graduates in an NLS-72 sample earned significantly more weekly in 1974 and

* Gustman and Steinmeier did not report separate results for black male commercial graduates for the LME data they analyzed.

1976 than general graduates. On the basis of vocational, occupational or technical coursework, however, Meyer found no apparent differences for the same time periods. Since Meyer did not perform the regressions separately by race, it is not clear whether his findings hold for black male T&I graduates. Gustman and Steinmeier (1981), who did perform separate regressions by race, found no apparent difference in 1976 weekly earnings for black males between self-reported T&I and general graduates in an NLS-72 sample.

For white male business graduates, the regression reanalyses based on commercial-business coursework showed white males who took more semesters of commercial-business coursework earned significantly less weekly in 1972, 1973 and 1976. The results of two recent regression studies of males with exactly 12 years of schooling, however, offer no support for white male business graduates earning significantly less. Meyer (1981) found that self-reported business graduates in an NLS-72 sample earned about the same as general graduates in 1974 and significantly more weekly in 1976. He found no apparent differences in 1974 or 1976 weekly earnings on the basis of the percentage of vocational, occupational or commercial coursework taken by these graduates. Gustman and Steinmeier (1981) found no apparent difference in 1976 weekly earnings as of four years' after graduation between self-reported commercial and general graduates in both an NLS-72 sample and a sample of LME young men (who were 21 years old in 1972).* In a sample of NLS-72 graduates which was not restricted to those with exactly 12 years of schooling, Wiley and Harnischfeger (1980) found no consistent relationship for white males on the basis of total class hours in vocational education coursework.

* It should be noted that Gustman and Steinmeier's findings for the LME analyses are based on only 6 white male commercial graduates.

For white male T&I graduates, the regression reanalyses based on T&I-industrial arts coursework showed white males who took more semesters of such coursework earned significantly more in 1973 and 1976. Meyer (1981) found that self-reported T&I graduates in an NLS-72 sample earned significantly more weekly in 1974 and 1976 than general graduates; on the basis of vocational, occupational or technical coursework, however, Meyer found no apparent differences for the same time periods. While Gustman and Steinmeier (1981) found no significant difference (at the .05 level) in 1976 weekly earnings between self-reported T&I and general graduates in an NLS-72 sample, they noted, "there is some hint in the estimates of a positive effect on weekly earnings for white males who took a program in trade and industry (who comprised about 17% of the sample), as compared to general program graduates" (p. 21).

- White male T&I graduates tend to work more weeks annually than general graduates, though the difference appears to be greater in the first year after job entry than four years after graduation.

No consistent differences were found for white male business graduates or black male business or T&I graduates.

For white males, the regression reanalyses based on T&I-industrial arts coursework provided no support for the proposition that white male T&I graduates work more weeks. Similarly no support was provided for this proposition by the results of either Meyer (1981) or Gustman and Steinmeier (1981). The regression reanalyses based on commercial-business coursework revealed no apparent relationship, with the exception of 1973, between amount of such coursework and the number of weeks worked for white males. A null finding for white male business majors was also supported by the results reported by Meyer (1981) and Gustman and Steinmeier (1981).

For black males, the regression reanalyses based on commercial-business coursework showed no relationship between amount of such coursework and the number of weeks worked; those based on T&I-industrial arts coursework indicated that those with a greater amount of such coursework worked significantly less weeks in 1976 but showed no relationship for 1972 or 1973. No relationship for either specialty area was indicated by the results reported by either Meyer (1981) or Gustman and Steinmeier (1981).

- White males business graduates tend to have jobs with slightly higher Duncan SEI scores than general graduates.

No consistent differences were found for white male T&I graduates or black male business or T&I graduates.

For white males, the relationship between commercial-business coursework and Duncan SEI scores was consistently positive in the regression reanalyses, though statistical significance was attained for 1976 only. Support for this finding is also provided by analyses performed on LME self-reported curriculum data for males with exactly 12 years of schooling. Based on 1969 data, Grasso (1975) found self-reported commercial graduates to have higher Duncan SEI scores than general graduates; similarly with 1971 data, Grasso and Shea (1979b) found self-reported commercial graduates to have higher Duncan SEI scores than general graduates, though significance was attained only at the .10 level. The results for T&I graduates were not consistent. Our regression reanalyses based on T&I-industrial coursework indicated that T&I graduates had significantly lower Duncan SEI scores in 1973 and 1976. However, analyses performed on LME self-reported curriculum data for males with exactly 12 years of schooling, did not show any significant differences between graduates of general programs and those of vocational programs other than commercial (Grasso, 1975; Grasso and Shea, 1979b).

For black males, our regression reanalyses showed no evidence of a significant relationship between Duncan SEI scores and either commercial-business or T&I-industrial arts coursework. This finding was also supported by two previous regression studies based on LME self-reported curriculum data for black males with exactly 12 years of schooling. Grasso and Shea (1979b) found no significant difference in Duncan SEI scores between self-reported commercial and general graduates. Grasso (1975) and Grasso and Shea (1979b) found no significant difference in Duncan SEI scores between black male self-reported general graduates and black males who graduated from vocational programs other than commercial.

No differences in hours worked were noted in section 4.9 for white or black male business or T&I graduates. Also no evidence of significant differences in hours worked was found in the regression reanalyses based on coursework. No previous regression study examining differences in hours worked for a sample of black males was located. Though not directly comparable to results by specialty area or specialized coursework, Wiley and Harnischfeger (1980) regressed weekly hours worked on total number of class hours in vocational education coursework for white males. They found white males in the NLS-72 sample who took more vocational education coursework tended to work a "considerably greater" number of hours weekly in 1972 but only a "marginally greater" number of hours weekly in 1976.

Summary. In this section, we have reviewed results of nine previous studies using regression analyses to examine outcomes associated with participation in secondary vocational education (based on either self-reports or coursework) with the findings of our own reanalyses based both on self-reports

of vocational participation and on vocational coursework. These nine studies varied in a number of major respects: sample selection criteria, the extent to which self-reports of vocational specialty areas were treated separately, the manner in which coursework data were treated, the extent to which sex-race groups were treated separately, and control variables included in the regression analyses performed. Nevertheless, in broad outline, the findings from these studies seem to largely confirm our own findings. Specifically, the results which seem to hold up across both our own reanalyses, and the nine regression studies reviewed in this section are as follows:

In comparison to female general graduates, female commercial graduates tend to:

- earn more per week;
- work more weeks per year; and
- have jobs with higher occupational status.

Such differences appeared more consistently for white females than for blacks in studies which disaggregated results by race.

In comparison to male general graduates, male graduates of business and T&I programs tend to work about the same number of hours per week and weeks per year. However, for two other gainful employment outcomes some differences were apparent. Both black and white T&I graduates appear to earn slightly more per week than general graduates. However black male business graduates appear to earn about the same as black general graduates, and for white male business graduates findings were inconsistent: in some cases showing an earning advantage, in some cases a disadvantage, and in others no difference. Also, results of analyses examining job status using the Duncan SEI showed white male business graduates to have slightly higher SEI scores than white male general graduates, though no consistent differences in SEI scores were apparent for black male business graduates, or for T&I graduates for both races.

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This seems to be the overall pattern of results across both our own reanalyses and previous analyses based on both descriptive statistics and regression analyses. Though results varied somewhat across race groups, this overall pattern was fairly consistent. In fact, results were to us surprisingly consistent. Although the details of regression analyses conducted by different analyses tended to differ, it appears that these results were not much affected by things like control variables included in regression analyses or whether log transformations of earnings were employed. In comparison, a more important source of variation in results appears to be whether curriculum identification is based on self-reports or upon course data. This point is not altogether clear because the only data set in which course data were available at the time of the studies reviewed was NLS-72. Nevertheless, means of vocational curriculum identification seems to be an important source of variation in results, and hence it is an issue to which we will return in our conclusions in Chapter 8.

CHAPTER 5. OTHER OUTCOME VARIABLES ASSOCIATED WITH PARTICIPATION IN
SECONDARY VOCATIONAL EDUCATION PROGRAMS

Outcomes associated with the vocational education goal of preparing students for gainful employment were examined extensively in Chapter 4. The second major goal of vocational education is preparation for enrollment in advanced technical education programs (Section 108(1), 1968 Amendments). Indicators of this second goal will be reviewed in Chapter 6. In addition to these two major goals, a review of vocational education suggested various other ways that secondary vocational education programs are intended to benefit their participants (Woods and Haney, 1979). The purpose of this chapter is to examine indicators of four other outcomes suggested by this review, considered the most relevant to the overall purposes of the Vocational Education Study.* The sections of this chapter are organized around these four outcome areas: occupational knowledge and skills (section 5.1); occupational advancement (section 5.2); years of secondary school attained (section 5.3); and citizenship (section 5.4). One outcome area that may be notable for its absence in this list is basic skill attainment. This outcome area is to be the subject of a separate report.

As in Chapter 4, our review will focus primarily on individuals with exactly 12 years of schooling; that is, high school graduates with no post-secondary education as of about four years after high school graduation.

* Limited resources required setting priorities in the investigation of outcomes associated with vocational education. The first priorities were, of course, established to be the examination of outcomes related to the two major goals.

Youth enrolled in high school or not enrolled in high school with less than 12 years of schooling will also be considered in our examination of occupational knowledge and skills (section 5.1) and years of secondary school attained (section 5.3). Following the format of Chapter 4, the review of each outcome area will be organized by three types of evidence: (1) previous non-national (i.e., local and state) studies; (2) previous research based on national data; and (3) results of our own reanalyses of national longitudinal data sets. A brief summary will conclude each section.

5.1 Occupational Knowledge and Skills

One of the ways in which secondary schooling can prepare students for gainful employment is to provide them with occupational knowledge and skills. Little empirical research, however, has been done to examine the extent to which secondary vocational programs or other types of secondary programs help to provide students with some occupational knowledge and skills.

Non-national Studies. In their review of the literature on vocational education, Mertens et al. (1980b) cite five non-national studies which examined the attainment of occupational skills by vocational graduates on the basis of objective measures. Two of the studies used a commercial standardized test (i.e., the Agricultural Mechanics Mastery Test and the Ohio Trade and Industrial Education Achievement Test); their findings (Farrington, 1974; McQuay, 1974) suggest that "students are acquiring the occupational skills relevant to their vocational program" (Mertens et al., 1980b, p. 79). Using performance on licensing examinations as an objective criterion of skills acquisition, Paulter (1975) reported that 93 percent of secondary vocational graduates passed the relevant examination. The two remaining studies were based on tailor-made tests and were judged inadequate in their data presentation. Mertens et al. (1980b) concluded that the data available on this outcome area were too limited to draw any conclusions.

Previous National Studies. No national studies were found that examined the attainment of occupational skills on the basis of an objective

measure. Some data on occupational knowledge are provided by the LME data set. The LME surveys included a set of questions labeled "Knowledge of the World of Work." Young men in 1966, and young women in 1969, were asked as part of this test to identify the principal duties of workers in ten occupations.* The occupations for each group were as follows:

Young Men

Acetylene welder
 Draftsman
 Economist
 Fork lift operator
 Hospital orderly
 Machinist
 Medical illustrator
 Social worker
 Stationary engineer
 Statistical clerk

Young Women

Assembler
 Bank teller
 Dept. store buyer
 Dietician
 Key punch operator
 Medical illustrator
 Nurse's aide
 Quality control in bakery
 Social worker
 Statistical clerk

Grasso and Shea (1979b, p. 24) provide a breakdown for each sex by high school curriculum for those enrolled in grades 10-12 at the time of the survey. Results were not disaggregated by race. Equivalent or greater percentages of both males and females in commercial programs than those in general programs identified the correct duties for the respective occupations. The results were more mixed for students enrolled in vocational programs other than commercial programs in comparison to students enrolled in general programs. Male students in vocational programs other than commercial and male students in the general program demonstrated similar knowledge of occupations which do not require a college degree,

* Young men were also asked to state the typical educational level for entrants to each occupation and were asked to identify for eight pairs of occupations which of each pair normally yields higher earnings.⁷ Young women were only asked to identify the principal duties. Previous research has focused on curriculum differences in the identification of duties.

but male vocational students demonstrated far less knowledge of occupations requiring advanced education than did male students in the general program. Female students in vocational programs other than commercial showed less knowledge of duties associated with all but two occupations (i.e., department store buyer and nurse's aide) than females in the general program.

Reanalyses. In spring 1979, the YA survey of youth aged 12-21 asked respondents to identify the duties of nine occupations, each of which had a counterpart in the LME surveys: four drawn from the young men's 1966 survey; four drawn from the young women's 1969 survey; and one drawn from both (i.e., medical illustrator). Results will first be reported for those in the YA sample enrolled in high school at the time of the survey and compared to a similar LME group for the set of common occupations. Results for all nine occupations will then be compared by sex-race group across three levels of education: (1) enrolled in high school; (2) not enrolled in high school with less than 12 years of schooling; and (3) not enrolled in school with exactly 12 years of schooling (that is, no postsecondary education).

Table 5.1.1 reports the results for the five occupations common to the LME and YA surveys of young males. The data for the more recent YA 1979 survey show that an equivalent or slightly greater percentage of males enrolled in high school vocational programs, in comparison to those enrolled in general programs, respond correctly to the five items. This pattern is highly comparable to the 1966 LME results for these same items. One time trend is suggested by the data in Table 5.1.1: knowledge of the duties of a fork

TABLE 5.1.1: Percentages of Males Who Correctly Identified Occupational Duties by H.S. Curriculum, LME vs. YA

Duties of	LME 5 Yng. Men Enrolled in Grade 10-12 (1966) ^a			YA - Males Enrolled in H.S. (1979) ^b	
	Gen.	Comm.	Rest Voc.	Gen.	Total Voc.
Economist	72	72	57	76	79
Fork Lift Operator	69	65	69	83	82
Hospital Orderly	68	66	67	62	68
Machinist	59	69	70	56	60
Medical Illustrator	50	51	38	44	3

^a Source: Table 2.3, Grasso and Shea, 1979^b, p. 24. Unweighted sample (Aggregated over race).

^b Reanalyses. Weighted sample. (Results disaggregated by race reported in Table 5.1.2).

lift operator may have increased over the 17-year interval (1966-1979) for both general and vocational students.

Table 5.1.2 indicates that at least for males enrolled in high school, even when the data are disaggregated by race, the vocational-general program pattern apparent in the YA data in Table 5.1.1 applies to all nine occupations included in the YA survey. Any apparent difference (i.e., at least 5%) between the two programs favors the vocational program. While this finding holds for white and black males, race differences are clearly discernible. A greater percentage of whites than blacks in both programs correctly identified the duties of these occupations.

For the remaining two educational levels (those not enrolled with less than or exactly 12 years of schooling), the findings for white males parallel the foregoing findings for youth enrolled in high school. For whites, apparent differences between the two programs clearly tended to favor the vocational program, although overall differences were slight. For black males not enrolled in high school (with less than or exactly 12 years of schooling), the findings are mixed. A greater percentage of the black males last enrolled in a general program as compared with those last enrolled in a vocational program correctly identified three of the nine occupations, but the occupations differentiating between the programs are different for each educational level (not enrolled with less than or exactly 12 years of schooling). For nonenrolled black males with less than 12 years of schooling, a lower percentage of vocational than general former participants identified the duties associated with the following occupations: Dietician (vocational, 36%; general 46%); economist (vocational,

TABLE 5.1.2: Percentage of Males Who Correctly Identified Occupational Duties by H.S. Curriculum, Educational Level, Race, YA (weighted percents)

Duties of	H.S. Curr.	Enrolled in H.S.		Non H.S. Grad Not Enrolled in H.S.		12 Yrs. Exactly (No Post Sec)	
		M-W	M-B	M-W	M-B	M-W	M-B
Assembler	Gen	67	46	70	55	80	61
	Voc	66	49	78	60	80	48
Dept. Store Buyer	Gen	64	45	57	39	74	60
	Voc	60	49	70	39	80	61
Dietician	Gen	41	34	51	46	52	47
	Voc	45	41	48	36	68	54
Economist	Gen	80	59	72	56	89	78
	Voc	81	70	76	40	92	79
Fork Lift Operator	Gen	84	55	86	63	92	78
	Voc	86	61	88	72	93	83
Hospital Orderly	Gen	64	54	71	61	71	75
	Voc	69	62	68	71	80	64
Keypunch Operator	Gen	60	45	63	49	64	61
	Voc	66	56	66	54	77	55
Machinist	Gen	62	25	70	34	89	56
	Voc	78	27	79	24	94	59
Medical Illustrator	Gen	47	36	48	40	52	40
	Voc	45	33	44	36	58	46
Average Percentage Correct Across All Nine Occupations	Gen	63	44	65	49	74	62
	Voc	66	50	69	48	80	61

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40%; general, 56%); and machinist (vocational, 24%; general, 34%). For black males with exactly 12 years of schooling, the occupations of which vocational graduates showed less knowledge than the general graduates, were: assembler (vocational, 48%; general, 61%); hospital orderly (vocational, 64%; general, 75%); and keypunch operator (vocational, 55%; general, 61%). Grasso and Shea, as reported above, found that vocational students had less knowledge of occupations requiring advanced education. This factor obviously does not explain the latter program differences.^c The race differences discernible in the findings for males enrolled in high school are also apparent for those not enrolled in school with less than or exactly 12 years of schooling. A greater percentage of whites than blacks in both programs at each level correctly identified the duties of these occupations.

Table 5.1.3 reports the results for the five occupations common to the LME and YA surveys of young women. The LME data show a greater percentage of females enrolled in commercial programs than those enrolled in general programs correctly identified the duties for the five occupations. The reverse is true for four of the five occupations for those enrolled in vocational programs other than commercial. In contrast, the YA data indicate for three of the five occupations an equivalence in the knowledge of females enrolled in general or vocational programs. In the remaining two items, a greater percentage of females in vocational programs identified the duties of an assembler and a greater percentage of females in general programs identified the duties of a medical illustrator. The most obvious reason for the inconsistency between the LME and YA findings is differences in the curriculum representation. LME reported results separately for

TABLE 5.1.3: Percentage of Females Who Correctly Identified Occupational Duties by H.S. Curriculum, LME vs. YA

Duties of	LME - Yng. Females Enrolled in Grade 10-12 (1969) ^a			YA - Females Enrolled in H.S. (1979) ^b	
	Gen.	Comm.	Rest Voc.	Gen.	Total Voc.
Assembler	67	74	50	63	70
Keypunch Operator	65	78	58	58	62
Dept. Store Buyer	65	77	83	65	65
Dietician	75	80	54	54	54
Medical Illustrator	48	55	33	47	41

^aSource: Table 2.3, Grasso and Shea, 1979b, p. 24. Unweighted sample (aggregated over race).

^bReanalyses. Weighted sample. (Results disaggregated by race reported in Table 5.1.4).

commercial and other vocational programs; vocational specialty areas are not differentiated and are pooled for the YA results reported in Table 5.1.3. Since enrollment in commercial programs accounts for a large proportion of female enrollment in vocational programs, this could explain the inconsistencies between the LME and the YA results.

Table 5.1.4 reports the YA results for young women by the three educational levels for the nine occupations included in the YA survey. Overall differences tend to favor vocational programs more than the general programs though differences are slight. The race differences discernible in the findings for males are also apparent for females in Table 5.1.4 across the three levels. A greater percentage of whites than blacks in both programs tended to correctly identify the duties of these occupations, and race differences tended to be larger than program differences.

Summary. Available evidence on the occupational skills and knowledge attainment of secondary vocational students is meager. Indeed, data on occupational skills are so meager as to preclude any meaningful overall conclusion. The situation regarding occupational knowledge is only slightly better. Recent national data suggest a very slight tendency for vocational students to have more knowledge of occupations (specifically to be able to identify correctly the duties of selected occupations) than general program high school students. However, it should be stressed that high school program differences in this regard (1) tend to be very slight; (2) have not been adjusted for variables such as SES which might help explain variation; and (3) in any case are considerably smaller than apparent race differences associated with occupational knowledge attainment.

TABLE 5.1.4: Percentage of Females Who Correctly Identified Occupational Duties by H.S. Curriculum, Educational Level, Race, YA (weighted percents).

Duties of	H.S. Curr.	Enrolled in H.S.		Non H.S. Grad. Not Enrolled in H.S.		12 Yrs. Exactly (No Post Sec)	
		F-W	F-B	F-W	F-B	F-W	F-B
Assembler	Gen	65	51	70	46	81	52
	Voc	72	59	66	63	86	55
Dept. Store Buyer	Gen	68	49	61	54	79	58
	Voc	67	55	60	45	79	58
Dietician	Gen	55	46	50	48	72	57
	Voc	55	49	61	61	87	67
Economist	Gen	77	56	64	54	79	55
	Voc	78	69	61	51	86	63
Fork Lift Operator	Gen	67	43	75	50	80	48
	Voc	62	50	53	53	78	63
Hospital Orderly	Gen	68	63	73	66	79	68
	Voc	71	73	76	60	76	75
Keypunch Operator	Gen	59	51	57	49	68	62
	Voc	64	54	39	37	85	74
Machinist	Gen	35	22	43	14	56	19
	Voc	46	29	47	20	63	28
Medical Illustrator	Gen	50	32	44	39	53	36
	Voc	41	42	40	41	69	31
Average Percentage Correct Across All Nine Occupations	Gen	60	46	60	47	72	51
	Voc	62	53	56	48	79	57

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5.2 Occupational Advancement

The outcome area examined in this section is what might generally be called occupational advancement. The 1976 Vocational Education Amendments included as one of the goals of vocational education the long-term preparation for each student for a "career" (Section 195(1)). A variation on this theme is that pursuit of a high school vocational program should not hinder a student "who later decides to pursue a college degree" from doing so (1968 Advisory Council, reprinted in Lazerson and Grubb, 1974, p. 170). In Chapter 6 the question of whether vocational graduates have the necessary credentials to pursue postsecondary education is examined. A broader interpretation of the goal of occupational advancement, however, also includes the expectation that high school vocational graduates who enter the labor force immediately after high school have the same opportunity for advancing up the occupational ladder as general graduates do. Research on the latter question is the subject of this section. Specifically, we seek to review evidence on the question of how patterns of occupational advancement by secondary vocational graduates compare with those by general program graduates. In this regard, the comparison is, of course, restricted to those with exactly 12 years of schooling (that is, with no postsecondary schooling).

Two major problems are apparent in trying to assess the issue of occupational advancement.

1. First, the concept of advancement requires that a measure of job change should have as one of its properties an indication of whether change is in the higher level direction. Without such an assessment of direction of change, the mere incidence of job changes provides at best a measure of job

mobility, not of advancement. Some commonly employed measures of occupation may appear without careful scrutiny to provide a basis for assessing advancement but in fact do not. For example, the Census Occupational Classification (COC) system (see introduction to section 4.4) was never intended in its construction to be used for such a purpose. A hierarchy does not underly its 3-digit scale, which identifies specific occupations. In way of example a higher COC code is associated with an apprentice than with a master craftsman (e.g., COC 431, electrician apprentice; COC 430, electrician). The apprenticeship example also illustrates one of the limitations with using the one-digit COC major occupational grouping codes for inferring occupational advancement. A change from an electrician apprentice (COC 431) to an electrician (COC 430), would indicate no advancement, since both occupations are represented as "4" in terms of the first COC digit. Duncan SEI scores provide a somewhat better basis for measuring occupational advancement, at least in that they do compensate for some of the hierarchical limitations of the COC. For example, an electrician has a higher Duncan SEI score (44.0) than an electrician apprentice (37.0). Further, the Duncan allows for variations within and across the one-digit major occupational groupings of the COC.

2. A second major problem is that the notion of advancement implicitly connotes change over time. In practice, the mean or median occupational level for two nominally equivalent groups at two different time points may be used to infer such change (i.e., a cross-sectional design is used). The assumption underlying such a cross-sectional inference is that if the aggregate occupational level of the group at the later time point is higher than that of the group at the earlier time point, then the occupational levels of individuals at least on average must have changed; this assumption is, of course, more persuasive in cases where there is considerable overlap in the composition of the group for the two occasions. A more accurate measurement of advancement is provided when the changes in occupation over time are assessed for a single set of individuals (i.e., a longitudinal design is used). Unfortunately, however, longitudinal data are usually less readily available than cross-sectional data.

In our review we viewed any research not based on a measure which indicated the direction of change as not relevant to this inquiry, since we are concerned with examining the concept of occupational advancement rather than job mobility. An example of the latter is provided by Grasso and Shea (Table

4.9, 1979b, p. 99); a comparison of changes in occupations by curriculum groups over a two-year period is provided without any assessment of the direction of change. The problem of inferring advancement from cross-sectional data does not in our view, in and of itself, negate any research based on a reasonable measure of occupational advancement, though it does signal the need for careful interpretation of the limitations of any associated findings.

Previous Research. No non-national studies addressing the question of occupational advancement were located by Mertens et al. (1980b). Our review disclosed that previous attempts to examine occupational advancement for high school graduates with exactly 12 years of schooling using existing national longitudinal data sets have been limited to LME data. This research provides limited findings on the question of occupational advancement. The only relevant study located used a cross-sectional design, though the researchers reported that there was considerable overlap in the groups at the two time points examined (Grasso and Shea, 1979b, Table 4.10, p. 100). Median Duncan SEI scores of current (or last) job in 1966 and 1973 were reported for males with exactly 12 years of schooling by curriculum group (general, commercial and other vocational) and race. Comparisons were made on the basis of differences (increases or declines) in median Duncan scores over the seven-year period. Male general graduates (with exactly 12 years of schooling) of both races tended to have gained or advanced more in occupational level than their commercial and other vocational peers. The only sizable difference in the pattern was between white male general graduates and their commercial counterparts; the former showed a gain of 5 points and the latter a decline of 8 points.

Reanalyses. In order to provide the most precise estimate of occupational advancement patterns from existing national longitudinal data, our analyses should have been based on a longitudinal design tracing occupational changes for the same individuals over two or more time points. Structural model or path analysis methods might also have been employed so that controls for individual differences in background and other relevant intervening variables could have been introduced. Due to the limited resources committed to this effects study, however, priorities precluded undertaking reanalyses of such a scope. Instead, the occupational advancement perspective will simply be applied to a re-examination of NLS-72 results obtained from reanalyses, which were previously reported in section 4.4. These results permit tracing patterns on the Duncan SEI over three time points (entry, one year and four years after high school graduation) for general and vocational high school graduates with exactly 12 years of schooling. Although these NLS-72 results were based on a cross-sectional design, there is considerable overlap in the membership of the groups representing the three time points.

We will also present other results from our reanalyses of NLS-72 data based on a possible mediator of occupational advancement among those not having the benefit of postsecondary education. Chapters 6 and 7 will examine differences among graduates from vocational and general high school programs in their continuing education in a regular postsecondary institution.* In this section we are concerned with high school graduates

* Regular postsecondary institutions were defined in this study to include vocational, trade, business or other career training schools; junior or community (two-year) colleges; or four-year colleges or universities.

with exactly 12 years of schooling who chose to enter the labor force or military service immediately after high school. Opportunities for occupational training in less formal settings are available to these youth.

Participation in on-the-job training programs, for example, can be instrumental in improving an individual's job within a company (or advancing up the ladder).^{*} It is possible, however, that employers faced with employees who graduated from either a high school general or vocational program tend to give on-the-job training to general graduates to a greater extent than to vocational graduates (this, of course, assumes scarcity of resources for training). While one interpretation of such an interaction with high school curriculum, if it existed, could be that vocational graduates because of their previous occupational training in high school require on-the-job training to a less extent than general graduates, the lack of the opportunity for such training could also be interpreted as a potential obstacle to occupational skill development, and hence to occupational advancement. We thus will examine differences between vocational and general graduates with exactly 12 years of schooling in their participation in on-the-job training programs (as of four years out of high school). Differences in apprenticeships undertaken will also be examined. We should emphasize that participation in these training programs is not viewed as an "outcome" variable but rather as a mediator variable which could indicate differences in opportunities in an occupational setting that may retard or enhance future occupational advancement.

* Rumberger (1980) investigated the effect of occupational training on the earnings of young men based on LME data. He found company training generally more rewarded than training acquired elsewhere. His study did not examine curriculum differences. Education was represented as the number of years of schooling completed.

Occupational Advancement. Tables 5.2.1 and 5.2.2 summarize the NLS-72 results on the Duncan SEI for male high school graduates with exactly 12 years of schooling. Table 5.2.1 reports the mean Duncan SEI scores for three time points (entry, one year and four years after high school graduation). Table 5.2.2 summarizes the occupational advancement pattern over the four-year time period; part A reports the gains (or declines) in Duncan means for three time intervals: (1) entry to one year out; (2) one year out to four years out; and (3) entry to four years out. Part B expresses the gains as annual rates of advancement and compares these rates for two time periods: (1) entry to one year out; and (2) one year out to four years out.

With minor exceptions, the scores reported in Table 5.2.2 show that for males, greater gains in average Duncan SEI scores occurred in the later time period -- between one year out of high school and three years later (or four years out of high school). Except for race differences, no underlying pattern is discernible in changes in the Duncan averages in the earlier time period. Between entry and one year later, only slight changes are apparent in the data shown in Table 5.2.2 (though black male graduates of business and T&I programs appear not to fare as well as their white counterparts in the first year out of high school). The gains shown between entry to year 4 across the programs range from 3-5 points for white males and 2-5 points for black males. Thus, differences in overall gains among the programs

TABLE 5.2.1: Mean Duncan SEI Scores for Male High School Graduates with Exactly 12 Years, by Race and Time Point, NLS-72 (weighted means)^a

	M-W			M-B		
	Entry 1972	Yr. 1 1973	Yr. 4 1976	Entry 1972	Yr. 1 1973	Yr. 4 1976
General	21.7	22.1	26.8	21.2	21.2	26.6
T & I	23.4	23.3	27.0	22.0	19.4	23.7
Business	24.4	26.8	29.1	24.5	21.3	29.0
Rest Voc ^b	24.0	21.9	27.4	19.2	21.7	21.5

^a Abstracted from Table 4.4.3.

^b Rest Voc includes agriculture, distributive education, health and home economics.

TABLE 5.2.2: Average Gains or Declines in Duncan SEI Scores Over Three Time Points and Annual Rates of Advancement for Male High School Graduates With Exactly 12 years, by Race, NLS-72

A. Average Gain or Decline^a

	<u>M-W</u>			<u>M-B</u>		
	Entry to Yr. 1	Yr. 1 to Yr. 4	Entry to Yr. 4	Entry to Yr. 1	Yr. 1 to Yr. 4	Entry to Yr. 4
General	0	+5	+5	0	+5	+5
Business	0	+4	+4	-3	+4	+2
T&I	+2	+2	+5	-3	+8	+5
Rest Voc ^b	-2	+6	+3	+2	0	+2

B. Annual Rates of Advancement^c

	Entry to Yr. 1	Yr. 1 to Yr. 4	Entry to Yr. 1	Yr. 1 to Yr. 4
	General	0	+1.7	0
Business	0	+1.3	-3	+1.3
T&I	+2	+0.7	-3	+2.7
Rest Voc ^b	-2	+2.0	+2	0

^a Differences in means reported in Table 5.2.1 rounded to whole number. Any differences less than 0.6 reported as zero.

^b Rest Voc includes agriculture, distributive education, health and home economics.

^c For period 2 (Yr.1 to Yr.4) annual rate of advancement equals gain for period 2 divided by three years to obtain the average gain per year.

never exceed 3 points, which is not a significant difference.* The annual rates of advancement for the second period (year 1 to year 4) also show only slight differences among the programs. The exception is the rest vocational group which shows a different pattern than that of the other programs. However, interpretation of the pattern for the rest vocational group is difficult given its heterogeneous composition (graduates of agriculture, distributive education, health and T&I programs are pooled in this group).

As for males, Tables 5.2.3 and 5.2.4 summarize the results for females. Table 5.2.4 shows that gains in the Duncan SEI averages occurred steadily over the total four-year period for female graduates of all programs. No significant differences in the pattern of occupational advancement are discernible between the general and commercial programs; differences in gains or overall rates of advancement never exceed one point between the two programs. The exception is the high rate of advancement for white females in the rest vocational programs in the first period. However, interpretation of the pattern for the rest vocational group is difficult given its heterogeneous composition (graduates of agriculture, distributive education, health and T&I programs are pooled in this group).

* None of the differences in gain scores among the general, T&I and business programs are significant (.05 level). The largest difference of 3 points for white males was between the general and T&I programs. A standard error of the difference between these two gain scores was estimated for this contrast and was found to be slightly greater than 1.5. If a correction for weighting is applied, the estimated corrected standard error is approximately 1.8 (assuming a design effect of 1.42 based on a derivation by Wiley, 1980). Thus, a difference in gain scores between the general and T&I programs for whites would have to be greater than 3.6 (2×1.8). Since the black males are based on a much smaller sample size, the standard error (corrected for weighting) for any contrast of gain scores among programs for blacks would be greater than 1.8.

TABLE 5.2.3: Average Mean Duncan SEI Scores for Females with 12 Years Exactly, by Race and Time Points, NLS-72 (weighted means)

	F-W			F-B		
	Entry 1972	Yr 1 1973	Yr 4 1976	Entry 1972	Yr 1 1973	Yr 4 1976
General	31.7	33.8	36.6	22.1	27.1	30.3
Commercial	41.8	43.7	47.4	37.6	42.8	46.5
Rest Voc	29.1	37.2	41.0	29.0	29.8	32.2

^a Abstracted from Table 4.4.5

^b Rest Voc includes agriculture, distributive education, health and T&I. Home economics is not included.

TABLE 5.2.4: Average Gains in Duncan SEI Scores Over Three Time Points and Annual Rates of Advancement for Female High School Graduates With Exactly 12 Years, by Race, NLS-72.

	A. Average Gains ^a					
	Entry to Yr. 1	$\frac{F-W}{Yr.1}$ to Yr.4	Entry to Yr.4	Entry to Yr.1	$\frac{F-B}{Yr.1}$ to Yr.4	Entry to Yr.4
General	+2	+3	+5	+5	+3	+8
Commercial	+2	+4	+6	+5	+4	+9
Rest Voc ^b	+8	+4	+12	+1	+2	+3

B. Annual Rates of Advancement^c

	$\frac{F-W}{Yr.1}$		$\frac{F-B}{Yr.1}$	
	Entry to Yr. 1	to Yr.4	Entry to Yr.1	to Yr.4
General	+2	+1	+5	+1
Commercial	+2	+1.3	+5	+1.3
Rest Voc ^b	+8	+1.3	+1	+0.7

^a Differences in means reported in Table 5.2.3 rounded to whole number. Any differences less than 0.6 reported as zero.

^b Rest Voc includes agriculture, distributive education, health and T&I. Home economics is not included.

^c For period 2 (Yr.1 to Yr.4) annual rate of advancement equals gain for period 2 divided by three years to obtain the average gain per year.

Two other patterns apparent in Table 5.2.4 are worth noting. First, the greatest rate of advancement for females occurs in the first year out of school. The annual rates of advancement for the next three years (Part B, Table 5.2.4) show a slight deceleration in rate in comparison to the first year. This pattern is quite different from that seen for males.* The greatest occupational advancement for males occurred after the first year. Second, black females showed a greater rate of advancement in the first year out of high school than whites: for both general and commercial graduates, black females showed a gain of 5 points and white females a gain of 2 points. There was no race difference in the rate of advancement in the subsequent three-year period.

On-the-Job Training and Apprenticeships. In NLS-72 surveys, self-reports were collected on participation in various types of training programs, including on-the-job or company training and apprenticeships, for three time periods during the first four years out of high school.** Table 5.2.5 reports, by curriculum and sex-race group, the percentage of high school graduates with exactly 12 years of schooling who reported participating in on-the-job or apprenticeship programs in the first four years out of high school.*** Within each sex-race group, the

* We have not done any significant tests of the differences in gain scores between the two periods, but the consistency of the pattern for females across both programs and race clearly suggests that the pattern for females differs from males.

** For specific content of questions, see footnote to Table 5.2.5.

*** Doeringer & Piore (1971, p. 17) note that on-the-job training can be so informal that it may not be recognized if it was received. We assume that these self-reports are based on on-the-job training programs that are sufficiently formal to be recognized. We see no reason for one curriculum group to have systematically recognized such programs to a greater extent than the other.

TABLE 5.2.5: Percent of High School Graduates With Exactly 12 Years of Schooling Reporting Participation in On-the-job/Company Training Programs or Apprenticeships for Three Time Periods During First Four Years Out of High School, by H.S. Curriculum, Race-Sex Group, NLS-72 (weighted percents)^a

Type of Training	# Training Prog's Participated in Over 4-Yr. Period	M-W		M-B		F-W		F-B	
		Gen.	Voc.	Gen.	Voc.	Gen.	Voc.	Gen.	Voc.
On-the-job training	None	55.5	53.8	63.8	66.1	69.6	65.7	74.0	71.3
	1	27.9	27.6	30.7	24.8	18.6	22.2	18.7	19.1
	2	11.9	12.0	5.4	6.6	8.0	9.0	4.4	9.3
	3	3.9	6.2	0.0	2.5	3.2	2.7	2.8	0.3
	4	0.9	0.3	0.0	0.0	0.5	0.5	0.0	0.0
Apprenticeship	None	94.6	93.3	96.4	97.8	99.7	99.8	99.3	98.6
	1	4.3	5.0	2.4	2.2	0.3	0.2	0.7	1.4
	2	0.7	1.1	1.3	0.0	0.0	0.0	0.0	0.0
	3	0.4	0.6	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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^a Specifically respondents were asked to indicate participation in "on-the-job (a program of instruction during normal working hours)" for three time periods: (1) between time left high school and Oct. 1973, (FQ22AA), (2) from Oct. 1973 to Oct. 1974 (SQ59B); and (3) since Oct. 1974 to Oct. 1976 (TQ109B). They were also asked to indicate participation in a "Formal Registered Apprenticeship (your State or Labor Union)" for the same three time periods (FQ22AB, SQ59C, and TQ109D, respectively). Responses to each set of three questions were accumulated so that an individual could potentially have participated in 3 programs over the four-year period. In addition, respondents were asked to indicate for the period "since Oct. 1974 to Oct. 1976," participation in an "employer-provided program of instruction other than on-the-job training" (TQ109C). Responses to this question were added to the number of on-the-job training programs so that the maximum of such programs over the four-year period could be 4.

percentage differences between graduates from general and vocational programs who indicated no participation in either on-the-job training or apprenticeship programs are slight (none in excess of 5%). For those reporting participation in one or more on-the-job training programs over the four-year period, there is a slight tendency for vocational graduates to report participation in more than one such program. However, this tendency is too slight to be interpreted as indicating significant differences between curricula. Assuming participation in such training programs is associated with more doors opening to future occupational advancement, then graduates from both curricula appear to have the same opportunities for such training within each sex-race group.

Race and sex differences are apparent in Table 5.2.5 however. Blacks tend to acquire less on-the-job training than whites. Race differences in the acquiring of training have been reported for males in previous research (e.g., Rumberger, 1980). Table 5.2.5 suggests that sex differences may be greater than race differences; more males tend to participate in these programs than females. These sex differences may be due to sex differences in vocational specialty enrollments. The greatest proportion of males enroll in T&I programs, while the greatest proportion of females enroll in commercial programs. It seems plausible to hypothesize that training programs and apprenticeships would be associated to a greater extent with industrial and labor union settings that tend to employ T&I male graduates rather than with office or clerical occupational settings that tend to employ female commercial graduates.

Summary. When then can be said about patterns of occupational advancement for secondary school graduates with exactly 12 years of schooling (as of four years after graduation)? First, there is a problem in operationalizing the meaning of "occupational advancement." Since there is no widely agreed upon measure of this construct, we simply used the measure of this construct employed in the only relevant study previously reported; namely, changes in Duncan SEI scores over time. While the crudeness of this measure as an indicator of "occupational advancement" certainly should be kept in mind, the findings suggest that while vocational graduates show no greater occupational advancement than general graduates, neither do they show any less. This rough equality in the advancement measure between vocational and general program graduates stands in contrast to apparent differences associated with race and sex. As one possible mediator of future occupational advancement, we also examined participation in on-the-job training programs and apprenticeships. No differences in training program patterns were associated with participation in secondary vocational or general programs. Graduates from both curricula appear to have the same opportunity for such training. Again, in contrast to the equality between curricula within sex-race groups, differences in training were associated with race and sex.

5.3 Years of Secondary School Attained

One of the purposes suggested for vocational education is that it should make the traditional education curriculum more "palatable" to high school students (Walsh, 1979, p. 234). Secondary vocational education programs also have been viewed as a means of "increasing the holding power of the schools" (National Academy of Education, 1979, p. 77). Given the pattern of results reported in Chapter 4, namely, that high school graduation, from either vocational or general programs, was associated with a variety of employment advantages over outcomes of early leavers, the question of whether a vocational education program holds students in high school who would have dropped out if they were in a general program appears a critical one in evaluating the place of vocational education in secondary schooling. Yet no definitive answer to this question of the holding power of vocational education is provided by previous research nor can one be obtained from national data available to date. Nevertheless, available evidence does suggest at least a tentative answer. This section will review this evidence.

Non-National Studies. Mertens et al. (1980b) identified 11 non-national studies relevant to this topic. The primary focus of the research, however, was why students drop out of high school, rather than estimation of dropout rates. Only one study (Bergstrad, Esser and Nelson, 1979) compared dropout rates for vocational programs to other nonvocational programs; it reported no difference in the percentage of dropouts from three program areas (vocational, nonvocational, and practical arts).

Mertens et al. (1980b, p. 79) concluded that the research currently available is insufficient to answer the question "Does vocational education serve to retain students in school who might otherwise have dropped out?"

Previous National Studies. National longitudinal studies which surveyed students enrolled in grades 9 or 10 at an initial time point and resurveyed these same students at a later time point offer potential data for estimating dropout rates. There is, however, one major pitfall in using such data for obtaining dropout estimates. None of the national longitudinal data sets in any of their follow-up surveys have attained a 100% response of their initial sample. This means that many or all of the nonrespondents to the later survey (who were enrolled in high school at the earlier time point) could have dropped out of school in the interim. If dropout estimates are based simply on the respondents to the later follow-up, they could be highly biased.

Grasso and Shea (1979b) guarded against this problem in the dropout estimates they derived from LME data. The estimates were based on students who were enrolled in grades 10-12 in the initial survey and who were reinterviewed one year later. An estimate of those who had left high school early was obtained from those who were reinterviewed; this estimate was considered to be a "low" estimate of the dropout rate. Since it was not known how many of the nonrespondents had dropped out of high school, all those who had been enrolled in grades 10-12 in the initial interview and who were not reinterviewed in the follow-up one year later were considered to be potential dropouts. Given this possibility, the nonrespondents were added to the number of dropouts estimated from the reinterviewed sample to derive a "high" (or outside) estimate of the dropout rate. Table 5.3.1 shows that the findings for the one-year interval proved consistent in

TABLE 5.3.1: Estimated High School Dropout Rates by Curriculum, Sex, and Race: Men (1966 to 67) and Women (1968 to 69) Enrolled in Grades 10 to 12 in the Base Years, LME

Sex	Race		Gen.	Voc.	Comm.
Males	White	Low ^a Est.	6%	10%	3%
		High ^b Est.	16	16	15
	Black	Low Est.	7	12	4
		High Est.	13	27	10
Females	White	Low Est.	4%	*	3%
		High Est.	7	*	7
	Black	Low Est.	6	*	1
		High Est.	6	*	4

* Sample size too small.

^a Low estimates = number reinterviewed who were not enrolled at first follow-up and had completed fewer than 12 years of schooling.

^b High estimates = number reinterviewed who were not enrolled at first follow-up and had completed fewer than 12 years of schooling, plus number not reinterviewed at first follow-up (who had been enrolled in grades 10-12 in initial interview).

Source: Table 3.1, Grasso and Shea, 1979h, p. 43

direction (if not in magnitude) regardless of whether they were based on the low or high estimates. For both males and females, black and white, the dropout rate for the commercial program was lower than for the general program. In contrast, the dropout rate for the remaining vocational programs for males tended to be higher than for the general program (insufficient data precluded estimating dropout rates for females in vocational programs other than commercial).

Dropout rates by high school curriculum also were reported by Vincent (1969, Table 7, p. 17) based on unpublished Project TALENT data for individuals who were 10th graders in 1960 and who responded to a follow-up in 1963. The estimates he provides are flawed, however, in that no account was taken in reporting these data of the fact that the response rate to the follow-up was only 42.5% (as reported by Wise, 1979, p. 7); also no indication was given that any weighting for nonresponse had been done. Nevertheless Vincent's findings do parallel those reported by Grasso and Shea: the commercial program students showed lower dropout rates than those in the general program and those in other vocational programs showed higher dropout rates than those in the general curriculum.

In addition to the longitudinal dropout results based on LME data, Grasso and Shea also reported some cross-sectional dropout results in which socioeconomic origin, scholastic aptitude and other background variables had been controlled. With respect to females, the cross-sectional and longitudinal results were consistent: females in a commercial curriculum are more likely than are their general peers to complete at least 12 years of school (p. xxii). For males, the cross-sectional results differed from the longitudinal results. As reviewed above, the longitudinal results indicated that

male students in a vocational program at the time of the 1966 survey were more likely to leave school by 1967 than were their general peers (see Table 5.3.1). In contrast, the cross-sectional results for males suggested that vocational studies enhanced completion of high school. A positive correlation between having been most recently in a vocational program, rather than a general one, and highest year of school completed over the range from grade 10 through grade 12 was found for the out-of-school youth. Grasso and Shea suggest that the tendency for students to shift to vocational programs as they progress through high school may account for their mixed findings for males:

Some vocational courses are offered only to seniors; others, to juniors and seniors only. Thus at any given time there are proportionately more seniors in occupational programs than juniors, and more juniors than sophomores. By itself, the net flow toward occupational studies results in a positive correlation between having been in an occupational program and highest year of school completed over the range from 10 to 12 years. (1979b, p. xxii)

The net flow or shifts among curricula between grades 9 to 12 were addressed by Coombs and Cooley (1968). Follow-up Project TALENT data collected in 1964 for the 9th grade cohort (1960) was used to assess differences in holding power among curricula (i.e., general, college preparatory, commercial-business, vocational, agricultural, and other). The curriculum classification was defined on the basis of self-reports for two time points: (1) curriculum planned in grade 9 (reported in 1960 survey); and (2) curriculum membership at the time of leaving or graduating from high school (reported in 1964 survey). Percentages associated with each curriculum at the two time points for the dropouts from high school since grade 9 were contrasted to percentages associated with a comparison group formed from a random subsample

of graduates from the 9th grade cohort who reported in the 1964 survey that they had not entered a junior or 4-year college.* The percentages were weighted to adjust for nonresponse bias. The comparison group was intended to provide norms for evaluating shifts among curricula between the expected curriculum in grade 9 to the actual curriculum at graduation. It was reasoned that if there was no association between the curriculum a student was in and his or her dropping out, then the rise or decline in the percentages in each curriculum between the two time points for those who had dropped out by the anticipated time of graduation should parallel those for the comparison group of graduates.** The comparison of the patterns between the two time points suggested that only one curriculum program was associated with a greater probability of dropping out -- the general curriculum. This finding held for both boys and girls. The Project TALENT data did not allow any racial disaggregation. Coombs and Cooley (p. 354) conclude their presentation of this finding with the following question: "Did enrollment in this general curriculum, which generally offers neither the intellectual stimulation of the academic curriculum nor the practical instruction of the vocational courses, influence the dropouts' decision to leave school? An answer cannot be given here, but educators should give some thought to the matter."

* Coombs and Cooley believed by restricting the comparison group of graduates to a noncollege population a more relevant norm group for the dropouts was obtained.

**The comparison group used by Coombs and Cooley does not provide an adequate control for the net flow effect described by Grasso and Shea. The distribution of the comparison group at the time of graduation shows the end result of the net flow, whereas dropouts overall include individuals who leave school at various time points between grades 9 and 12.

Reanalyses. Grasso and Shea (1979b) have previously provided estimates of dropout rates from the LME data. Of the other two national longitudinal data sets (NLS-72 and YA) used in our reanalyses, neither provides an ideal basis for estimating dropout rates. In the case of NLS-72, since its initial data collection was done in the spring of the senior year, about 98% of the NLS-72 sample actually graduated from high school (Tabler, 1976, Table 8, pp. 28-99). Thus the NLS-72 data offer little potential for examining the dropout question.

In the case of YA, the only data available are from the initial survey and as yet no follow-ups are available. The YA data at present are thus cross-sectional, not longitudinal. Inferring time trends from cross-sectional data inevitably is hazardous, but since the YA were collected as recently as 1979, they provide one of the most up-to-date sources of information available. This advantage seemed to us to outweigh the risks of using cross-sectional data to estimate time trends. Thus, we have used the cross-sectional data collected in the initial YA survey to simulate longitudinal data for purposes of estimating dropout rates. In interpreting these estimates, we will, of course, clearly identify problems of inferring longitudinal patterns from cross-sectional data.

Since the YA sample included youth aged 14-21 (as of January 1, 1979) and the sample was drawn from households, it includes both youth enrolled in high school and youth not enrolled in high school. Three distinct educational levels are represented in the "not enrolled in" high school population: (1) those who have not completed 12 years of schooling (i.e., early leavers or dropouts at that point in time); (2) those who have completed exactly 12 years of schooling; and (3) those who are enrolled or have been enrolled in some

postsecondary institution. We used these cross-sectional data to estimate dropout rates for two populations:

1. School-age population, defined by those 19 or under who were: (1) enrolled in high school or (2) not enrolled in high school and who had completed less than 12 years of schooling.* The population was further restricted to those who reported they were enrolled in (or had last been enrolled in) a vocational or general program. Dropout rates for this population were derived separately for each program and sex-race group as follows:

$$\text{Dropout rate} = N_1 / (N_1 + N_2)$$

Where: N_1 = Those not enrolled in high school aged 19 or less who reported less than 12 years of schooling

N_2 = Those enrolled in high school aged 19 or less

2. Out-of-school population, defined by all youth not enrolled in high school who reported being last enrolled in a vocational or general program in high school. No restriction on age was used beyond the age sampling frame for the YA survey, namely ages 14 to 21 (as of January 1, 1979). The dropout rates for this population were derived separately for each program and sex-race group as follows:

$$\text{Dropout rate} = N_3 / (N_3 + N_4)$$

Where: N_3 = Those not enrolled in school who reported completing less than 12 years

N_4 = Those who reported completing 12 years or more

Since any individuals in the YA sample who were attending (or had last attended) a nonpublic high school were deleted from our reanalysis file (see Appendix A, Table A-3.1), both these populations represent public school populations.

* Age 19 was selected as the cutoff point since of those in the YA sample enrolled in a vocational or general program in high school (N=3364), less than one percent (N=21) were 20 or older.

Table 5.3.2 provides dropout estimates for the school-age and out-of-school populations. Each set of estimates supports the same finding: the percentage of those not enrolled in high school who have not yet completed 12 years of schooling are greater for former participants of general programs than vocational programs. This finding is consistent across all sex and race groups. Estimated dropout rates across the sex-race groups range in the school-age population from 9 to 18% for the vocational curriculum and 19 to 25% for the general curriculum. In the out-of-school population, the range is 7 to 30% for the vocational curriculum and 30 to 51% for the general curriculum. The magnitude of the differences in dropout rates across the race and sex groups is 5-12 percentage points less for former vocational students for the school-age population, and 10-33 percentage points less for the out-of-school population. Race differences are less apparent in the school-age population estimates. These findings are based on public school populations.

Since these estimates were derived from cross-sectional data, there are difficulties in interpreting these estimates as anything more than rough approximations. The problems of estimating "longitudinal" dropout rates with cross-sectional data can best be illustrated with some simulated data examples. For the total school population and various subgroups within this population, dropout rates are commonly derived from national high school surveys on the basis of the percentage of students who entered grade 10 and dropped out of school (i.e., did not re-enroll or transfer to another school) before completing grade 12. While this procedure appears highly

TABLE E.3.2: Estimated Percent Dropouts for School-Age Population and Out-of-School Population by Curriculum, Sex-Race Groups, YA (Both Populations Restricted to Public High School Attendance)

	<u>School-Age Population^a</u>		<u>Out-of-School Population^b</u>	
	Est. % Dropouts Gen.	Voc.	Est. % Dropouts Gen.	Voc.
Male - White	24	18	30	20
Black	20	15	45	30
Hispanic	25	16	51	26
Female - White	21	9	30	7
Black	19	10	38	19
Hispanic	24	14	50	17

^a Population defined by those aged 19 or under enrolled in high school or not enrolled in school and have completed less than twelve years of schooling. See text for further definition and formula. (unweighted sample)

^b Population defined by all youth not enrolled in high school. See text for further definitions and formula. (weighted sample)

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appropriate for estimating dropout rates for sex and race groups, it may be inappropriate for estimating such rates for curriculum groups. If some vocational "programs" (not courses) available in grade 12 do not become available until grade 11 or 12, as suggested by Grasso and Shea (see quote above), then basing the dropout rate on those enrolled in a vocational curriculum in grade 10 would not provide an accurate basis for estimating dropout rates for curriculum groups. This will be shown with the second example given below.

In the illustration that follows, we will base the longitudinal estimate of dropout rates on the definition given above, namely the proportion of grade 10 enrollees who drop out of school before completing grade 12. By applying this procedure to the estimation of dropout rates for curriculum groups (rather than sex or race groups), interpretation of these rates is dependent on changes in the enrollment pattern among curricula between grades 10 and 12 being due to changes in holding power among curricula. Across the simulated data examples, an equivalent dropout pattern over the grade levels will be assumed for each curriculum -- specifically that one student at each grade level (10, 11 and 12) drops out of the curriculum in which he or she initially enrolled in grade 10, or a total of three students initially enrolled in the curriculum in grade 10 drop out before graduation. If each curriculum in grade 10 began with an enrollment of 10 students (just to keep the numbers small), then the longitudinal dropout rate for the percentage of students who entered a curriculum in grade 10 and dropped out of school before completing grade 12 would be .30 (3/10) for each curriculum.

Assuming this pattern of dropouts is generalizable to a three-year period, then the picture based on grade 10-12 cross-sectional data would look like Simulated Data Example #1 (Part A, Table 5-3-3). In a spring survey of students enrolled in grades 10-12, the total enrollment in grades 10-12 would be 24 for each curriculum.* In the cross-sectional case, the total number of dropouts would be derived from the survey of the school-age population not enrolled in high school. Table 5-3-4 shows how the total number of dropouts estimated from such a cross-sectional population would be 6. The cross-sectional estimated dropout rate for each curriculum using Simulated Data #1 would be $.20$ ($6/(24+6)$). The cross-sectional approach leads to an underestimate of the dropout rate ($.20$ in comparison to the longitudinal estimate of $.30$) because some of the youth counted as in-school will still drop out before completing high school.

* This, of course, assumes that all students who are going to drop out in that school year have dropped out at the time of the survey. The collection of data in the YA survey between the end of January to August suggests that in practice this assumption may not be tenable. This could also involve a curriculum bias if some students tend to drop out of one curriculum earlier in the school year than students in the other curriculum.

TABLE 5.3.3: Simulated Data Examples to Illustrate Problems of Estimating Dropout Rates From Cross-Sectional Data.

A. Simulated Data Example #1

	Fall Gr. 10 (14-15)	Fall Gr. 11 (16-17)	Fall Gr. 12 (18-19)	Total Gr. 10-12 (14-19)
Total # Enrolled Fall	10	9	8	27
# Dropouts During Yr.	-1	-1	-1	
Total # Enrolled Spring	9	8	7	24

B. Simulated Data Example #2: Vocational Curriculum

	Fall Gr. 10	Fall Gr. 11	Fall Gr. 12	Total Gr. 10-12
Total # Enrolled Fall	10	10	10	30
# Dropouts During Yr.	-1	-1	-1	
Net Transfers in/out	+1	+1	+1	
Total # Enrolled Spring	10	10	10	30

C. Simulated Data Example #3: General Curriculum

	Fall Gr. 10	Fall Gr. 11	Fall Gr. 12	Total Gr. 10-12
Total # Enrolled Fall	10	8	6	24
# Dropouts During Yr.	-1	-1	-1	
Net Transfers in/out	-1	-1	-1	
Total # Enrolled Spring	8	6	4	18

TOTAL 5.3.4: Simulated Example of Number of Dropouts in Cross-sectional School-Age Population Not Enrolled in High School (with less than 12 years schooling)

Age at Time of Survey	Age When Dropped Out	Gr.10 Gen.Voc.		Gr.11 Gen.Voc.		Gr.12 Gen.Voc.		Cross-Sectional Grand-Total Gen. Voc.	
14-15	14-15	1	1					1	1
16-17	14-15	1	1					1	1
	16-17			1	1			1	1
18-19	14-15	1	1					1	1
	16-17			1	1			1	1
	18-19					1	1	1	1
Total # Dropouts		3	3	2	2	1	1	6	6

The first cross-sectional example was based on the assumption that the pattern of enrollment across grades 10-12 was changed only by dropouts -- either because there were no transfers among the general, vocational and academic curricula or the net effect of transfers for each curriculum was zero (i.e., the number of transfers out of a particular curriculum was equal to the number of transfers in). If the net flow of transfers does change the initial grade 10 enrollment pattern among curricula, the question is whether these changes may be interpreted solely as indicating differences in the holding power of a curriculum or whether, as suggested by Grasso and Shea, these changes may also reflect differences in curriculum organization across grade levels. We have controlled for the latter type of changes in the first cross-sectional example. In the longitudinal data, the grade 10 enrollment pattern of the vocational curriculum relative to the general curriculum was .50/.50 (10/10); in the first cross-sectional example, this same enrollment pattern of .50/.50 was maintained across grades 10-12 (10/10, 9/9, 8/8).

To show how changes in the enrollment pattern across grades 10-12 can affect cross-sectional estimates, in the next hypothetical example, the enrollment patterns among curricula will not be restricted to the same across the grade levels. In fact, in this second cross-sectional example, the net curriculum transfers will favor one curriculum. Specifically, we assume that net transfers lead to an increase in the enrollment in the vocational curriculum of one student per year and a reduction of enrollment in the general curriculum of one student per year. Simulated Data Example #2 (Part B, Table 5.3.3) shows how the vocational enrollment at each grade level would look if, in addition to

losing one student due to dropout, the net flow of transfers resulted in one additional student at each grade level. Paralleling this, Simulated Data Example #3 (Part C, Table 5-3-3) indicates how the general curriculum enrollment would look if the net flow of transfers resulted in one student being lost each year. The initial equivalence of the enrollment pattern in grade 10 of .50/.50 (10/10) changes in grade 11 to .55/.45 (10/8) and in grade 12 to .62/.38 (10/6). Using these enrollment patterns as the basis of the second set of cross-sectional estimates, the total number enrolled in grades 10-12 at the time of a spring survey would be 30 for the vocational curriculum and 18 for the general curriculum. The number of dropouts estimated from the cross-sectional school-age population (see Table 5-3-4), as in the first cross-sectional example, would be 6. The cross-sectional dropout estimates thus would be .167 ($6/(30+6)$) for the vocational curriculum and .25 ($6/(18+6)$) for the general curriculum. In comparison to the equivalence between curricula in the dropout rate of .30 for the longitudinal example and .20 for the first cross-sectional example, the interaction of net flow transfers with curriculum over the grade 10-12 period results in a much lower estimate for the vocational curriculum relative to the general curriculum.

The foregoing illustration indicates two major sources of bias in estimating dropout rates, using cross-sectional data rather than longitudinal data.* First, cross-sectional approaches to estimating

* A third potential source of bias would exist if the survey were conducted in the fall or at a time in the school year when all students who will drop out in the course of the school year have not yet dropped out. If some students tend to drop out of one curriculum earlier in the school year than students in the other curriculum, this would also involve a curriculum bias in estimates, for both the school-age enrollee and nonenrollee populations.

Dropout rates based on a school-age population tend to underestimate actual dropout rates, due to the fact that some of the youth counted as in-school will still drop out before completing high school. Second, depending on the transfer pattern among curricula, cross-sectional approaches may yield biased estimates of relative curriculum dropout rates.

Summary. In light of the problems with using cross-sectional data to estimate dropout rates discussed in this section, what can be said of the dropout estimates based on the recent YA cross-sectional data reported in Table 5.3.2? First, we must emphasize that it is impossible to say definitively that future estimates derived from YA longitudinal data after follow-up data become available will show the same pattern. In one instance (i.e., Coombs and Cooley) has previous research based on national longitudinal data offered support for the proposition that vocational programs overall have greater holding power than general programs. Previous national research by Grasso and Shea, using both cross-sectional and longitudinal estimates, has been consistent in finding the holding power of commercial programs for females to be greater than that of general programs; yet it cannot be ignored that previous findings have been based on national data collected in the 1960s. Until the YA longitudinal data become available, the estimates provided in Table 5.3.2 provide tentative support for the proposition that in the late 1970s the holding power of vocational programs offered in public schools was greater than that of general programs. Support for this finding is provided by the consistent pattern found across the sex-race groups; however, caution is necessary in drawing conclusions about

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specific magnitudes in the dropout rates of general and vocational programs. We should also emphasize that although the YA dropout estimates were not computed separately by vocational specialty areas, previous research makes it seem entirely plausible that dropout rates may well vary as much between specialty areas within vocational education as between vocational and general programs overall.

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5.4 Citizenship

In the 1914 Report of the Commission on National Aid to Vocational Education, one of the direct needs for vocational courses was reported to be "to attract and hold in school pupils who now leave because they are unable to obtain suitable preparation for useful employment." This Commission also argued that for such students vocational courses offered "the only opportunity the schools have to give further training in citizenship" (reprinted in Swanson, 1964, p. 26). Preparation for citizenship has thus long been one of the general goals of vocational education. Citizenship obviously involves far more than mere employment. Nevertheless evidence on whether vocational programs meet this goal is extremely limited. The major limitation with the research in this area is how the concept of "citizenship" has been operationalized.

Non-national Studies. Seven studies examining citizenship were reviewed by Mertens et al. (1980b). Citizenship was most frequently defined as voting behavior in these studies; however, several of the studies were based on subjective assessments by vocational graduates of whether they felt their program had been helpful in making them become responsible citizens. The studies based on voting behavior found no apparent differences between vocational and nonvocational graduates (Conroy and Diamond, 1976; Hu et al., 1968). Notable among the findings, however, were educational level differences; postsecondary education was associated with a higher incidence of voting behavior.

National Studies. Research based on national longitudinal data sets relevant to curricular differences associated with voting behavior is limited

to the NLS-72 data set. Voting behavior was defined as (1) whether a respondent was registered to vote or (2) whether he or she had ever voted in a local, state or national election. Voting behavior results based on the NLS-72 data were reported by high school curriculum groups as of two years and four years out of high school (Peng and Holt, 1977, Vol. II, Tables 339, 340; Peng et al., 1978, Vol. II, Tables 473, 474). Results for general and vocational graduates are summarized in Table 5.4.1. Differences between programs were slight, ranging from 1-6%. For each sex a slightly greater percent of general than vocational graduates indicated they were registered to vote or had voted. This pattern was true also for whites, but in the case of blacks, a slightly greater percent of vocational than general graduates indicated such behavior. No sex-race breakdowns were reported. One major limitation of these results, however, is that they are based on the total NLS-72 population: no distinction was made between NLS-72 high school graduates with no postsecondary education and those with postsecondary education. As indicated above, previous research has shown voting behavior to be related to educational level.

Reanalyses. Responses to the two voting behavior questions included in the NLS-72 1976 survey were reanalyzed for vocational and general high school graduates with exactly 12 years of schooling, as of four years out of high school. Results are presented separately by sex-race group for each program in Table 5.4.2. Within each sex race group, there is no apparent difference between programs in the percent reporting they were registered to vote (as of four years out of high school). This finding of no program differences holds also for the percents of white males and white females

TABLE 5.4.1: Percent Voting Behavior of H.S. Graduates of General and Vocational Programs (With No Restriction on # of Years of Schooling) for Two Time Points, by Sex, by Race, NLS-72 (weighted percents)

Subgroup	Year	# of Yrs. out of H.S.	Registered to vote ^a		Ever voted ^b	
			Gen.	Voc.	Gen.	Voc.
<u>Sex</u>						
Male	1974	2	66.81	61.81	58.64	52.91
	1976	4	65.73	61.42	63.02	58.46
Female	1974	2	64.19	63.28	55.04	52.44
	1976	4	67.10	64.90	63.41	57.67
<u>Race</u>						
White	1974	2	67.00	62.84	59.84	54.30
	1976	4	67.46	65.73	65.92	59.64
Black	1974	2	63.58	66.47	45.01	50.54
	1976	4	68.06	70.15	52.64	54.88
TOTAL	1974	2	65.55	62.67	56.91	52.63
	1976	4	66.34	63.47	63.12	58.10

^a Abstracted from Peng and Holt, 1977, Vol. II, Tables 339-340.

^b Abstracted from Peng et al., 1978, Vol. III, Tables 473-474.

TABLE 5.4.2: Percent Voting Behavior of H.S. Graduates with Exactly 12 Years of Schooling, by H.S. Curriculum, Sex-Race, NLS-72 (weighted percents)

	A. % Registered to Vote ^a (as of Oct. 1976)	
	Gen.	Voc.
M-W	56.7	56.0
M-B	66.1	67.8
F-W	58.2	59.4
F-B	67.3	68.8

	B. % Who Have Ever Voted in a Local, State or National Election (before Oct. 1976) ^b	
	Gen.	Voc.
M-W	54.4	55.2
M-B	51.5	47.2
F-W	53.6	53.3
F-B	49.5	54.2

^a Based on responses to TQ154.

^b Based on responses to TQ155.

reporting they had voted in a local, state or national election before October 1976 (about four years out of high school). The results on this question were mixed for blacks. A slightly lower percent of black males graduating from a vocational rather than a general program (47.2% vs. 51.5%) reported they had voted. Due to sampling variation (particularly in the case of blacks), however a 5% difference should not be interpreted as indicating a significant difference.

It is interesting to note that the percents across the subgroups who had voted (ranging from 50-55%) are highly consistent with national statistics. The U.S. Congress reported that 54.5% of the nation's voting age population had voted in the 1976 presidential election. Slightly less of the nation cast votes in elections of U.S. representatives (e.g., 36.1% in 1974 and 49.6% in 1976).*

One other notable pattern apparent in Table 5.4.1 is the race differences in percents registered to vote. About 10% more blacks than whites for each sex reported they were registered to vote. However, responses to the question of having ever voted show no notable differences in the tendency of blacks and whites to actually cast a vote.

Summary. Few data are available relevant to the goal of vocational education with respect to preparation for citizenship. To the extent that this goal has been studied at all, it has been examined in terms of voting behavior. No curriculum differences in voting patterns were apparent. However, even if they were, it would seem unwarranted to draw broad conclusions

* Source: U. S. Congress, Clerk of the House, Statistics of the Presidential and Congressional Election and Statistics of the Congressional Election; and Elections Research Center, Washington, D.C., America Votes.

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about the efficiency of secondary school programs in preparing individuals for citizenship on the basis of voting behavior, since citizenship surely involves more than merely registering to vote or voting.

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CHAPTER 6: DESCRIPTION OF POPULATION CHARACTERISTICS AT THE POSTSECONDARY LEVEL

In Chapters 4 and 5, we focused exclusively on the population of secondary vocational students who do not go on for postsecondary education, that is, those described in the data sets we reanalyzed as having exactly twelve years of schooling. In Chapters 6 and 7, we examine the other group of vocational students, namely, those who do proceed to some kind of postsecondary schooling. We begin in section 6.1 by describing requirements for entrance into nonbaccalaureate postsecondary institutions. In section 6.2 we describe patterns of postsecondary enrollment by graduates of public school secondary vocational and general programs, and discuss the problems of identifying differing kinds of postsecondary curricula. In section 6.3 we describe the similarities and differences between those who do and do not go on for postsecondary schooling. And finally in section 6.4 we describe the relationship between different groups of secondary students' educational plans and their actual behavior in seeking and attaining postsecondary educational experience. We turn in Chapter 7 to the review of evidence on gainful employment outcomes associated with participation in postsecondary vocational programs.

6.1 Entrance Requirements for Nonbaccalaureate Postsecondary Institutions

One of the goals of secondary vocational programs defined in both the Education Amendments of 1968 and of 1976 is to provide preparation for study beyond high school. The 1968 Amendments suggested as a goal for secondary vocational education the preparation of students for "enrollment" in advanced technical education programs (section 108(1)). The 1976 Amendments broadened this definition to include preparation for a "career requiring other than a

baccalaureate or advanced degree" (Section 195(1)). This legislation thus clearly intends that secondary vocational programs prepare students not just for jobs, but also for further education leading to gainful employment, while at the same time clearly setting it apart from academic high school programs which generally aim at preparation for baccalaureate degree programs.

One clear aim behind federal support of vocational education is thus that secondary vocational courses prepare students for postsecondary vocational training. When we examined the research literature on vocational education, however, we found only a single national study which examined the extent to which secondary vocational programs provide students with coursework necessary for postsecondary education. This was in the study of the effects of vocational education by Wiley and Harnischfeger (1980). Using NLS-72 data, these investigators examined the extent to which graduates of the three major high school curricula (vocational, general and academic) completed the coursework necessary for admission into selected postsecondary institutions. The selected institutions were Harvard University, Northern Michigan University and Purdue University. Given such criteria for comparison, Wiley and Harnischfeger not too surprisingly found that:

. . . high school program strongly determines which pupils meet course admission requirements to universities: less than one-half of one percent of vocational pupils satisfy Harvard's course entry requirements, while over ten percent of academic track pupils do so; 24 percent of vocational enrollees satisfy Purdue's requirements, 67 percent of academic pupils do so.

(Wiley & Harnischfeger, 1980, highlights)

These results are provocative, but the criteria of comparison used--namely, course requirements for entry into three four-year academic institutions--hardly seems relevant to the legislatively expressed goal for secondary

vocational programs of preparing students for entry into nonbaccalaureate postsecondary programs. Also, comparing academic track students with vocational students tends, we think, as we argued in section 2.1, to be an inappropriate basis on which to estimate effects of vocational programs.

Thus in evaluating the extent to which secondary vocational programs prepare students for relevant postsecondary education, we sought to obtain more relevant data. Since we could locate no such information in the research literature, we undertook a survey of nonbaccalaureate postsecondary institutions.

The Survey. The universe of institutions we surveyed was accredited postsecondary vocational schools, technical institutions and junior and community colleges listed in the Directory of Postsecondary Schools with Occupational Programs 1978 by E. R. Kay.* This amounted to a total of 1725 schools, from which we drew a 5% random sample ($n = 86$), after stratifying by region, type of school, and type of governance.** At the same time we selected a replacement sample of approximately half the size of the primary sample, to be used in the event that institutions in the primary sample did not respond to our survey.

Each institution was sent a letter requesting information regarding

* The only schools excluded from the survey universe were ones solely concerned with a single quite narrow occupation, such as cosmetology, barbering, nursing or airplane piloting.

** There were four regional groupings employed (northeast, north central, south and west); three school types (vocational, technical and junior/community college) and three governance types (public, proprietary and independent).

entrance requirements, with a particular request for a list of high school courses required for entrance both into the institution as a whole, and into specific programs of study offered. The initial survey letter was mailed in June 1980, with follow-up letters in July and August and telephone calls as necessary. Using such follow-up procedures a response rate of 73% was attained for the primary sample, and 80% for the replacement sample. Results reported below are thus based on a sample (with replacement) of 86 nonbaccalaureate postsecondary institutions designed to be nationally representative.

Results. The majority of responses from schools were in the form of catalogues containing admissions information. The pattern of results was clear: A vast majority of the schools sampled required only a high school diploma for entrance, or else a GED degree. In all but one of our sampling strata a full-100% of the respondent schools required no specific coursework for admissions. The only exception was an institution in the northeastern public junior-community college stratum; it required four units of English and two of history for general admissions.

In addition to asking schools about general admission requirements, we also inquired about course requirements for admissions into programs of study. Again we found that for admission into programs within institutions, the vast majority required nothing in the way of high school coursework beyond a high school diploma or a GED degree. More than three-quarters of the responding schools of each of the three types surveyed (vocational, technical, and junior/community college) indicated no further requirements for entry into program areas. Of the fourteen schools in our analysis sample which did require specific coursework for admission to particular program areas, the majority (13 of 14) required academic courses of various sorts (Algebra I,

two years or units of math, science, English, social science or natural science or in one case 15 units of "college preparatory work"). Most such specific requirements for program admissions pertained to academic or associates degree programs. Only one out of the 29 responding vocational schools (including area vocational technical schools) clearly indicated any high school vocational coursework as a prerequisite to post-secondary program admissions, namely two years of industrial arts and one year of mechanical drawing.

Three caveats should be noted with respect to these findings pertaining to coursework requirements for program admissions. First, the distinction between admissions requirements and recommendations should be noted. Catalogues for several institutions listed recommended high school coursework above and beyond coursework required for admissions. In the findings summarized above we described only required coursework. Second, it should be noted that in summarizing program admissions requirements, we refer to broad program areas such as vocational, occupational, technical and academic programs, as opposed to specific courses of study such as auto mechanics or medical technology. Third, catalogues for several schools which did indicate coursework requirements for program admissions (e.g., four of eleven area vocational technical schools) implied in their literature that such requirements (or prerequisites) could be fulfilled after entry into the school.

Although our survey specifically inquired only about coursework admissions requirements, materials provided by respondent institutions also indicated that two other types of information may affect admissions decisions, namely personal qualities and test scores. On the first count fairly frequent comments in the materials provided implied that personal qualities of

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candidates could affect admissions decisions, such things as "evidence of interest and motivation," "quality performance," and "improvement in high school record." Second, many of the schools in our sample indicated that some form of standardized test data was required for admissions. Out of a total of 86 schools in our sample, 35 (or 41%) indicated in their material on general admissions requirements that some sort of admissions test score was required. Tests specifically mentioned were the ACT, SAT, GATB (General Aptitude Test Battery), DAT (Diagnostic Aptitude Test) and BSAT (Basic Skills Placement Test). There did not appear to be any tendency for test information to be required differentially by the three types of schools surveyed (vocational, technical, and junior/community college), but there did appear to be a slight regional tendency, with schools in the South and West more often asking for test data. Most schools indicated that test data were requested for the purposes of placement and counseling, though some schools gave no indication of how the test data requested were to be used. In all but one case there was no clear indication of any minimum test scores being required for admission. The only exception was one proprietary school in the central region which stated that appli-

Conclusions. From the information collected in 1980 from a national sample of 86 nonbaccalaureate postsecondary institutions, we draw the following conclusions. First, the vast majority of such schools require only a high school diploma (or a GED) for admission. Second, most such schools do not have course requirements for general admissions or for admissions into broad programs of study. Third, where courses are required

for either general or broad program admissions, it tends far more often to be academic rather than technical or vocational coursework. Fourth, it appears that any technical coursework prerequisites for admission to specific advanced technical programs can be fulfilled after entry into the institution. Fifth, from these findings it seems safe to infer that high school vocational programs which provide students with nothing more than a high school diploma meet the goal of preparing individuals for post-secondary education for careers "requiring other than a baccalaureate or advanced degree," at least insofar as such preparation is taken to mean meeting the admissions requirements of nonbaccalaureate postsecondary institutions.

6.2 Postsecondary Enrollment Patterns for Secondary Vocational and General Graduates and Discussion of Problem of Identifying Postsecondary Vocational Specialties

Graduates of vocational high school programs clearly have the opportunity to pursue postsecondary education, in that a high school diploma is the basic entrance requirement for almost all nonbaccalaureate postsecondary institutions. Given this fact, how many do pursue such postsecondary educational opportunities and in what manner? This general question is addressed in this section using the NLS-72 data set, since it is the only one available with relatively detailed information on postsecondary educational experiences of a national sample of students. Following our general strategy, questions concerning postsecondary attendance of public secondary vocational graduates are addressed in comparison to secondary general program graduates and the four sex-race groups are treated separately.

Before describing findings concerning patterns of postsecondary vocational enrollment, we should explain the general restrictions imposed on the NLS-72 data set, to obtain the sample used in deriving results reported in both Chapters 6 and 7. The postsecondary population was defined as composed of those who had attended some regular postsecondary institution within the first four years out of high school (specifically between June 1972 and October 1976), excluding those who (1) had completed four years of postsecondary schooling or (2) were enrolled full-time in either fall 1974 or fall 1975.* The first exclusion criterion was imposed as an attempt to eliminate those who had

* The postsecondary attendance classification was not based on the response to one question but was estimated on the basis of a number of questions. In the third follow-up in 1976, respondents were asked what their highest level of education was as of October 1976 (TQ49a). A total of 12% of the sample (2725/22652) were not classified by this question. For those respondents who had indicated high school only and those unclassified, responses to a cluster of questions related to postsecondary education in the first three follow-ups (1973, 1974, and 1976) were checked. Specifically, the activity state questions asking about attendance at college full time or part time were checked, as were questions related to type of postsecondary institution last attended, postsecondary curriculum last pursued and postsecondary credentials obtained.

pursued baccalaureate degrees,* and the second was imposed so as to yield a population which had the potential for being in the labor force full time for at least two years by the time of the third follow-up survey in fall 1976 -- the time point used in examining gainful employment outcomes which are reported in Chapter 7.**

Data on postsecondary enrollment for 1972 public high school graduates of both general and vocational programs (as self-reported) are provided in Table 6.2.1. The overall findings for vocational and general high school graduates are almost identical: 55.4% of vocational graduates and 55.6% of general graduates overall had no postsecondary schooling as of four years after public high school graduation, and around 45% of each group did pursue some type of postsecondary schooling. The rates of postsecondary enrollment and nonenrollment appear to be fairly stable across the four sex-race groups, for both general and vocational graduates (specifically the percentage of the eight sex-race curriculum groups not enrolled in postsecondary education within four years of public high school graduation range only from 48% to 58%). It should be noted, however, that a higher percentage of general than vocational graduates pursue academic postsecondary programs (averaging 14% as opposed to 7%). To put the matter another way, a higher percentage of secondary vocational graduates (21%) pursue vocational postsecondary study than do general secondary graduates (17%). Finally, it should be noted that for some 12 to 20% of secondary graduates who do pursue postsecondary

* For an analysis of enrollment patterns for the full population of postsecondary enrollees, that is not restricted to those enrolled in programs below the baccalaureate programs. see Appendix E.

** Two types of missing data cases were also deleted from the postsecondary population; (1) cases which could not be classified with respect to whether or not they had ever enrolled in a postsecondary institution; (2) ones with postsecondary experience who did not respond to one of the three follow-up surveys. The latter restriction was necessary so that a consistent weight could be used in calculating weighted results across all three time points examined with NLS-72 data. Table A-1.1 provides a record of the exact number of cases deleted as a result of each of these restrictions.

TABLE 6.2.1: Postsecondary Enrollment by Secondary Curriculum (General vs. Vocational) and Sex-Race Group, NLS-72, (Weighted Percentages)

<u>Secondary General Graduates</u>				
	HS Gen PS None	HS Gen PS Acad	HS Gen PS Voc	HS Gen PS MDC ^a
Male - White	57.4	14.1	14.6	13.8
Male - Black	51.5	15.7	12.0	20.9
Female - White	55.3	13.1	19.5	12.1
Female - Black	47.5	16.2	22.8	13.5
Column Total	55.6	13.9	17.1	13.4

<u>Secondary Vocational Graduates</u>				
	HS Voc PS None	HS Voc PS Acad	HS Voc PS Voc	HS Voc PS MDC ^a
Male - White	53.1	7.1	19.8	20.0
Male - Black	51.7	9.5	21.0	17.8
Female - White	57.9	6.7	22.4	13.1
Female - Black	51.9	11.6	23.0	13.5
Column Total	55.4	7.3	21.4	15.9

Source: See Table A-1.5. Corresponding unweighted percentages can be calculated from Table A-1.4.

^aPS MDC - Those identified as having enrolled in postsecondary programs for whom information was unavailable regarding whether they pursued academic or vocational programs.

schooling, information is unavailable regarding whether they pursued academic or vocational programs (indicated as MDC or missing data code in Table 6.2.1).

Given that around 45% of secondary graduates, both vocational and general, do pursue postsecondary education, what is the nature of the postsecondary education pursued? In the following paragraphs we seek to answer this question in terms of full-time versus part-time postsecondary schooling, type of postsecondary education institution attended, vocational area of specialty, and type of certification earned as a result of postsecondary schooling. In presenting data on these different aspects of postsecondary attendance, we will disaggregate results in terms of four combinations of secondary and postsecondary schooling, namely:

- public high school general graduates who enroll in postsecondary academic programs (HS-Gen PS-Acad);
- public high school vocational graduates who enrolled in postsecondary academic programs (HS-Voc PS-Acad);
- public high school general graduates who enrolled in postsecondary vocational programs (HS-Gen HS-Voc); and
- public high school vocational graduates who enrolled in postsecondary vocational programs. (HS-Voc PS-Voc)*

When respondents indicated in an NLS-72 follow-up survey that they were or had been enrolled in a postsecondary program, they were asked a variety of questions concerning the nature of the postsecondary program; the data presented in the paragraphs below were drawn from self-reports given in response to such questions.

* In reporting results, we generally omit results for the two groups whose postsecondary schooling was not classified as academic or vocational, namely the HS-Gen PS-MDC and HS-Voc PS-MDC groups (see Table 6.2.1).

Full-Time vs. Part-Time Enrollment. Table 6.2.2 shows the percentages of NLS-72 vocational and general high school program graduates of those enrolled who indicated they were enrolled full-time in postsecondary educational programs as of Oct. 1972 or Oct. 1973. As these data indicate, most of the high school graduates, of both general and vocational programs, who were enrolled in postsecondary programs as of Oct. 1972 or Oct. 1973, were enrolled full-time. This was true across the four sex-race groups and across the four combinations of secondary-postsecondary programs as well. There appears, however, to be a tendency for whites to be enrolled full-time at the Oct. 1973 time point (slightly over a year after graduation) in slightly lower proportions than at the Oct. 1972 time point (just a few months after graduation). There is no clear pattern regarding full-time attendance associated with enrollment in academic or vocational postsecondary programs.

Type of Institution. Given that a substantial proportion of secondary vocational graduates do go on to pursue postsecondary education, and most of them report doing so full-time, what kind of institutions do they attend? Data on this question, drawn again from the NLS-72 data set are shown in Table 6.2.3. First, it should be noted that for fairly large proportions of respondents in the NLS-72 first follow-up survey who indicated they were enrolled in some postsecondary institution between June 1972 and October 1973, the type of institution was not reported. Such non-reporting of type of postsecondary institution was particularly frequent for the Oct. 1973 time point (when from 28 to 66% of respondents across the sixteen secondary-postsecondary, sex-race groups did not provide this information) and seems to have been slightly

TABLE 6.2.2: Percentages of Different Groups of 1972 High School Graduates Attending Postsecondary Schooling Who Attended Full-Time as of Oct. 1972 or Oct. 1973, by Sex-Race Group (weighted percentages)

	Oct. 1972 ^a				Oct. 1973 ^b			
	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-Acad	HS-Voc HS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc
Males - White	91	78	84	88	68	52	70	62
Males - Black	89	97	71	76	67	100	82	72
Females - White	88	77	87	83	77	68	71	68
Females - Black	92	86	70	83	82	86	62	72

^a Based on responses to FQ33B or ACT372.

^b Based on responses to FQ27B or ACT373.

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more prevalent overall among those who indicated they were pursuing a postsecondary vocational program of study rather than an academic one. Given such problems of non-reporting, these data obviously should be interpreted cautiously. Nevertheless several trends stand out in the data shown in Table 6.2.3. First, there appears to be a slight tendency for general graduates, as compared with vocational graduates, pursuing postsecondary academic studies to do so in four-year colleges rather than two-year/junior colleges, except for female blacks, who seem to enter academic studies in four-year colleges in equal proportions regardless of whether they graduated from general or vocational high school programs. Second, high school graduates pursuing postsecondary vocational programs tend to do so mainly in vocational-technical postsecondary institutions rather than in four-year or two-year/junior college institutions. There also appears to be a slight tendency among males pursuing postsecondary vocational programs for blacks as compared to whites to do so more often in vocational-technical institutions as opposed to other types of institutions. This tendency appears to be independent of whether or not individuals pursuing postsecondary vocational programs graduated from a vocational or a general high school program.

Vocational Specialty Area. Having described patterns of postsecondary vocational enrollment for high school graduates in comparison to patterns of postsecondary academic enrollment, a natural next question concerns the type of program pursued by those enrolled in postsecondary vocational programs. Again the NLS-72 data provide at least limited evidence on this question. In the first follow-up survey in Oct. 1973, high school graduates who indicated that they were enrolled in postsecondary institutions as of Oct. 1972 or Oct.

TABLE 6.2.3. Percentages of 1972 High School Graduates Pursuing Postsecondary Education Who Attended Different Types of Postsecondary Institutions, as of Oct. 1972 or Oct. 1973, by Secondary, Postsecondary and Sex-Race Groups. (Weighted Averages)

Type of Postsecondary Education	Oct. 1972 ^a				Oct. 1973 ^b			
	HS Gen PS Acad	HS Voc PS Acad	HS Gen PS Voc	HS Voc PS Voc	HS Gen PS Acad	HS Voc PS Acad	HS Gen PS Voc	HS Voc PS Voc
Male-White								
Voc-Tech ^c	6.9	8.6	36.0	41.1	5.8	6.5	27.1	30.8
2 Yr Jun ^d	46.4	39.9	27.3	20.3	35.8	34.6	20.0	16.2
4 Yr Col	29.7	23.0	5.9	2.8	14.1	11.6	7.3	4.5
Other	7.0	5.4	5.2	6.4	2.4	5.5	0.8	2.6
Type UNR	9.9	23.2	25.5	29.4	41.9	41.8	44.9	45.9
Male-Black								
Voc-Tech	11.4	22.8	54.4	42.6	10.3	16.0	46.9	30.0
2 Yr Jun	37.4	47.3	12.2	19.3	18.7	11.0	16.7	16.6
4 Yr Col	42.0	15.6	6.0	8.4	33.6	15.6	6.0	8.4
Other	3.6	5.0	3.3	9.5	0.0	5.0	2.2	3.7
Type UNR	5.6	9.3	24.1	20.1	37.5	52.5	28.2	41.2
Female-White								
Voc-Tech	10.3	24.2	41.7	47.1	8.2	8.0	21.3	16.5
2 Yr Jun	41.1	37.4	26.7	21.8	29.0	32.9	19.1	13.3
4 Yr Col	34.2	11.9	6.8	5.5	17.0	12.0	4.0	2.2
Other	3.4	4.7	3.9	7.2	0.4	2.7	0.6	1.6
Type UNR	11.0	21.7	20.9	18.5	45.5	44.4	55.1	66.4
Female-Black								
Voc-Tech	18.6	14.9	51.4	47.6	11.6	7.3	23.9	30.4
2 Yr Jun	35.6	13.3	15.2	12.7	21.3	16.8	16.0	13.6
4 Yr Col	36.6	37.6	0.7	2.6	25.5	23.5	1.6	2.4
Other	5.1	10.4	6.8	7.5	0.0	1.9	0.0	1.0
Type UNR	4.1	23.8	26.0	29.6	41.6	50.5	58.5	52.6

a Based on FQ5.2B or ACT272.

b Based on FQ25 or ACT273.

c Vocational, trade, business or other career training school.

d Junior or community college (2-years).

1973 were asked to indicate for each time point whether their "actual or intended field of study or training" was in an academic field or vocational area. If the latter, respondents were asked to indicate one of the following seven response options:

- Office and Clerical (bookkeeping, stenography, commercial art, general office, etc.)
- Computer Technology (keypunch operator, programming, computer operations, etc.)
- Mechanical and Engineering Technology (automotive mechanic, machinist, drafting, construction, electronics, etc.)
- Health Services (lab technician, occupational therapy, practical nursing, etc.)
- Public Services (police science, food service, recreation, beautician, etc.)
- Other Vocational Areas (agriculture, home economics, etc.)
- A Vocational area, but undecided.

Since respondents were asked this question for both the Oct. 1972 and Oct. 1973 time points, responses for these two time points represent overlapping but not identical sets of individuals. Thus in Table 6 2.4, we have summarized responses to these questions in the following manner. The table includes responses of individuals to the question on type of post-secondary vocational area for both the Oct. 1972 and Oct. 1973 questions, but where individuals responded to both questions only their latter response is counted. As these data indicate, males who enrolled in post-secondary vocational programs within two years of graduating from high school tend to specialize, according to these self-reports, in the mechanical and engineering technology area, apparently quite independent of whether they were in general or in vocational programs in high school. This finding tends to hold for black as well as white males (although black males tend to report specializing in computer technology slightly more frequently than white males, these differences should obviously be judged cautiously given the relatively small sample of black males). In contrast women who enrolled

TABLE 6.2.4: Most Recent Specialty Area of Postsecondary Vocational Enrollees as of October 1972 or October 1973^a, (weighted percentages)

Postsecondary Specialty	Male-White		Male-Black		Female-White		Female-Black	
	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-Voc	HS-Voc PS-Voc
Office & Clerical	2.1	3.5	4.4	8.3	33.7	57.5	45.4	46.8
Computer Tech.	3.6	5.5	10.0	14.1	2.9	4.7	11.0	18.1
Mech. & Eng. Tech.	49.9	60.6	44.4	44.1	0.8	0.3	0.0	0.0
Health Serv.	2.9	1.0	19.1	2.7	26.4	13.6	15.1	14.5
Public Serv.	13.2	6.6	0.0	2.2	20.7	9.5	5.1	2.4
Other Voc Area	9.6	9.9	6.5	9.9	3.3	4.8	1.7	2.1
Undecided	7.4	7.6	10.3	5.2	5.0	3.0	5.3	0.9
Unreported	11.2	10.2	5.3	13.4	7.2	6.7	16.4	15.1

^a Based on responses to FQ28B and FQ36B.

in postsecondary vocational programs within two years of graduating from high school predominantly report specializing in the office and clerical area, although this specialization may be slightly more common among those who graduated from a vocational high school program as opposed to a general one. The second most popular postsecondary vocational specialization among females generally was health services, although 10% or more of black female respondents also said they were specializing in computer technology and 10% or more of white female respondents, in public service.

Certification. What kind of certification do students receive as a result of such courses of study? This question can be addressed in terms of NLS-72 follow-up questions which asked students whether or not they had earned a certificate, license or two- or three-year degree as a result of postsecondary study. Table 6.2.5 shows results for this question for both the Oct. 1974 and Oct. 1976 follow-up survey dates. As these data indicate, of graduates enrolled in postsecondary vocational programs, some 40-50% report earning a certificate, license, or 2- or 3-year degree within roughly two years of high school graduation. A few more appear to earn some such certification within the two-to-four year period after graduation, but it should be noted that several anomalies are apparent in comparing the results for the earlier and later time point. For example, the proportion of black females in postsecondary vocational programs earning such certification appears to decrease slightly between the 1974 and 1976 survey dates. Since postsecondary institutions generally are not known to take certification back once it is given, this anomalous result is presumably due to sampling error with respect to respondents who answered this particular question in the two follow-up surveys and/or unreliability in self-reports regarding such certification. Whatever

TABLE 6.2.5; Proportions of 1972 Graduates Enrolled in Postsecondary Institutions Who Earned Certificate, License or 2 or 3 Year Degree as of Oct. 1974 and Oct. 1976 by Sex-Race and Secondary-Postsecondary Group (weighted)

<u>October 1974^a</u>	HS Gen		HS Voc		HS Gen		HS Voc	
	PS	Acad	PS	Acad	PS	Voc	PS	Voc
Male - White	0.20		0.24		0.45		0.50	
Male - Black	0.26		0.25		0.28		0.45	
Female - White	0.31		0.25		0.51		0.45	
Female - Black	0.26		0.25		0.50		0.53	
 <u>October 1976^b</u>								
Male - White	0.26		0.28		0.52		0.57	
Male - Black	0.34		0.13		0.53		0.51	
Female - White	0.32		0.33		0.56		0.48	
Female - Black	0.30		0.22		0.46		0.43	

^a Based on responses to SQ43 and SQ66A-SQ66GA.

^b Based on responses to TQ47 and TQ48GA.

the exact cause, however, such anomalous results should stand as clear warning against reading too much into small percentage differences in this and other tables presenting self-reported survey data. While we do not present detailed results here, it is perhaps worth noting that of the various types of certification mentioned, postsecondary vocational students tend to report earning certificates much more frequently than licenses or 2- or 3-year degrees as of both the Oct. 1974 and the Oct. 1976 follow-up surveys.

Problems in Identifying Postsecondary Vocational Specialties.

In the foregoing paragraphs of section 5.2, we have described patterns of postsecondary vocational enrollment as evidenced in the NLS-72 postsecondary population. One problem of special note is that of identifying postsecondary vocational specialties. In examining outcomes associated with secondary vocational participation in Chapter 4, we saw that disaggregating data into the different vocational specialties yielded markedly different results across the areas. However, at the postsecondary level, we have not nearly as much information available. In terms of self-reports available in the NLS-72 data set, we have five different postsecondary specialties self-reported by students (although as indicated in Table 6.2.4, some 15-28% of the cases were not clearly identifiable by specialty area because data were unreported, individuals were undecided, or were specializing in one of the areas identified in the pooled "other vocational area" category (i.e., "agriculture, home economics, etc.")). However, the problems in identifying areas of postsecondary vocational specialty go beyond such familiar problems as missing data, and unreliability of self-reports, to the actual categories used to describe postsecondary vocational specialization and indeed the very meaning of postsecondary "vocational" education.

On the first point the NLS-72 survey offered five response options as a means of describing specific vocational specialty areas (plus of course the other vocational and undecided categories as noted in Table 6.2.4). In contrast, however, surveys of postsecondary vocational enrollment conducted by the National Center for Education Statistics (NCES) have identified seven different specialties as noted in Table 6.2.6. In addition, there is considerable variation in the content of the specialties provided as options in the NLS-72 surveys and the categories used by NCES. The former lists two (computer technology and public services) which have no clear counterpart in the latter. And conversely NLS-72 did not separately identify three areas used in the latter tabulation; namely, agriculture, distributive education and technical. Presumably there is a rough correspondence between three categories listed across the three tabulations identified in the NLS-72 surveys as health services, office-clerical, and mechanical and engineering technology. In addition to the ambiguity in postsecondary vocational area identification, there are of course several other potential explanations for the difference in enrollment patterns across these three data sources apparent in Table 6.2.6 (e.g., changes in enrollment patterns across time and definitions of survey populations), but the contrasting categories used clearly do illustrate the problems in identifying postsecondary vocational specialty areas using the NLS-72 data.

Because of these problems and also because of relatively small sample sizes for particular specialty areas, we did not attempt to analyze outcomes associated with participation in postsecondary education (reported in Chapter 7) in terms of particular specialty areas. Nevertheless we must clearly acknowledge that this is a clear and severe weakness in our postsecondary

TABLE 6.2.6: Postsecondary Vocational Specialty Enrollments Based on Three Different Sources (Not Dis-aggregated by Sex-Race Groups).

Enrollments in Postsecondary Vocational Areas, NLS-72 Sample, as of Oct. 1972 or Oct. 1973 ^a			Enrollments in Federally-aided Postsecondary Vocational Education, FY 1977 ^b			Enrollments in Occupationally Specific Vocational Education Programs 1978-1979 ^c		
	N (in hundreds)	%		N	%		N	%
			Agriculture	73,597	3.1	Agriculture	49,144	2.6
Health Services	28,670	12.4	Distributive	221,022	9.2	Distributive	222,193	11.9
Office & Clerical	66,011	28.5	Health	302,011	12.6	Health	213,550	11.4
Mechanical or Engineering Technology	51,910	22.4	Home Economics	117,917	4.9	Occupat., Home Ec.	63,589	3.4
Computer Technology	12,410	5.4	Office	693,850	28.9	Office Occupa.	615,062	32.9
Public Services	26,925	11.6	Technical	326,605	13.6	Technical	291,086	15.5
Other Vocational (agric., home econ., etc.)	14,339	6.2	Trades & Industry	577,816	24.1	Trade & Indust.	392,996	21.0
A vocational area, undecided	10,340	4.5	Other	84,890	3.5	Other	24,354	1.3
Unreported	21,277	9.2						
	231,882			2,397,708			1,871,974	

a Source: NLS-72 reanalyses: Calculated from weighted N's aggregated across four sex-race groups which were basis of percentages reported in Table 6.2.4.

b Source: Grant and Lina, 1979, p.150.

c Source: Wulfsberg, 1980, p.22.

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analyses. Based on results for the secondary analyses reported in Chapter 4, it is reasonable to presume that could we analyze postsecondary results by postsecondary specialty area, they would vary markedly across the different areas. Despite this weakness, however, we analyzed postsecondary results undifferentiated by vocational specialty area for one very simple reason. Previous national analyses of outcomes associated with vocational education have never even analyzed any results separately for those with postsecondary education and those with only twelve years of schooling. Thus, while we view our postsecondary analyses as a step in the right direction, we wish to emphasize that they are severely flawed due to our inability to clearly differentiate postsecondary vocational education by specialty areas.

In acknowledging this weakness in our analyses, we observe, however, that this problem is not merely one of methodology and data availability. We believe it involves a deeper conceptual issue. At least historically, secondary vocational programs are different than secondary general or academic programs in that they more clearly have as their aim the preparation of students for entry to vocations directly from high school without further formal education. The conceptual problem with respect to identifying postsecondary vocational programs is that no such similar distinction pertains. Graduates of postsecondary programs -- be they academic or "vocational" -- presumably are ready to enter their chosen vocations. The distinction between postsecondary vocational and nonvocational programs seems to be made on the grounds that the former typically do not lead to a baccalaureate degree, and the latter do. Nevertheless, it is relevant to ask from a conceptual point of view why a four-year engineering program leading to a B.S. degree is any less a vocational program than a two-year program leading to an associates degree. In other words, the point we wish

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to make is simply that the difference between vocational and nonvocational programs at the secondary level is not nearly so clear at the postsecondary level.

6.3 Differences in Background Characteristics and Test Scores Among Secondary-Postsecondary Groups

In describing patterns of postsecondary enrollment for graduates of public high school general and vocational programs, we next consider how they compare in terms of socioeconomic status and test scores. It should be recalled that these comparisons are based exclusively on those NLS-72 high school graduates who did not report being enrolled full-time in postsecondary educational institutions as of the third or fourth year after high school graduation (that is Oct. 1974 or Oct. 1975).

SES Differences. As noted in Chapter 3, a number of variables indicate socioeconomic background, including parents' education, income, and occupation and various characteristics of the household. Rather than trying to describe how groups of students who have various combinations of secondary and postsecondary education compare on a range of such variables, we will instead simply describe them in terms of an SES composite score available in the NLS-72 data set.* Table 6.3:1 shows the SES composite scores for the various secondary-postsecondary groups by sex-race group. Within the four sex-race groups, differences in SES scores for the eight secondary-postsecondary groups are quite small, in no case approaching the magnitude of one-half standard deviation, and in only a few cases exceeding one-quarter standard deviation. Nevertheless, it should be noted that the

* The NLS-72 SES composite (based on equally weighted standardized scores of father's education, mother's education, parents' income, father's occupation, and household items) is a standardized score with a mean of zero and a standard deviation of 1.0. Since the lowest score in our analysis sample was -2.3373, 2.3374 was added to all composite score values so as to make all values positive, but such an origin transformation of course retains the standard deviation value of 1.0.

TABLE 6.3.1: SES Composite Scores by Secondary-Postsecondary Group and Sex-Race Group NLS-72.
(weighted averages)

	HS-Gen PS None	HS-Voc PS None	HS-Gen PS Acad	HS-Voc PS Acad	HS-Gen PS Voc	HS-Voc PS Voc	HS-Gen PS Mdc ^a	HS-Voc PS Mdca	Row Average
Male-White	2.10	2.03	2.51	2.25	2.27	2.24	2.25	2.15	2.17
Male-Black	1.59	1.60	1.96	1.64	1.76	1.66	1.84	1.50	1.66
Female-White	2.04	2.03	2.42	2.23	2.27	2.17	2.19	2.12	2.12
Female-Black	1.43	1.61	1.74	1.74	1.79	1.64	1.61	1.62	1.61
Column Average	2.01	1.98	2.39	2.14	2.21	2.12	2.15	2.06	2.08

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^a PS MDC - those reporting they were enrolled in a postsecondary institution for whom information was not available regarding whether an academic or vocational program was pursued.

means for most all of these groups fall below the mean of the total NLS-72 sample (2.33, given our origin transformation). The only group whose averages given in Table 6.3.1 exceeds the NLS-72 overall average are whites, both male and female, who took a general high school program and an academic course in postsecondary. Also, it should be noted that in contrast to the very slight differences in SES composite across the secondary-postsecondary groups within sex-race groups, racial differences on this measure are substantial, averaging approximately one-half a standard deviation between blacks and whites for both males and females.

Test Score Differences. As already noted in Chapter 3, the NLS-72 sample was given a battery of tests in its senior year of high school. In this section we report general reading and mathematics test scores for the various groups of secondary-postsecondary students.*

Table 6.3.2 shows the average reading test scores for the various secondary-postsecondary groups separately by sex-race group. These data indicate a slight tendency among males, both whites and blacks, for high school general graduates to score higher than high school vocational graduates, and for both males and females, a tendency for those who pursue a postsecondary academic program to score higher than those pursuing a vocational postsecondary program who in turn score slightly higher than those who did not go on for postsecondary schooling (regardless of whether they were in a general or vocational program in high school). Nevertheless, it should be stressed that the differences across subgroups tend to be quite

* Two points already noted in Chapter 3 are worth repeating here. First, though these NLS-72 data have sometimes been characterized as measuring students' abilities or aptitudes, we avoid such terms here. Second, these test score data are reported in standardized scores having a mean of 50 and a standard deviation of 10 for the total NLS-72 sample tested.

TABLE 6.3.2: Reading Test Scores by Secondary-Postsecondary Group and Sex-Race Group, NLS-72 (weighted averages)

	HS Gen PS None	HS Voc PS None	HS Gen PS Acad	HS Voc PS Acad	HS Gen PS Voc	HS Voc PS Voc	HS Gen PS MDC ^a	HS Voc PS MDC ^a	Row Average
Male-White	46.78	45.18	51.87	49.10	47.82	47.58	49.84	46.92	47.33
Male-Black	39.72	37.50	46.43	39.48	42.05	38.71	42.19	39.33	40.03
Female-White	47.73	47.37	51.92	51.29	48.78	48.71	47.45	47.45	48.19
Female-Black	38.98	40.32	42.33	43.33	40.97	40.39	39.13	39.62	40.41
Column Average	46.54	45.75	50.95	48.71	47.67	47.28	47.73	46.22	46.98

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^a PS MDC = those reporting they were enrolled in a postsecondary institution for whom information was not available regarding whether an academic or vocational program was pursued.

small. The only secondary-postsecondary group score which varies by more than a half-standard deviation from the overall average within a sex-race group is male blacks who graduated from a general high school program and went on for academic postsecondary schooling. Their average reading test score was two-thirds of a standard deviation greater than male blacks overall and in particular from male blacks who graduated from a high school program but did not go on for postsecondary schooling.

Table 6.3.3 shows similar results for the math test scores. There is a slight tendency in math scores in the same direction as for reading test scores (namely among males for high school general graduates to score higher than vocational graduates, and among males and females for those pursuing postsecondary academic programs to score higher than those who enroll in postsecondary vocational programs or no postsecondary schooling at all). Nevertheless, the differences in math scores across groups are even smaller than the reading score differences. In not a single case do the average math scores across the secondary-postsecondary combination groups within sex-race group vary by as much as a half-standard deviation from the overall average.

TABLE 6.3.3: Math Test Scores by Secondary-Postsecondary Group and Sex-Race Group NLS-72 (weighted averages)

	HS Gen PS None	HS Voc PS None	HS Gen PS Acad	HS Voc PS Acad	HS Gen PS Voc	HS Voc PS Voc	HS Gen PS MDC ^a	HS Voc PS MDC ^a	Row Average
Male-White	47.16	45.67	51.93	50.26	49.03	49.17	48.75	46.74	47.75
Male-Black	40.22	37.33	43.49	43.09	42.34	38.95	42.16	38.12	40.00
Female-White	45.02	45.55	50.06	48.66	46.95	46.78	46.22	45.76	46.13
Female-Black	37.89	38.48	39.74	41.58	38.90	38.54	37.61	40.17	38.83
Column Average	45.54	44.82	49.92	48.00	47.08	46.61	46.65	45.40	46.08

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a PS MDC - those reporting they were enrolled in a postsecondary institution for whom information was not available regarding whether an academic or vocational program was pursued.

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6.4 Postsecondary Educational Plans, Applications and Acceptances

In this section we describe plans for postsecondary education in the senior year by individuals in the different secondary-postsecondary groups and by the four sex-race groups. For these same groups, we also describe whether individuals reported applying for admission or were admitted to any postsecondary institution by Oct. 1973 (about one year out of high school). In considering these data, it is important to remember that varieties of schooling in a postsecondary institution have been defined in terms of survey data reported up to and including Oct. 1976 (about four years out of high school).

Table 6.4.1 shows the percentages of individuals with different combinations of secondary and postsecondary education (within the first four years out of high school) who indicated any plans for postsecondary education during the spring of their senior year in high school.* The first thing to be noted regarding these data is that the vast majority of individuals who went on to postsecondary education, either academic or vocational, indicated plans for doing so during their senior year in high school (percentages with plans across the groups of individuals with either type of postsecondary schooling ranged from 62-87%). In contrast, the percentage of those who did not go on for postsecondary schooling who had indicated plans for such were considerably lower (ranging from 26% to 50% across the sex-race groups). Within the sex-race groups, equivalent percentages of graduates from high school general and vocational programs with no postsecondary schooling had not pursued their plans. However, individuals with such unfulfilled plans

* Our "any postsecondary plans" variable was constructed from five different NLS-72 base year questions (specifically BQ31, BQ81, BQ36, BQ41, BQ53). These questions indicated variously whether individuals planned or would most likely be attending various kinds of postsecondary institutions either full-time or part-time in the year after they left high school.

TABLE 6.4.1: Any Plans for Postsecondary Education in Senior Year in High School by Secondary-Postsecondary Group and Sex-Race Group, NLS-72. (weighted percentages)

	HS Gen PS None	HS Voc PS None	HS Gen PS Acad	HS Voc PS Acad	HS Gen PS Voc	HS Voc PS Voc	HS Gen PS MDC ^a	HS Voc PS MDC ^a	Row Average
Male-White	32	33	82	78	72	68	50	42	47
Male-Black	46	49	77	74	73	62	38	57	54
Female-White	31	26	87	76	78	77	54	45	47
Female-Black	49	50	81	74	77	72	63	55	61
Average	33	31	84	76	76	73	51	45	48

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a PS MDC - those reporting they had been enrolled in a postsecondary institution for whom information was not available regarding whether an academic or vocational program was pursued.

tended to be more common among blacks (46% and 49% for male blacks in general and vocational high school programs respectively and 49% and 50% among female blacks in the two high school programs respectively) than among whites (for whom the comparable figures were 32%, 33%, 31% and 26%).

In addition to questions about plans for postsecondary schooling, respondents in the NLS-72 sample were also asked if they had applied to any college, university or other school. Table 6.4.2 shows the percentages in the various secondary-postsecondary and sex-race groups who indicated that they had applied to any such institution prior to October 1973.* Data on applications generally seem to parallel those on plans in that higher proportions of those who did go on to postsecondary schooling indicated that they had applied to a postsecondary school or college (by October 1973) than did those who had no postsecondary schooling (within the first four years out of high school). Specifically percentages of those with postsecondary education indicating they had applied ranged from 41 to 89% across the relevant subgroups while percentages with no postsecondary schooling answering similarly ranged from 11 to 25%. However, the racial difference apparent in plans for those who did not realize them in enrolling in postsecondary institutions within four years of high school graduation (i.e., see Table 6.4.1) is not paralleled in the pattern of applications reported by those who had no postsecondary schooling (whites in the latter category amounted to 10 to 14% across the relevant subgroups while figures for blacks were only slightly higher, 16 to 25%).

* October 1973 was the last time point for which a question on application for postsecondary schooling was asked. Thus we have summarized results on applications across the base year questionnaire (BQ66) and the October 1973 follow-up survey (FQ81).

TABLE 6.4.2: Application for Postsecondary Schooling Prior to Oct. 1973, by Secondary-Postsecondary Group and Sex-Race Group, NLS-72. (weighted percentages)

	HS Gen		HS Voc		HS Gen		HS Voc		HS Gen		HS Voc		Row Average		
	PS	None	PS	None	PS	Acad	PS	Voc	PS	MDC ^a	PS	MDC ^a			
Male-White		12		10		71		61		57		44	25	18	27
Male-Black		16		16		89		68		45		68	41	31	35
Female-White		14		11		77		59		56		58	30	23	30
Female-Black		19		25		68		79		41		57	50	35	38
Average		14		12		75		62		55		53	30	22	29

a PS MDC - those reporting they had been enrolled in a postsecondary institution for whom information was not available regarding whether an academic or vocational program was pursued.

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Substantial proportions of those who did enroll in some form of postsecondary institution within four years of high school graduation (specifically by October 1976) had not indicated that they had applied for postsecondary schooling by October 1973. There are, of course, a number of possible interpretations for explaining this apparent anomaly, but the general point it suggests is that considerable caution should be exercised in interpreting such data.*

The much lower percentage of applications shown in Table 6.4.2 for those with no postsecondary schooling within four years of high school graduation suggested that one proximal reason for unrealized plans (though doubtless there were other distal reasons) is simply that individuals did not apply for postsecondary schooling. Do greater percentages of vocational than general graduates with no postsecondary education fail to follow through on their plans with an application to some postsecondary institution? Table 6.4.3 shows patterns of plans and applications for vocational and general graduates with no postsecondary schooling within four years out of high school. The data indicate no marked differences between the vocational and

* Five explanations of this anomaly occur to us. First, it may be that some institutions do not have formal application procedures, but instead simply allow students to register for courses, and for such schools students do not perceive themselves as having applied for admission. Or conversely, an institution may have a formal application procedure, but some students may be allowed to fill out an application when they attempt to register for coursework and may not view it as an application per se. Second, it may be that substantial numbers of individuals who reported postsecondary schooling by Oct. 1976 may have made application between this date and Oct. 1973. Third, the apparent discrepancy may have derived from slight differences in the wording of questions on enrollment and applications (the latter referred exclusively to "college or university" or "college or other school," while the former explicitly mentioned institutions such as "vocational, trade, business or other career training schools"). Fourth, the apparent discrepancy may indicate unreliability in self-reports of questions of either or both types. Fifth, and potentially more seriously, the discrepancy may also represent the fairly well-documented tendency for individuals reporting retrospectively to upgrade their educational levels.

TABLE 6.4.3: Patterns of Plans for Postsecondary Education in Senior Year in High School and Application Prior to October 1973 for Group with No Postsecondary Schooling^a Within Four Years Out of High School, by Sex-Race Group, NLS-72. (weighted percentages)

Plans vs. Application ^b	M-W		M-B		F-W		F-B	
	HS Gen	HS Voc						
No Plans-No Appl.	63	63	57	45	63	71	42	44
No Plans-Yes Appl.	4	4	1	4	5	4	7	5
Yes Plans-No Appl.	23	27	31	40	22	20	34	31
Yes Plans-Yes Appl.	10	6	11	11	10	6	16	20

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^a 12 years exactly of schooling

^b Due to missing data on one of these variables these percentages will not add up to their respective marginal percentage in Tables 6.4.1 (plans) and 6.4.2 (applications).

general programs in the extent to which plans are pursued as indicated by applications to postsecondary institutions. They do show racial differences however. For both males and females a greater percentage of blacks than whites who reported plans for postsecondary schooling (in their senior year in high school) also reported they had not applied to any institution within one year out of high school.

Given that high school students applied for postsecondary schooling, a natural next question is whether they were accepted for admission into the institutions to which they applied. Data on this point are available in the NLS-72 data set and are summarized in Table 6.4.4.* It should be noted that questions regarding acceptance were posed only to those who indicated that they had applied for postsecondary schooling. The striking result apparent in these data is that across all of the subgroups a vast majority of those who applied to postsecondary institutions reported being accepted to at least one institution. Although it should be stressed that those who did not go on for postsecondary schooling but had applied for admissions constituted relatively small samples of individuals, it is notable that among the group of non-enrollees in postsecondary schooling who applied for admission, a vast majority across all subgroups (81 to 95%) reported being accepted. These data clearly suggest that the main reasons for high school graduates not going on for postsecondary schooling was not that they could not gain admission to such institutions. This inference, it should be noted, parallels the finding reported in section 6.1, namely, that most non-baccalaureate institutions of postsecondary education require nothing more than a high school diploma or equivalency degree for general admissions.

* Specifically, respondents are counted as having been accepted if they indicated acceptance on any of four survey questions (BQ67; FQ82B, FQ83B; and FQ84B).

TABLE 6.4.4: Acceptance to Any Postsecondary Institution Among Those Who Applied Prior to Oct. 1973
By Secondary-Postsecondary Group and Sex-Race Group, NLS-72 (weighted percentages)

	HS Gen PS None	HS Voc PS None	HS Gen PS Acad	HS Voc PS Acad	HS Gen PS Voc	HS Voc PS Voc	HS Gen PS MDC ^a	HS Voc PS MDC ^a	Row Average
Male-White	90	91	100	100	99	99	93	95	97
Male-Black	85	88	97	93	98	100	100	100	95
Female-White	95	93	99	100	96	96	94	92	96
Female-Black	85	81	96	97	100	94	79	94	91
Column Average	91	91	99	99	98	97	93	94	96

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a PS MDC - those reporting they had been enrolled in a postsecondary institution for whom information was not available regarding whether an academic or vocational program was pursued.

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CHAPTER 7. GAINFUL EMPLOYMENT OUTCOMES ASSOCIATED WITH PARTICIPATION
IN POSTSECONDARY VOCATIONAL PROGRAMS

Given that substantial numbers of students do enroll in vocational programs at the postsecondary level, what is the result in terms of gainful employment outcomes? This is the question addressed in this chapter. The chapter is organized in a format roughly parallel to that of Chapter 4. First in section 7.1 we review unemployment indices. Then in section 7.2 we review indicators of employment status. In section 7.3, patterns of earnings for postsecondary vocational participants are discussed, and section 7.4 reviews data on occupational status. Following the format of Chapter 4, we will present descriptive results before regression results. Finally section 7.5 provides a summary of the chapter. Results of relevant previous research will be compared with findings from re-analyses in this summary section rather than in the main text of the chapter.

As in Chapter 6, the analyses presented in this chapter are organized in terms of eight groups of individuals having different patterns of secondary and postsecondary education, namely

HS-Gen-PS-None
 HS-Voc-PS-None
 HS-Gen-PS-Acad
 HS-Voc-PS-Acad
 HS-Gen-PS-Voc
 HS-Voc-PS-Voc
 HS-Gen-PS-MDC
 HS-Voc-PS-MDC

Recall that for the latter two groups, PS-MDC refers to individuals whose survey results indicated that they had enrolled in postsecondary educational

institutions, but for whom data were unavailable to indicate whether their postsecondary program was academic or vocational.

Regression analyses performed were of two types. The first set included all eight secondary-postsecondary groups, with dummy variables used to represent all groups except the HS-Gen-PS-None group. Thus, in the first set of analyses, the HS-Gen-PS-None group provided the contrast against which the employment outcomes for all other groups were compared. Using the HS-Gen-PS-None group as a base of comparison, in effect, links our postsecondary analyses with those on individuals with exactly twelve years of school, since those analyses, reported in Chapter 4, also used the HS-Gen-PS-None group as a base of comparison. For this first set of postsecondary regressions, we entered a number of adjustment variables. First, in our basic regression we entered simply individual SES composite scores. Next we tried controlling for a variety of adjustment variables in addition to SES, namely:

- Proportion of full-time jobs held by individuals across the dates October 1972, 1973, 1974, 1975, and 1976
- Individual job tenure in number of months as of October 1976
- Individual marital status as of October 1976
- High school percentage of total enrollment in vocational program areas
- Community percentage unemployment of males aged 16 and over
- Community average income per person in labor force aged 16 and over
- Community size, total population
- Residence in South
- Individual number of weeks employed 1972-1976
- Individual average hours per week worked during high school

- Individual participation in various types of training programs (represented by 8 variables)
- Individual high school semester courses in ten areas.

Each of these sets of variables was entered pairwise with individual SES, to make twelve supplementary analyses in the first set of regressions.

The second set of analyses, encompassing only the six groups with some postsecondary education, used the HS-Voc-PS-Voc as a contrast. The second set thus shows how employment outcomes for other secondary-postsecondary groups compared to the set of individuals who reported themselves to have followed a vocational program of study in both secondary and postsecondary school. For this second set of postsecondary regressions, we first performed our standard basic analysis, controlling only for individual SES. Then we performed a second set of analyses, controlling, in addition to SES, for

- individuals' type of postsecondary institution; vocational-technical, two year/community college or other; each contrasted with four year college type of postsecondary institution
- individuals' full-time postsecondary enrollment as of October 1972 and as of October 1973 (each contrasted with postsecondary enrollment but not full-time, as of the same date)
- individuals' receipt of a postsecondary certificate, license or two or three year degree by October 1976.*

Before entering into the substance of this chapter, several additional points should be noted. First, data on postsecondary vocational education and outcomes associated with participation in vocational programs at this level are far more meager than comparable data for vocational programs at

* These variables were all entered simultaneously with SES. Actually we also did a set of supplementary analyses in our second set of postsecondary regression analyses using the variables listed on p. 7.0.2. We do not try to summarize them, however, because so few contrasts proved significant. In the second set of regression analyses, our attention was restricted to individuals having some type of postsecondary schooling.

the secondary level. The only national longitudinal data set providing even a modicum of information on postsecondary vocational education is the NLS-72 data set, and this is why this chapter focuses far more heavily on this particular data set than did Chapter 4 on secondary vocational programs. Second, because of the problems in identifying postsecondary vocational specialties discussed in Chapter 6, we have not attempted to disaggregate our analyses in terms of postsecondary vocational specialties. This is a severe weakness in the analyses reported. As was shown in Chapter 4, when data were disaggregated at the secondary level, results often varied markedly across different vocational specialties. Similar variation likely would pertain at the postsecondary level, if data could be disaggregated in terms of vocational specialties. This point should be stressed, and we readily acknowledge our inability to disaggregate data in terms of postsecondary vocational specialties as a severe weakness in the analyses reported in this chapter. Nevertheless, the analyses are worth reporting for one very simple reason. No previous national study available at the initiation of our inquiry had reported on the employment outcomes of postsecondary vocational programs, separately from those of secondary programs (or from some combination of secondary and postsecondary vocational education). Subsequently, however, several relevant studies have been released, and hence in section 7.5, we compare our findings with those of recent national studies, as well as with previous non-national studies.

As one final caveat, readers should be reminded of the means by which the postsecondary populations were defined for the purpose of our

analyses. Specifically, as reported in section 6.2, the postsecondary population was defined as those who had attended some regular postsecondary institution* within the first four years out of high school (specifically between June 1972 and October 1976), excluding those who (1) had completed four years of postsecondary schooling or (2) were enrolled full-time in either fall 1974 or fall 1975. The second criterion was imposed in an effort to limit analyses to populations of individuals which had the potential for being in the labor market full-time for at least two years by the fall-1976 survey point -- the point for which all employment outcomes reported in this chapter are considered.

* Regular postsecondary institutions were defined to include: vocational, trade, business or other career training schools, junior or community (two-year) colleges; and four-year colleges or universities.

7.1 Employment Status

As noted already, in comparing employment outcomes for the eight secondary-postsecondary groups, we consider only a single time point, namely, October 1976. As in Chapter 4, we describe three indicators of employment status, namely, labor force participation rates, unemployment rates, and number of weeks of unemployment. Cross-tabular results are presented for all three variables, and regression results for only the latter.

Table 7.1.1 shows the average labor force participation (LFPR) rates for the eight secondary-postsecondary groups across the four sex-race groups (for 32 groups in all). LFPR is calculated in the standard way, as described in Chapter 4 (see p. 4-1-1). LFPRs for three sex-race groups (MW, MB, and FB) are fairly similar overall; 0.89, 0.82 and 0.83, respectively. The rate for female whites, 0.72 is substantially lower. In comparison to the difference between female whites and the three other sex-race groups the differences among secondary-postsecondary groups within the sex-race groups are relatively small. In only four out of 32 cases do such group averages vary by as much as 10 percentage points from the sex-race group averages. Male blacks in the HS-Voc-PS-Acad group showed a high LFPR of 0.95; and in the HS-Gen-PS-MDC, a low of 0.67. Among female whites, the HS-Voc-PS-MDC group showed a low of 0.71. What to make of the low values for PS-MDC groups is quite unclear, because as previously explained these groups represent individuals whose records indicated some form of postsecondary schooling, but did not indicate whether it was academic or vocational. The only clear conclusion that seems warranted from the data shown in Table 7.1.1 is that postsecondary schooling below the baccalaureate, either academic or vocational, is not clearly associated with any differences in LFPR.

TABLE 7.1.1: Average Labor Force Participation Rates, October 1976, by Secondary-Postsecondary Group and Sex-Race Group, NLS-72 Data Set (Weighted averages)

	HS-Gen PS-None	HS-Voc PS-None	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC	Row Avr.
Male-White	0.91	0.93	0.83	0.89	0.87	0.91	0.82	0.88	0.89
Male-Black	0.81	0.90	0.75	0.95	0.89	0.82	0.67	0.77	0.82
Female-White	0.63	0.73	0.77	0.84	0.78	0.78	0.71	0.79	0.72
Female-Black	0.79	0.89	0.77	0.82	0.82	0.89	0.82	0.71	0.83

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Table 7.1.2 shows the unemployment rates for the eight secondary-postsecondary groups, by the four sex-race groups, as of October 1976. In general within sex-race groups, unemployment rates do not appear to vary markedly across the eight secondary-postsecondary groups. Among whites, all average unemployment rates are within five percentage points of 7%, which is the average unemployment rate across all the groups. The highest unemployment rate apparent is for black females (15% overall) as compared with the overall rate of 8% for white females. This race difference in unemployment rates was previously noted in Chapter 4, concerning those with exactly twelve years of school (see p. 4.1.6). In contrast to the generally high unemployment rate for black females, one figure stands out. Black females in the HS-Voc-PS-Acad group show an unemployment rate of only 6%.

A second unemployment index is number of weeks unemployed in a year's time. Table 7.1.3 shows data on number of weeks unemployed in the previous year as reported by NLS-72 respondents in October 1976, the time of the third follow-up survey. Across all 32 subgroups the average number of weeks unemployed was about nine. Blacks tended to be unemployed more weeks than whites and females more than males. The sex-race group with the highest average number of weeks unemployed is female blacks with an average of 14.6 as compared with the grand average of 8.8. Within sex-race groups, average weeks of unemployment varied little by secondary-postsecondary group. The only exception was for the HS-Voc-PS-Acad group which tended, though not without exception, to report having 2-5 weeks less unemployment in the year preceding

TABLE 7.1.2: Average Unemployment Rates October 1976 by Secondary-Postsecondary Group and Sex-Race Group, NLS-72 (Weighted averages).

	<u>Secondary-Postsecondary Group</u>								Row Avr.
	HS-Gen PS-None	HS-Voc PS-None	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC	
Male-White	.04	.06	.05	.02	.07	.04	.02	.04	.05
Male-Black	.06	.10	.02	.0	.07	.0	.09	.03	.06
Female-White	.08	.08	.08	.07	.07	.07	.09	.05	.08
Female-Black	.17	.18	.17	.06	.12	.11	.16	.18	.15
							Grand Avr.		.07

TABLE 7.1.3: Average Number of Weeks Unemployed in Previous Year as Reported Oct. 1976, by Secondary-Postsecondary Group and Sex-Race Group, NLS-72^a (Weighted averages).

	HS-Gen PS-None	HS-Voc PS-None	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen ^c HS-MDC	HS-Voc PS-MDC	Row Average
Male-White	7.02	6.07	6.66	4.57	7.18	5.83	6.93	6.78	6.61
Male-Black	8.20	8.35	7.45	4.37	16.12	6.49	11.14	15.52	9.25
Female-White	13.64	10.18	8.09	7.45	8.51	7.72	12.90	8.94	10.39
Female-Black	14.82	14.91	10.85	10.93	14.97	14.16	15.27	21.24	14.64
							Grand Average		8.84

^a Number of weeks unemployment was operationalized as the difference between 52 weeks and the number of weeks worked (TQ42B). TQ42B specifically asked: "From Oct. 1975 to Oct. 1976 about how many weeks did you work altogether? (Count all weeks in which you did any work at all or were on paid vacation)."

October 1976 than did other secondary-postsecondary groups.

How do these differences show up in regression analyses? Table 7.1.4 shows the results of our first set of postsecondary regression analyses (which use the HS-Gen-PS-None group as a contrast) for the number of weeks unemployment variable. For each of the remaining secondary-postsecondary groups and sex-race groups, three types of contrasts are presented. First is the raw contrast (simply the unadjusted difference in averages between the groups named and the HS-Gen-PS-None contrast group). These raw contrasts can be derived directly from the descriptive results already presented. Second are the results from the basic analysis controlling only for SES. Contrasts which were statistically significant at less than the .05 probability level are indicated with an asterisk.* The third figure represents a summary of results of our second set of regressions, namely controlling for SES and the various variables listed in the introduction to this chapter. If a majority of the contrasts from these secondary regressions were not statistically significant, this is indicated by NS. However, if a majority of the contrasts were significant, we have simply indicated the range of significant contrasts.

What then do the data in Table 7.1.4 mean? They indicate that for male whites, none of the various combinations of secondary and postsecondary schooling are associated with significantly more or less weeks of unemployment than for the HS-Gen-PS-None group. This is largely true also for male blacks, except those in HS-Gen-PS-Voc, and HS-Voc-PS-MDC groups who had some six to eight weeks more unemployment than the HS-Gen-PS-None group of male blacks who had no postsecondary schooling.

* Following previous practice, individual contrasts are indicated as significant only if the overall R^2 for the particular regression equation from which it was derived also was significant at the .05 level. So a procedure of judging individual b-coefficients as significant only if the overall R^2 is significant is known as a protected test of significance. It helps to protect against spurious results, appearing simply by chance.

TABLE 7.1.4: Summary of Regression Results for Number of Weeks Unemployed in Previous Year, with HS-Gen-PS-None as Contrast Group, by Sex and Race, Reported Oct. 1976, NLS-72 (Weighted).

	Secondary-Postsecondary Group							R ²
	HS-Voc PS-None	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC	
<u>Male Whites</u>								
(1) Raw Contrast	-0.95	-0.36	-2.45	.16	-1.19	-0.09	-0.24	
(2) Contrast controlled for SES	-1.23	-0.68	-1.50	-0.84	-1.06	1.43	-0.30	.0049
(3) Contrast controlled for SES and other variables	NS	NS	NS	NS	NS	NS	NS	
<u>Male Blacks</u>								
(1) Raw Contrast	0.15	-0.75	-3.83	7.92	-1.71	2.94	7.32	
(2) Contrast controlled for SES	-2.07	0.42	-2.43	7.62*	-0.60	4.07	7.56*	.0631*
(3) Contrast controlled for SES and other variables	NS	NS	NS	6.3 to 8.1	NS	NS	5.8 to 7.8	
<u>Female Whites</u>								
(1) Raw Contrast	-3.46	-5.55	-6.19	-5.13	-5.92	-0.74	-4.70	
(2) Contrast controlled for SES	-3.46*	-5.50*	-6.98*	-5.24*	-5.94*	-2.21	-4.35*	.0277*
(3) Contrast controlled for SES and other variables	-2.2 to -3.5	-4.9 to -7.5	-5.1 to -6.9	-5.1 to -6.9	-4.9 to -7.5	NS	-3.5 to -4.4	
<u>Female Blacks</u>								
(1) Raw Contrast	0.09	-3.97	-3.89	0.15	-0.66	0.45	6.42	
(2) Contrast controlled for SES	-0.14	-0.61	2.81	4.25	0.83	1.55	7.68	.261*
(3) Contrast controlled for SES and other variables	NS	NS	NS	NS	NS	NS	7.6 to 8.7	

* Note: See footnotes to Table 7.3.2 for details on contrasts (1) - (3).

For females, no significant contrasts at all were apparent in the basic regression analyses for black females (the contrast for the HS-Voc-PS-MDC showed up as significant for black females in supplementary regressions, but the meaning of this result is hard to interpret since we have no indication of whether their postsecondary program was academic or vocational). However, for white females, six or seven contrasts showed up as statistically significant. In all cases, the groups listed had less weeks unemployment than the HS-Gen-PS-None group of females. The first column indicates for example that female secondary vocational graduates with no postsecondary schooling (HS-Voc-PS-None) on average had about 3.5 weeks less unemployment than the general graduates with no postsecondary schooling. White females in the HS-Gen-PS-Acad showed about 5.5 less weeks unemployment; those in the HS-Gen-PS-Voc, about 5.2 weeks less unemployment, and those in the HS-Voc-PS-Voc group 5.9 weeks less. Among white females, the lowest level of reported weeks of unemployment in the year preceding the October 1976 survey date was for those in the HS-Voc-PS-Acad group, which had after adjusting for SES, nearly 7 weeks less than those in the HS-Gen-PS-None comparison group.

If postsecondary schooling of various sorts (vocational, academic, or unspecified MDC) appears to carry an advantage for white females in terms of lower average weeks of unemployment as compared with those who graduate from a general high school program and have no postsecondary schooling, what about differences associated with various types of postsecondary schooling? This, of course, was the question addressed in our second set of postsecondary analyses, limited exclusively to those with some sort of postsecondary schooling, and using the HS-Voc-PS-Voc group as a comparison. The pattern

of results for the weeks unemployment outcome variable indicated no clear differences for different types of postsecondary schooling.* In other words, our second set of postsecondary analyses for the weeks unemployment outcome variable showed no significant differences associated with different kinds of postsecondary schooling in combination with either high school general or high school vocational programs.

* In the basic analyses no contrasts proved significant. SES and the five variables corresponding to different types of secondary-postsecondary schooling accounted for no more than 3% of variance. In analyses including variables describing institutional type, full-time attendance, and certification, only one out of 20 secondary-postsecondary group contrasts (across the four sex race groups) proved significant, for the HS-Gen-PS-MDC group of white males, a result which has no clear interpretation.

7.2 Extent of Labor Force Participation

In a manner analogous to that followed in Chapter 4, we now turn to consider two indicators of the extent of individuals' labor force participation, namely

- number of hours worked per week, and
- full-time versus part-time employment.

These indices are calculated on the same basis as those defined and discussed in Chapter 4. Also as usual, we first describe cross-tabular results before summarizing results of regression analyses. Cross-tabular results are reported for both outcome measures; regression results for only the first. All results are, of course, limited to those employed as of October 1976.

Table 7.2.1 shows the cross-tabular results for number of hours worked per week. As the overall average on this variable (41.01 hours) indicates, respondents on average reported working more than a full 40-hour work week. Males tended to work some two to six hours more per week than females, largely independent of secondary-postsecondary group. Also black males tended to work less hours per week than white males, although black females tended to work as much or slightly more than white females. In light of the sex differences on this outcome variable, differences among the secondary-postsecondary groups are small, rarely exceeding two hours per week. The only exceptions to this general pattern are: male blacks in the HS-Voc-PS-Acad group reported working an average of about 44.5 hours per week, as compared with 40.74 for male blacks overall; male blacks in the HS-Voc-PS-MDC group reported working about 2 hours less per week than male blacks overall; and female blacks in the HS-Voc-PS-Acad group reported working about two hours less per week than female blacks overall.

TABLE 7.2.1: Average Number of Hours Worked Per Week, October 1976, By Secondary-Postsecondary Group and Sex-Race Group, NLS-72 (weighted averages).

	HS-Gen PS-None	HS-Voc PS-None	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC	Row Avr.
Male-White	43.68	43.87	44.36	45.77	45.21	44.40	43.57	43.35	43.99
Male-Black	39.77	41.50	40.42	44.46	39.79	41.03	42.21	38.52	40.74
Female-White	38.07	38.26	38.49	36.31	37.85	37.51	37.65	37.84	37.95
Female-Black	37.73	38.19	39.05	36.07	39.03	39.28	38.43	36.75	38.21
							Grand Avr.		41.01

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How do differences in the number of hours worked per week outcome variable show up in regression analyses? A summary of results from our first set of postsecondary regression analyses (using HS-Gen-PS-None as a comparison) is shown in Table 7.2.2. As this table indicates, in only one of the 28 sex-race secondary-postsecondary groups were regression results significant in both the basic regression (adjusting only for SES) and in a majority of the supplementary analyses (adjusting for both SES and other variables): male blacks in the HS-Voc-PS-Acad group worked 4.5 to 6.4 more hours per week than male blacks in the HS-Gen-PS-None group. A majority of supplementary analyses showed male blacks in the HS-Gen-PS-MDC group to work significantly more (2.6 to 3.3 hours) and male whites in the HS-Gen-PS-Voc group to work 1.6 to 2.5 more hours per week; but these contrasts were not significant in the basic reanalysis adjusting only for SES.

Our second set of regression analyses on the number of hours worked per week outcome variable showed not a single significant contrast when adjustment was made only of SES. However in supplementary analyses a few contrasts did show up as significant as shown in Table 7.2.3. Male blacks in the HS-Gen-PS-Voc and in the HS-Gen-PS-MDC tended to work a few less hours per week than their colleagues in the HS-Voc-PS-Voc comparison group, and female blacks in the HS-Voc-PS-MDC group tended to work about 4 hours less than female blacks in the HS-Voc-PS-Voc group.

Our third index of employment status is percent of each group of those employed who are employed full-time. Cross-tabular results are given in Table 7.2.4. These results indicate that males tend to work full-time in

TABLE 7.2.2: Summary of First Set of Postsecondary Regression Results (with HS-Gen-PS-None as Contrast Group), for Numbers of Hours Worked Per Week, Reported Oct. 1976, NLS-72 Data Set (weighted).

	HS-Voc PS-None	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC	R ²
Male-Whites								
1. Raw contrast	0.19	0.60	2.09	1.53	0.72	-0.11	-0.33	
2. Contrast adjusted for SES	0.36	0.65	2.26	-1.64	1.00	0.13	-0.15	.0040
3. Contrast controlled for SES and other variables	NS	NS	NS	1.6 to 2.5	NS	NS	NS	
Male-Blacks								
1. Raw contrast	1.73	0.65	4.69	0.02	1.26	2.44	-1.25	
2. Contrast adjusted for SES	1.37	0.96	4.60*	-0.14	1.37	2.68	-1.46	.0487*
3. Contrast controlled for SES and other variables	NS	NS	4.5 to 6.4	NS	NS	2.6 to 3.3	NS	
Female-Whites								
1. Raw contrast	0.19	0.41	-1.76	-0.22	-0.56	-0.42	-0.23	
2. Contrast adjusted for SES	0.00	0.35	-1.84	-0.28	-0.72	-0.60	-0.37	.0034
3. Contrast controlled for SES and other variables	NS	NS	NS	NS	NS	NS	NS	
Female-Blacks								
1. Raw contrast	0.46	1.32	-1.66	1.30	1.55	0.70	-1.00	
2. Contrast adjusted for SES	0.50	1.68	-1.36	1.39	1.63	0.72	-0.80	.0254
3. Contrast controlled for SES and other variables	NS	NS	NS	NS	NS	NS	NS	

1. No significance tests performed for raw contrasts

2. Asterisk indicates contrast significant at less than 0.05 level only if total R² significant at less than 0.05 level.

3. Only majority pattern of contrasts summarized: if majority not significant then NS indicated; if majority significant then range of significant contrasts given.

TABLE 7.2.3: Summary of Second Set of Postsecondary Regression Results (With HS-Voc-PS-Voc as Contrast Group), For Number of Hours Worked Per Week, Reported Oct. 1976, NLS-72 Data Set (Weighted).

	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC	R ²
Male-Whites						
1. Raw contrast	-0.04	1.37	0.81	-0.83	-1.05	
2. Contrast adjusted for SES	-0.40	1.23	0.60	-0.88	-1.16	0.0052
3. Contrast controlled for SES and other variables	-1.57	-0.34	0.46	-1.95	-2.11	0.0147
Male-Blacks						
1. Raw contrast	-0.61	3.43	-1.24	1.17	-2.51	
2. Contrast adjusted for SES	-0.38	3.17	-1.55	1.32	-2.90	0.0726*
3. Contrast controlled for SES and other variables	-0.36	2.95	-4.58*	0.70	-8.79*	0.1539
Female-Whites						
1. Raw contrast	0.98	-1.20	0.34	0.14	0.33	
2. Contrast adjusted for SES	0.96	-1.12	0.40	0.10	0.38	0.0046
3. Contrast controlled for SES and other variables	1.54	-0.79	0.73	1.04	1.35	0.0170
Female-Blacks						
1. Raw contrast	-0.23	-3.21	-0.25	-0.85	-2.53	
2. Contrast adjusted for SES	0.04	-2.29	-0.30	-1.02	-2.47	0.046
3. Contrast controlled for SES and other variables	0.29	-1.82	-1.12	-2.50	-4.30*	0.0907*

1. No significance tests performed for raw contrasts.
 2. Asterisk indicates contrast significant at less than 0.05 level only if total R² significant at less than 0.05 level.
 3. Asterisks indicate contrasts significant at 0.05 level.

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TABLE 7.2.4: Average Percentage Employed Full-Time (of Those Employed) October 1976, by Secondary-Postsecondary Group and Sex-Race Group, NLS-72 Data Set (Weighted Responses).

	HS-Gen PS-None	HS-Voc PS-None	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC	Row Avr.
Male-White	96	97	95	99	97	95	91	95	96
Male-Black	95	97	83	97	91	94	96	83	93
Female-White	83	87	90	86	85	85	86	88	86
Female-Black	87	89	93	77	93	91	79	83	88
							Grand Avr.		91

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higher proportion than females, and blacks more than whites, though the average sex difference for blacks (5%) is half that for whites (10%).

In light of such sex and race differences, differences between secondary-postsecondary groups within sex-race groups appear as relatively small.

The only instances showing variation of more than 5% from the sex-race group overall averages are that male blacks in the HS-Gen-PS-Acad group were employed full-time 10% less than male blacks overall (83% vs.

93%), and female blacks in the HS-Voc-PS-Acad group were employed full-time 11% less than female blacks overall (77% vs. 88%).

7.3 Wages and Earnings

Our third type of indicator is income, or more specifically, hourly wages and weekly earnings. Our strategy for dealing with these outcome variables for postsecondary level participants was essentially the same as that in treating these outcome variables for those with twelve years of schooling exactly, reported in section 4.3. Let us briefly recap four prime aspects of this strategy. First, while we did analyses on both hourly wages and weekly earnings, we report data only for the latter outcome variable, because, as noted previously (see p. 4-3-7), hourly wages had to be estimated from typical weekly earnings and typical hours worked weekly. Such derivations led to a sufficiently large number of cases of suspiciously high or low hourly wages to suggest that directly reported weekly earnings may be a more reliable measure than derived estimates of hourly wages. Second, even though the earnings data reported in this section all pertain to a single survey point, namely October 1976, weekly earnings data were adjusted to constant 1978 dollars to make these data comparable to earnings data given elsewhere in this report. Third, for all regression analyses on earnings, parallel analyses using the natural logarithm of earnings were also conducted (to control for skewness in the earnings distribution). The natural log results are not reported in detail, but instead summary tables of results merely indicate when the natural log results were significant or not significant. Fourth, data on average earnings is calculated solely on the basis of those employed since unemployment rates and labor force participants rates have already been considered separately.

Table 7.3.1 shows the average typical weekly earnings across the eight secondary-postsecondary groups and the four sex-race groups. These earnings data show a familiar pattern -- namely, a sharp sex-related earnings difference. Indeed, with only two exceptions (both for black males), the male groups show average earnings at or above the grand average across sexes of \$192, whereas all the female groups, both black and white, show average earnings below the grand average across sexes. The sex differential in weekly earnings is about \$80 among whites and about \$50 among blacks. While there appears to be a race differential among males (with whites earning \$30 more than blacks on average), a rough parity pertains among white and black females in the various secondary-postsecondary groups. In light of such differences associated with sex, and among males with race, differences associated with secondary-postsecondary groups within sex-race groups are small (ranging from maximum differences across HS-PS groups of \$31 for MW; \$33 for MB; \$20 for FW; and \$27 for FB). Indeed for males, these cross-tabular data make it appear that postsecondary attendance translates into little if any earnings advantage as compared to graduates of high school general and vocational programs who did not attend postsecondary institutions. Nevertheless for females, these descriptive data do suggest some earnings advantage associated with postsecondary attendance, although there appears to be no differential advantage associated with following an academic or vocational postsecondary program.

How do these differences show up in regression analyses? Table 7.3.2 provides a summary of our first set of regression analyses for the earnings outcome variable. According to all of the regressions we performed, female whites in the HS-Gen-PS-Acad group tended to earn significantly more per week

TABLE 7.3.1: Average Typical Weekly Earnings October 1976, in 1978 Dollars by Secondary-Postsecondary Group and Sex-Race Group, NLS-72 Data Set (Weighted Averages).

	HS-Gen PS-None	HS-Voc PS-None	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC	Row Avr.
Male-White	226	235	225	256	228	225	233	238	231
Male-Black	208	208	196	208	187	209	192	176	202
Female-White	143	156	163	152	150	153	146	154	151
Female-Black	141	155	161	149	155	162	135	139	151
							Grand Avr.		\$192

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TABLE 7.3.2: Summary of First Set of Regression Results (With HS-Gen-PS-None as Contrast Group), For Typical Weekly Earnings, by Sex-Race, Reported Oct. 1976, in 1978 Dollars NLS-72 Data Set (Weighted).

	HS-Voc PS-None	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC	R ²
Male-Whites								
1. Raw contrast	9	-1	30	2	-1	7	12	
2. Contrast adjusted for SES	9.0	-3.1	29.4*	3.0	-1.5	5.3	15.5*	.0102*
3. Contrast controlled for SES and other variables	NS	NS	27.4	NS	NS	NS	14.7	
4. Log Contrast Con't for SES	SS	NS	to 35.1 NS	NS	NS	NS	to 17.5 NS	
Male-Blacks								
1. Raw contrast	0	-12	0	-21	1	-16	-32	
2. Contrast adjusted for SES	-9.5	-35.7*	-5.4	-28.1	-5.0	-26.6	-30.0	.0691*
3. Contrast controlled for SES and other variables	NS	-32.4	NS	NS	NS	NS	NS	
4. Log Contrast Con't for SES	NS	to -39.0 NS	NS	NS	NS	NS	NS	
Female-Whites								
1. Raw contrast	13	20	9	7	10	3	11	
2. Contrast adjusted for SES	11.4*	16.2*	5.0	5.1	6.8	-0.5	9.7	.0197*
3. Contrast controlled for SES and other variables	9.2	14.7	NS	NS	NS	NS	NS	
4. Log Contrast Con't for SES	NS	to 19.5 SS	to 24.5 NS	NS	NS	NS	NS	
Female-Blacks								
1. Raw contrast	14	20	8	14	21	-6	-2	
2. Contrast adjusted for SES	8.4	11.8	3.1	11.0	17.4	-9.2	-8.7	.0409*
3. Contrast controlled for SES and other variables	NS	NS	NS	NS	NS	NS	NS	
4. Log Contrast Con't for SES	SS	SS	NS	SS	SS	NS	NS	

1. No significance tests performed for raw contrasts.

2. Asterisk indicates contrast significant at less than 0.05 level only if total R² significant at less than 0.05 level.

3. Represents a summary of contrasts from 12 different regression equations; if majority not significant at .05 level then NS; if majority significant then range of significant contrasts given.

4. Contrasts from regressions using natural log of earnings, summarized simply as significant (SS) or not significant (NS), since contrasts are in the log metric.

(\$15 to 25) than female whites in the HS-Gen-PS-None group. Male whites in the HS-Voc-PS-Acad group tended to earn \$27 to 35 more than the corresponding HS-Gen-PS-None group, but male blacks in the HS-Gen-PS-Acad group tended to earn \$32 to 39 less than male blacks graduating from the HS general program and having no postsecondary schooling. Also, female whites in the HS-Voc-PS-None group tended to earn some \$10 to \$20 more than female whites in the HS-Gen-PS-None group -- a result which likely is merely a reflection of the advantage to female white commercial program graduates, demonstrated in Chapter 4 (see Table 4.3.5).

What if attention is restricted to those having some form of postsecondary schooling? Do any significant differences show up? Results from our second set of regression analyses bearing on these questions are summarized in Table 7.3.3. Again we see that few significant differences in w weekly earnings are associated with different kinds of postsecondary schooling. The only significant contrast was for white males in the HS-Voc-PS-Acad group who earned about \$30 more per week than white males in the HS-Voc-PS-Voc group.

What do we make of the findings overall regarding differences in weekly earnings associated with different kinds of postsecondary schooling not leading to a baccalaureate degree? The data are meager, it should be noted, but from available evidence, it seems reasonable to conclude that this sort of postsecondary schooling, either vocational or academic, leads to no clear weekly earnings advantages over high school graduates with no postsecondary schooling.

TABLE 7.3.3: Summary of Second Set of Regression Analyses (with HS-Voc-PS-Voc as contrast group) for Typical Weekly Earnings by Sex and Race Group Reported October 1976, in 1978 Dollars, NLS-72 Data Set. (Weighted).

	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC	R ²
Male-Whites						
1. Raw contrast	0	31	3	8	13	
2. Contrast adjusted for SES	-1.5	31.1*	4.6	6.9	17.1	.0138*
3. Contrast controlled for SES and other variables	-3.0	30.4	7.3	9.2	20.4	.0202
Male-Blacks						
1. Raw contrast	-13	-1	-22	-17	-33	
2. Contrast adjusted for SES	-31.4	-0.9	-23.7	-22.6	-25.8	.0901
3. Contrast controlled for SES and other variables	NA	NA	NA	NA	NA	NA
Female-Whites						
1. Raw contrast	10	-1	-3	-7	1	
2. Contrast adjusted for SES	9.4	-1.9	-1.8	-7.4	2.0	.0172*
3. Contrast controlled for SES and other variables	10.8	-3.7	-2.2	0.2	7.2	
Female-Blacks						
1. Raw contrast	-1	-13	-7	-27	-23	
2. Contrast adjusted for SES	-3.8	-13.2	-6.2	-27.4	-25.9	.0321
3. Contrast controlled for SES and other variables	-8.0	-5.8	-10.5	-33.1	-31.8	.0776

1. No significance tests performed for raw contrasts.
 2. Asterisk indicates contrast significant at less than 0.05 level only if total R² significant at less than 0.05 level.
 3. Asterisks indicate significance at 0.05 level. NA indicates ill-conditioning in regression equation.

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7.4 Occupational Status

The fourth type of gainful employment outcome whose association with postsecondary vocational schooling we investigated was occupational status measured in terms of the Duncan Socioeconomic Index (see p. 4-4-20, for a description of our analyses on the SEI for those with exactly twelve years of schooling).

Table 7.4.1 shows average Duncan SEI scores by secondary-postsecondary group and sex-race group. On this outcome variable we again see a sharp sex difference, but note that it is in the opposite direction as the sex differential in weekly earnings. Females consistently tend to hold jobs with higher SEI scores than males. Overall the sex difference in this outcome variable tends to be about 14 points among whites and 10 points among blacks. Also there appears to be a slight tendency for whites to have higher SEI scores than blacks.

Note too that there appears to be a fairly clear advantage associated with postsecondary schooling. Within sex-race groups, those with some form of postsecondary schooling (Voc, Acad, or MDC), almost without exception have higher average SEI scores than the HS-Gen-PS-None groups (the exceptions are the MB-HS-Gen-PS-MDC, and the FB-HS-Gen-PS-MDC groups).

How do these differences show up in regression analyses? Table 7.4.2 presents a summary of the first set of regression analyses for this outcome variable. For white females, six of the seven secondary-postsecondary groups listed show significantly higher SEI scores than white females in the HS-Gen-PS-None group, with differences ranging from about 4 to 13 points. The greatest differences are apparent for white females in the HS-Voc-PS-Acad and the HS-Voc-PS-Voc groups. Note, however, that for white female general graduates, enrolling in a postsecondary vocational program

TABLE 7.4.1: Average Duncan SEI Score, October 1976, by Secondary-Postsecondary Group and Sex-Race Group, NLS-72 Data Set (Weighted Averages).

	HS-Gen PS-None	HS-Voc PS-None	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC	Row Avr.
Male-White	26.8	27.4	34.6	32.9	31.3	32.5	29.1	30.7	29.1
Male-Black	26.6	24.1	33.9	29.0	33.6	29.1	26.1	27.8	27.5
Female-White	36.6	45.0	45.3	51.0	41.8	49.2	37.3	43.3	42.8
Female-Black	30.3	37.8	42.1	48.4	39.3	45.3	26.7	34.2	37.6
							Grand Avr.		35.1

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TABLE 7.4.2: Summary of First Set of Regression Results (with HS-Gen-PS-None as Contrast Group), for Duncan Socioeconomics Index, October 1976, by Sex and Race, Reported Oct. 1976, NLS-72 Data Set (Weighted Regressions).

	HS-Voc PS-None	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Voc PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC
Male-Whites							
1. Raw contrast	0.6	7.8	6.1	4.5	5.7	2.3	3.9
2. Contrast adjusted for SES	0.60	5.89*	5.03*	2.44	5.32*	1.68	3.03
3. Contrast controlled for SES and other variables	NS	5.3 to 7.0	4.9 to 5.5	NS	5.1 to 6.1	NS	3.0 to 3.4
Male-Blacks							
1. Raw contrast	-2.5	7.5	2.4	7.0	2.5	-0.5	1.2
2. Contrast adjusted for SES	-2.25	5.54	0.81	5.60	1.32	-2.43	1.52
3. Contrast controlled for SES and other variables	NS	NS	NS	NS	NS	NS	NS
Female-Whites							
1. Raw contrast	8.4	8.7	14.4*	5.2	12.6	0.7	6.7
2. Contrast adjusted for SES	8.01*	6.96*	13.10*	4.27*	11.36*	0.65	6.66*
3. Contrast controlled for SES and other variables	5.9 to 8.1	6.5 to 8.3	11.7 to 13.6	4.1 to 5.4	9.2 to 12.4	NS	4.9 to 6.8
Female-Blacks							
1. Raw contrast	7.5	11.8	18.0	9.0	15.0	-3.6	3.9
2. Contrast adjusted for SES	5.03*	7.72*	15.06*	7.47*	13.37*	5.06	1.36
3. Contrast controlled for SES and other variables	5.0 to 5.3	7.6 to 9.2	13.4 to 19.1	6.8 to 10.1	11.7 to 14.8	NS	NS

1. No significance tests performed for raw contrasts.
2. Asterisk indicates contrast significant at less than 0.05 level only if total R^2 significant at less than 0.05 level.
3. Only majority pattern of contrasts summarized: if majority not significant then NS indicated; if majority significant then range of significant contrasts given.

is associated with a lesser advantage in SEI scores than white females who were in a secondary vocational program and had no postsecondary schooling.

Substantial differences are also apparent for black females. Again the largest ones are associated with the HS-Voc-PS-Acad and HS-Voc-PS-Voc groups. Unlike white females, however, black females in the HS-Gen-PS-Voc group showed a slightly higher advantage over HS-Gen-PS-None black females than did the HS-Voc-PS-None black females.

Differences for males were less commonly apparent. Indeed for black males, none of the various combinations of secondary and postsecondary schooling are associated with significantly greater or lesser average SEI scores than black males in the HS-Gen-PS-None group. However, for white males, postsecondary attendance did appear to be associated with about a 5 point SEI advantage over white males in the HS-Gen-PS-None group (the exceptions were for those in the two PS-MDC groups and in the HS-Gen-PS-Voc group).

If postsecondary attendance does appear to be associated with higher SEI scores in at least three of the four sex-race groups, what about differences in type of postsecondary schooling? Data on this question from our second set of regression analyses on this outcome variable, which excluded the two PS-None groups and used the HS-Voc-PS-Voc group as a comparison, are summarized in Table 7.4.3. Results indicate that for males, both black and white, different types of postsecondary programs are not associated with significantly greater or lesser SEI scores than for males in the corresponding HS-Voc-PS-Voc groups. For females, however, significant differences were apparent. White females in the HS-Gen-PS-Acad, HS-Gen-PS-Voc, HS-Gen-PS-MDC and HS-Voc-PS-MDC had SEI scores some 4 to 11 points lower than white females in the HS-Voc-PS-Voc group. Note, however, that the SEI scores of white females in the HS-Voc-PS-Acad group had SEI scores equivalent to those

TABLE 7.4.3: Summary of Second Set of Regression Results (with HS-Voc-PS-Voc as Contrast Group) for Duncan Socioeconomic Index, October 1976, by Sex and Race, NLS-72 Data Set (Weighted)

	HS-Gen PS-Acad	HS-Voc PS-Acad	HS-Gen PS-Voc	HS-Gen PS-MDC	HS-Voc PS-MDC	R ²
Male-Whites						
1. Raw contrast	2.1	0.4	-1.3	-3.4	-1.8	
2. Contrast adjusted for SES	0.62	-0.21	-2.89	-3.57	-2.27	.0297*
3. Contrast controlled for SES and other variables	-0.47	-1.25	-2.98	-4.87	-3.29	.0397*
Male-Blacks						
1. Raw contrast	4.8	-0.1	4.5	-3.0	-1.3	
2. Contrast adjusted for SES	3.87	-0.56	4.25	-3.91	0.47	.0602
3. Contrast controlled for SES and other variables	NA	NA	NA	NA	NA	NA
Female-Whites						
1. Raw contrast	-3.9	1.8	-7.4	-11.9	-5.9	
2. Contrast adjusted for SES	-4.34*	1.78	-7.00*	-10.57*	-4.63*	.0657*
3. Contrast controlled for SES and other variables	-6.51	0.78	-7.62*	-11.05*	-4.84*	.0882*
Female-Blacks						
1. Raw contrast	-3.2	+3.1	-6.0	-18.6	-11.1	
2. Contrast adjusted for SES	-5.44	1.71	-5.98	-18.71*	-11.9*	.01454*
3. Contrast controlled for SES and other variables	-7.32	6.03	-5.18	-18.01*	-10.10	.01681*

1. No significance tests performed for raw contrasts.
2. Asterisk indicates contrast significant at less than 0.05 level only if total R² significant at less than 0.05 level.
3. Asterisks indicate significance at 0.05 level. NA indicates ill-conditioning in regression equation.

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in the HS-Voc-PS-Voc group. For black females, those in the two PS-MDC groups had lower SEI scores than black females in the HS-Voc-PS-Voc group. The meaning of these latter differences are impossible to interpret, however, because we have no indication of the type of postsecondary program of those in the PS-MDC groups.

7.5 Summary of Gainful Employment Outcomes Associated With Postsecondary Vocational Education and Comparison of Findings to Previous Research

The preceding four sections described results of analyses of selected gainful employment outcome indicators for groups self-reported as having different combinations of secondary and postsecondary schooling; specifically general or vocational programs at the high school level, and no postsecondary schooling, academic postsecondary schooling, vocational postsecondary schooling, or unspecified postsecondary schooling (i.e., PS-MDC). We attempted to limit the postsecondary schooling considered to that leading to less than a baccalaureate degree by excluding those who had completed four years of postsecondary schooling. Also, we excluded those who were enrolled full-time in either fall 1974 or fall 1975 in order to limit results to those who had the potential for being in the labor market full-time for two years prior to October 1976, the time of the third NLS-72 follow-up survey, and the time point for which all employment outcomes associated with postsecondary schooling were considered in reanalyses of the NLS-72 data set.

With these caveats in mind, in this summary section we recap results of postsecondary reanalyses from two perspectives:

- (1) How gainful employment outcomes for the various secondary-postsecondary groups compared with those of individuals who graduated from a general high school program but reported no postsecondary schooling.
- (2) How gainful employment outcomes for the groups having some form of postsecondary schooling (i.e., excluding the HS-Gen-PS-None, and HS-Voc-PS-None groups) compared with the group of individuals reporting following vocational programs in both high school and postsecondary school (i.e., HS-Voc-PS-Voc).

After summarizing results of reanalyses from these two perspectives, we briefly discuss how they compare with previous research findings.

From the first perspective, Table 7.5.1 provides a summary of both cross-tabular results and our first set of postsecondary regression results. In order to provide comparability between the two kinds of analyses, cross-tabular results have been summarized in terms of contrasts to the HS-Gen-PS-None group. However, since the criteria for noting differences in the cross-tabular results are somewhat arbitrary (listed in parentheses in the left hand column), we indicate cross-tabular differences worth noting in parentheses. Significant results derived from regression analyses are indicated without parentheses. Positive and negative signs indicate the direction of contrasts -- though it should be noted that for the two unemployment variables, a negative sign indicates a substantively positive outcome -- that is less unemployment.

The first obvious point to be noted about the summary results shown in Table 7.5.1 is that notable contrasts tend to be more frequent for females (particularly white females) than for males. In comparison to individuals in the HS-Gen-PS-None groups, females with various sorts of postsecondary schooling (and females without postsecondary schooling, but who were in vocational programs in high school) tend to show higher labor force participation rates, fewer weeks unemployment, and higher Duncan SEI scores. The magnitude of the differences for white females, though not shown in Table 7.5.1, are for them to have: 1) LFPRs some 10 to 20 points higher (see p. 7-1-2); 2-7 weeks less unemployment in the previous year (see p. 7-1-7); and Duncan SEI scores some 4 to 14 points higher (see p. 7-3-4) than white females in the HS-Gen-PS-None group.

Other notable patterns in the summary data are the following. Postsecondary attendance appears to be at least slightly associated with lower

TABLE 7.5.1: Summary of Cross-Tabular Results and First Set of Regression Results, Contrast to HS-Gen-PS-None*

Outcomes	Secondary Postsecondary Groups							p. ref.
	Voc None	Gen Acad	Voc Acad	Gen Voc	Voc Voc	Gen MDC	Voc MDC	
1) Employment Status								
LFPR	MW							
(> 10% diff)	MB			(+)			(-)	
	FW	(+)	(+)	(+)	(+)	(+)		(+)
	FB	(+)				(+)		
Unemployment Rate	MW							
(> 5% diff)	MB		(-)	(-)		(-)		
	FW							7-1-4
	FB			(-)	(-)	(-)		
No. Weeks Unemployment	MW							
	MB				+			+
	FW	-	-	-	-	-	-	-
	FB							+
2) Extent of Labor Force Participation								
-- Hours/week	MW				+			
	MB			+			+	
	FW							7-2-4
	FB							
-- Full Time Employment	MW						(-)	
(> 5% diff)	MB		(-)					(-)
	FW		(+)					(+)
	FB		(+)	(-)	(+)		(-)	
3) Weekly Earnings								
	MW				+			+
	MB		-					
	FW	+	+					7-3-4
	FB							
4) Occupational Status								
Duncan SEI	MW		+	+		+		+
	MB							
	FW	+	+	+	+	+		+
	FB	+	+	+	+	+		7-4-3

* Plus or minus signs indicate substantial differences on the outcome variable between the groups listed and the HS-Gen-PS-None contrast group. Parentheses indicate differences of the indicated magnitudes apparent from cross-tabular results only. Signs without parentheses indicate differences which were significant in regression analyses. Note that for the two unemployment variables negative signs indicate less unemployment.

unemployment rates for blacks, both male and female (even though the HS-Gen-PS-Voc combination is associated with slightly higher number of weeks of unemployment for male blacks). Postsecondary attendance is not strongly associated with differences in hours worked per week, full-time employment, or weekly earnings for any of the sex-race groups.

If one looks not across the rows of Table 7.5.1 (showing different outcome variables), but instead looks down the columns (showing different secondary-postsecondary groups), two interesting patterns are apparent. First, while the groups of individuals having vocational education in a public high school and no postsecondary schooling (HS-Voc-PS-None) show some gainful employment advantages over the group having a general public high school education and no postsecondary schooling (HS-Gen-PS-None), advantages are more common for most all of the groups having some form of postsecondary schooling (the exceptions are mainly the PS-MDC groups). Second, while there appear to be slightly more notable differences for the academic postsecondary groups (HS-Gen-PS-Acad and HS-Voc-PS-Acad) than for the vocational postsecondary groups (HS-Gen-PS-Voc and HS-Voc-PS-Voc), the overall differences are too slight to conclude that academic postsecondary schooling has an advantage over vocational postsecondary schooling. This suggests that if there is a modest advantage to postsecondary schooling in terms of at least some employment outcomes, that it is no greater for vocational postsecondary schooling than for academic postsecondary schooling below the baccalaureate degree. However, the data shown in Table 7.5.1 bear only indirectly on this question, since results are summarized there in terms of comparisons to the respective HS-Gen-PS-None groups. In order to recap more direct evidence on this question, we now turn to a summary of our second set of postsecondary analyses.

Table 7.5.2 shows a summary of results in terms of our second approach to investigating postsecondary outcomes, namely, focusing exclusively on individuals having some forms of postsecondary schooling and using the HS-Voc-PS-Voc group as a contrast. As in the previous table, contrasts derived simply from cross-tabular results are shown in parentheses. Those derived from regression results are shown without parentheses. The first point to be noted about this summary table is how few significant differences are apparent. Indeed, only five contrasts were shown to be significant in regression analyses, and four of these pertained to groups which had unspecified postsecondary schooling (PS-MDC).

Further, all five significant contrasts were associated with one gainful employment outcome, the Duncan SEI. No notable differences among any of the different forms of postsecondary schooling were found in regression analyses on weekly earnings, number of weeks unemployed, and weekly hours worked. With respect to the cross-tabular results, if one looks only at the first three columns in Table 7.5.2, which summarize contrasts based on identifiable forms of postsecondary schooling (i.e., academic or vocational), two findings are apparent. First, the cross-tabular results based on labor force participation rates, unemployment rates and full-time employment indicate few notable differences. Second, there was no consistent pattern apparent in the differences that were noted, from the perspective of either the sex-race groups or the secondary-postsecondary groups. In other words the regression and cross-tabular results essentially confirm the pattern apparent in Table 7.5.1. There is no evidence apparent that vocational as opposed to academic postsecondary schooling (at least as self reported) confers any relative advantage in terms of a variety of gainful employment

TABLE 7.5.2: Summary of Cross-Tabular Results and Second Set of Regression Results, Contrast to HS-Voc-PS-Voc.*

Outcome Variables	Secondary Postsecondary Group					Page Reference
	Gen Acad	Voc Acad	Gen Voc	Gen MDC	Voc MDC	
<u>1) Employment Status</u>						
- LFPR ($\geq 10\%$ diff)	MW					
	MB		(+)		(-)	
	FW					7-1-2
	FB	(-)				(-)
- Unemployment Rate ($\geq 5\%$ diff)	MW					
	MB			(+)	(+)	
	FW					7-1-4
	FB	(+)	(-)		(+)	(+)
- No Weeks Unemployed	MW					
	MB					7-1-8
	FW					7-1-9
	FB					
<u>2) Extent of Labor Force Participation</u>						
- Hours/Week	MW					
	MB					7-2-5
	FW					
	FB					
- Full-Time Employment ($\geq 5\%$ diff)	MW					
	MB	(-)				(-)
	FW	(+)				7-2-6
	FB		(-)		(-)	(-)
<u>3) Weekly Earnings</u>						
	MW		(+)			
	MB					
	FW					7-3-6
	FB					
<u>4) Occupational Status</u>						
	MW					
	MB					
	FW					7-4-5
	FB					

* Plus or minus signs indicate substantial differences on the outcome variable between the groups listed and the HS-Voc-PS-Voc contrast group. Parentheses indicate differences of the indicated magnitude, apparent from cross-tabular results only. Signs without parentheses indicate differences which were significant in regression analyses. Note that for the two unemployment variables negative signs indicate less unemployment.

outcome indicators. This finding, of course, is limited to the time point associated with the data analyzed (i.e., four years after public high school graduation or about two or three years after attendance in a postsecondary institution). However, as noted in the discussion of Table 7.5.1, there is some evidence to support the proposition that postsecondary schooling as compared to general high school graduation without postsecondary schooling is associated with outcome differences in terms of greater labor force participation, lower unemployment, and higher occupational status.

How do these results from our reanalysis of NLS-72 data compare with previous research findings regarding outcomes associated with postsecondary vocational education? The first point to note in this regard is that compared with studies on secondary vocational education, there is considerably less previous research on postsecondary vocational education. Mertens et al. (1980b), for example, located over 140 relevant studies since 1968 bearing on secondary vocational education but only 80 on postsecondary. Moreover, of 77 non-national studies bearing on postsecondary vocational education, only 38 were rated as relatively "more rigorous" (p. 13). Nevertheless, in the paragraphs that follow, we will briefly summarize previous research on postsecondary vocational education including not only studies reviewed by Mertens et al. (1980b), but also several other studies not covered in the Mertens et al. review.

Four studies rated by Mertens et al. (1980b) as "more rigorous" indicated collectively that postsecondary vocational graduates tended to have lower unemployment rates than secondary graduates without postsecondary training, but slightly higher unemployment rates than graduates of four-year colleges. One local study (Shymoniak, 1972, cited in Mertens et al., 1980b, p. 57) indicated that community college graduates of office, trade and industry and

technical programs experienced less unemployment in the first two years after graduation than general community college graduates, but that graduates of other community college vocational programs showed unemployment rates similar to those of nonvocational postsecondary graduates.

Findings reported by Mertens et al. (1980b) regarding earnings were similar. Graduates of two-year postsecondary vocational programs tend to earn more than secondary graduates without postsecondary education, but less than graduates of four-year colleges. The same local study cited above (Shymoniak, 1972) indicated that postsecondary office and trade and industry graduates made significantly more than general postsecondary students in hourly earnings, but that other postsecondary vocational graduates had earnings similar to the latter group.

Mertens et al. (1980b) did not report finding any studies bearing directly on labor force participation rates or occupational status of postsecondary vocational graduates. Nevertheless, there are several other studies bearing on unemployment and earnings, as well as occupational status, which were published subsequently to the Mertens et al. review.

Pincus (1980) reviews the results of "several statewide follow-up studies of vocational students in public community colleges and technical institutes," as well as several national sources of data. Regarding unemployment of postsecondary vocational graduates, Pincus concludes:

Clearly, vocational graduates are less likely to be unemployed than those who graduate from high school. In all probability, vocational graduates are more likely to be unemployed than college graduates, though as likely to be unemployed as those with some college. The best that can be said is that vocational graduates are no more likely to be unemployed than college graduates. (pp. 349-350)

Pincus also reviewed data on income of postsecondary vocational graduates from six state reports. Comparing these data with national data on income of those with 1-3 years of college and with four or more years of

college, he observed that in two cases postsecondary vocational graduates tended to earn less than four year college graduates, and in two cases "about the same as the national sample of college graduates" (p. 350). Drawing on data available from two states, Pincus also observes that male postsecondary vocational graduates tend to earn more than female graduates. In one final set of comparisons regarding income, drawing on data from four states, Pincus concludes that nongraduates of postsecondary vocational programs "tend to have higher incomes than graduates," which he says is "contrary to the claims of vocational schools" (p. 352). However, it should be noted that in his graduate/nongraduate comparisons, Pincus does not control for any student background characteristics. Most notably missing was any control for sex, a surprising absence since Pincus previously argued that the income returns of male graduates were higher than those of female graduates, and it seems fairly likely that completion rates are different for the two sexes.

Another recent study on postsecondary education (PSE) below the baccalaureate level is Selby's (1980) Short-term Postsecondary Education and Work Four Years After High School. This work is particularly interesting in comparison to our own reanalyses, because it was based on the same data set, namely, NLS-72. Selby sought to estimate the employment benefits from PSE of five types: a) two-year academic degrees, b) two-year vocational degrees from colleges, c) two-year vocational degrees from vocational schools, d) non-degree credentials, and e) participation not resulting in any credential. Measures of employment benefits included employment during 1975-76, and (as of October 1976) occupational status, hourly earnings, and satisfaction with pay and jobs. These outcomes for PSE participants and graduates were compared with those of high school graduates of 1972 with no PSE, via regression

analyses which controlled for background variables including SES, sex, ethnicity, high school grades, and high school curriculum program. Selby's "major findings" were the following:

People with sub-baccalaureate PSE had some employment advantages over comparable people whose education stopped with high school. The kind of PSE exposure, sex, and minority status affect both the kind and magnitude of benefits.

Benefits are largely indirect. PSE influences other aspects of work experience, which in turn determine the major outcomes. If local conditions inhibit the free play of these indirect influences, PSE benefits will be depressed. Hence PSE benefits depend partly on local labor market conditions.

Sub-baccalaureate PSE does not eliminate status and wage disadvantages for women and minority-group members. Women and minorities held lower-status jobs and were paid less even when background, education, place of residence, work history, and job content were taken into account. The gap between women and men was greater than that between minorities and non-minorities.

The analytic equations account for only small proportions of variation in the major outcomes. Consequently, individual predictions are unlikely to be very accurate. This implies that individual PSE participants cannot depend on realizing the average benefit for a given credential. This risk may make postsecondary education a poor choice for some young people. (Selby, 1980, p. i; emphasis in original)

In addition to these general points, several other of Selby's specific findings are worth noting. Contrary to Pincus's conclusions, Selby found that "job status benefits for dropouts . . . are generally much smaller than those resulting from credentials, especially degrees" (p. 86). Regarding the relative benefits of different kinds of PSE degrees, Selby concluded that "academic" degrees yielded the greatest benefits. Vocational degrees from vocational schools (as distinct from colleges) were less beneficial" (pp. 86-87). Selby also suggested that the lack of clearcut wage advantages from PSE may be due primarily to foregone work experience and job seniority (p. 87). With regard to earnings benefits, Selby nevertheless did find that "both two-year academic degrees and vocational school degrees yielded substantial hourly earnings

benefits for women" (p. 26).*

One final recent study of postsecondary vocational education is worth mentioning, at least briefly. It is Wilms and Hansell's The Unfulfilled Promise of Vocational Education: Graduates and Dropouts in the Labor Market (1980). This study was based on follow-up surveys of some 1300 dropouts and graduates of six different occupational vocational education programs in four major cities (San Francisco, Chicago, Boston and Miami). Follow-up surveys were conducted as long as 18 months after students' initial entry into the programs studied though the authors do not make it entirely clear exactly when follow-up surveys were conducted for the various groups in the analysis sample. Wilms and Hansell sought, using regression analyses, to compare the personal characteristics, job placement and earnings of the various groups of postsecondary vocational education participants studied. Major findings described in the study's final report abstract were as follows:

Results showed that dropouts were more frequently black, older, less educated and more likely from public programs than graduates. Also, few men and no women who studied for upper level jobs (accountant, computer programmer, and electronic technician) got those jobs, regardless of whether they had graduated from or dropped out of their vocational programs. However, the majority of women who studied for

* An even more recent study of employment outcomes associated with postsecondary education below the baccalaureate level, also using NLS-72 data, has been conducted by Breneman and Nelson (1981). However, we do not attempt to summarize it here for two reasons. First, only a draft report on this study is currently available. Second, the draft report provides no indication of the relative benefits of vocational postsecondary education, as opposed to other forms of postsecondary education.

lower-level jobs (secretary, dental assistant and cosmetologist) successfully found those jobs and graduates fared significantly better in job placement than dropouts. Finally, program completion was unrelated to first or later earnings. Graduates from all programs earned no more than dropouts. These results suggest that vocational training, which may be done more efficiently in proprietary schools may enhance placement only in lower-level jobs, but may not generally increase the earnings of either graduates or dropouts. (Wilms and Hansell, 1980, abstract)

In citing these findings three general caveats should be offered concerning the Wilms and Hansell study design and analysis. First, the study included no comparison group of individuals who had not participated in postsecondary vocational education. Second, although these investigators did include a variable in their regression analyses to control for individual SES background, it was trichotomized only as low, medium and high. Third, regarding the authors' comparisons of public and proprietary schooling, it should be noted that the distribution of individuals in these two types of institutions varied significantly by sex, race and type of occupational program, and hence it is unfortunate that the authors did not conduct separate analyses by sex, race, and occupational specialty instead of pooling together all such groups in common regression equations.

Given this brief review of recent literature, plus the results of our own reanalyses, what do we conclude about gainful employment outcomes associated with participation in postsecondary vocational education? The first point worth noting is that although evidence is partial, several points seem fairly clear. Indeed, it seems evident that the markedly different conclusions different researchers have reached regarding efficacy of postsecondary vocational education derive not from disputes about basic patterns in the evidence, but instead from points of view and standards of comparison. The

basic points from the research reviewed and from our own reanalyses are the following:

- In comparison to high school graduation without postsecondary education, participation in postsecondary education is associated with several kinds of employment advantages, specifically lower unemployment, and better occupational status.
- However, evidence also suggests that employment advantages associated with postsecondary education below the baccalaureate level are not as great as, or at least no greater than, those associated with four-year college graduation.

In the literature reviewed, different investigators do not seem to dispute these two broad trends, but do nevertheless interpret them in markedly different ways. Pincus, for example, seems to feel that the standard of comparison ought to be college graduation, for he argues, somewhat polemically, that "considering the amount of money and effort that advocates of [postsecondary] vocational education use to convince students that vocational education will lead to some kind of economic security, it is their responsibility to prove their case" (p. 350). By implication Pincus seems to be arguing that "their case" is that postsecondary vocational education is more advantageous economically than four-year college education, though he gives no specifics on exactly whose or what case he is referring to.

In contrast, in the research conducted by Selby and the studies reviewed by Mertens et al., the standard of comparison generally is high school graduation without postsecondary education, and from this perspective it seems clear that postsecondary education appears as relatively attractive, leading to a number of employment advantages, most notably higher occupational status and lower unemployment.

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Between these two extremes of comparison, namely high school graduation or four-year college graduation, what remains less clear from the available evidence is whether or not postsecondary vocational education is associated with any gainful employment advantages in comparison to other forms of postsecondary education below the baccalaureate level. Evidence on this question is clearly mixed as represented not only in our own reanalyses, but also the findings of Selby, Wilms and studies reviewed by Mertens et al. Moreover, it seems to us as though there likely never will be any clearcut answers in this regard for two broad sets of reasons. The first is that the distinction between vocational and nonvocational postsecondary education below the baccalaureate level is not terribly clear. Second is that whatever distinctions there are in this regard, it seems likely that employment outcomes will vary as much between different kinds of postsecondary vocational education and will likely vary as much as between vocational and nonvocational postsecondary education. This point is suggested by the findings of both Wilms and the studies reviewed by Mertens et al., which in several cases indicated that the gainful employment outcomes associated with postsecondary education appear to vary considerably in terms of different occupational specialty programs.

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CHAPTER 8. SUMMARY AND CONCLUSIONS

Does vocational education make a difference? That is the question with which we began this report, and it is the question to which we return in this concluding chapter. In doing so we recap in summary fashion much of what we have said previously, but in addition offer our interpretation of what we have found. The chapter is organized in a fashion paralleling the previous portions of this report, with the first seven sections corresponding roughly to the first seven chapters.

The penultimate section 8.8 provides our best overall answer to the question of whether vocational education makes a difference, and discusses the apparent role of vocational education in our nation's broader educational system. The final section points out why our best answer to this overall question is still none too good and what we view as the main research questions regarding vocational education which we have not been able to answer very well (or at all) but which nevertheless deserve further scrutiny.

8.1 Scope of Study

The purpose of the study reported in this volume was to review available evidence, both national and non-national, and to reanalyze national longitudinal data sets bearing on the effects of vocational education on individual participants. Though our goal was thus to review and synthesize evidence on the effects of vocational education, we concluded that available evidence has sufficient drawbacks to make the term "effects" potentially misleading. It is hard, given available evidence, to identify reliably individuals who have participated in vocational education. Vocational education has a variety of goals, and for some of these there is simply no directly relevant evidence at all. Moreover, there are several different standards of comparison by which to estimate effects of vocational education. Thus, because of such problems, we concluded that the phrase "outcomes associated with vocational education" better represents the nature of our inquiry than "effects of vocational education."

In order to identify intended outcomes of vocational education, we reviewed its history in the United States and the record pertaining to federal legislation regarding vocational education. From this review, we identified eight different outcomes in terms of which vocational education has been intended to benefit individuals. While we review evidence on a number of such outcomes, we focus mainly on "gainful employment" outcomes since historically the goal which most clearly characterizes vocational education, as distinct from other forms of education, is that it has been intended to help prepare individuals for gainful employment above unskilled levels.

Our study draws on three types of evidence, namely:

- (1) non-national studies of vocational education (that is, studies based on local, state or regional samples);
- (2) previous national studies concerning the outcomes of vocational education; and
- (3) reanalyses of three national longitudinal data sets providing relevant data.

The reanalyses were performed on the following data sets:

- National Longitudinal Surveys of Labor Market Experience -- Young Men (LME)
- National Longitudinal Study of the High School Class of 1972 (NLS-72); and
- National Longitudinal Surveys of Young Americans (YA).

These three data sets provided data on individuals who graduated (or for dropouts or early leavers who would have graduated) from high school in the following periods: LME: 1960-1970; NLS-72: 1972; and NLS-YA: 1976-1979. The NLS-72 data set was also used to inquire into the experiences of individuals participating either full-time or part-time in postsecondary education programs in the period 1972-73 or 1973-74.*

* Any participation in postsecondary programs in 1974-75 or 1975-76 was restricted to part-time or no attendance in order that such individuals would have had the potential to work full-time during the latter two-year period. Also individuals enrolled full-time in the latter two years would have more likely been baccalaureate candidates.

8.2 Research Strategy

In reviewing previous research, as well as in conducting reanalyses of national longitudinal data sets, we had to make several decisions regarding research strategy. Since the rationale for these decisions is provided in Chapter 2, here we simply describe the basic elements in our research strategy.

In order to estimate outcomes associated with participation in vocational education, we had to choose some standard against which outcomes for vocational participants could be reasonably compared. At the secondary level, we selected a comparison group of general high school program students rather than academic or college preparatory students. At the post-secondary level, we sought to compare vocational program students both with high school students without any postsecondary education, and with individuals having various forms of postsecondary education below the baccalaureate level. In comparisons drawn at both secondary and post-secondary levels, we sought insofar as possible to treat different sex-race groups separately (namely, white males, black males, white females and black females).

On the issue of timing of assessments we sought a compromise between the desiderata of obtaining evidence on current vocational education programs, and obtaining relatively long-term follow-up data on outcomes associated with participation in vocational education. As the oldest data set, LME provided follow-up data over the longest period, for up to 10 years after high school graduation. In contrast, the YA data set provided information on individuals in school as late as 1979, but provided data on gainful employment outcomes for no more than three years after high school graduation. The NLS-72 data set provides something of a

compromise containing data for up to four years after high school graduation on individuals who were in school in the early 1970s.

Our next step was to select measures among those available in the data sets reanalyzed, relevant to the outcomes of interest. The details of which measures were chosen are described in section 2.3, so here let us note simply that insofar as possible we sought to examine more than one measure for each outcome for the simple reason that no one indication can adequately characterize constructs as general as "gainful employment."

Procedures used for constructing reanalysis data sets are described in detail in section 2.4, so in this section we simply summarize four major delimitations in the data used in reanalyses. First, insofar as possible attention was restricted to cases in which individuals had attended public schools. Second, attention was restricted to individuals who were self-reported to have participated in general or vocational programs while in high school (self-reported academic or college preparatory students were excluded from reanalyses). Third, reanalyses pertaining to secondary vocational education programs were restricted to individuals who reported completing no more than twelve years of schooling, as of the latest available survey for each of the data sets, while postsecondary reanalyses were restricted insofar as possible to the NLS-72 sample of individuals who had postsecondary education below the baccalaureate level as of the October 1976 survey date. Fourth, while the duration of time out of high school could be estimated relatively precisely for the NLS-72 data set (given that it was based on a twelfth-grade sample), duration of time after high school had to be approximated for the LME and YA data sets based on the assumption that 18 years is the modal age of high school graduation (these data sets were based on household, rather than grade-level samples).

The analyses conducted were of four broad types, namely, cross-tabular descriptive analyses, basic regression analyses, detailed regression analyses, and regression analyses using coursework information. Most reanalyses (specifically all of the latter three types just mentioned) were performed on the NLS-72 data set. We focused on this data set because it offered a number of advantages in comparison to other data sets, and because we did not have resources to conduct all the analyses that might have been desirable. Detailed regression analyses included controls not only for individual SES, but also a variety of other individual, school and community characteristics. Details of all analyses performed are given in section 2.5 and Appendix D.

Criteria used for determining outcome differences worth noting in this report included both statistical significance and other heuristic standards defined separately as guidelines for different outcome measures examined. In synthesizing results across the three different types of evidence available for this study, greatest weight was given to results of reanalyses and least weight to previous non-national studies. Nevertheless, it should be noted that all sources of evidence suffer from a variety of weaknesses both practical and technical. Thus, our review is appropriately viewed as an effort to piece together available bits of evidence to show the outlines of a large picture, even though we know that some of the pieces to the puzzle are missing.

8.3 Identification and Description of Secondary Vocational Education Students and Graduates

Previous national research on vocational education typically has identified participants in secondary vocational education simply on the basis of individuals' self-reports of their high school program of study. The NLS-72 data set, however, provides three alternative means of identifying vocational education participants or graduates; namely, via student self-report, patterns of high school coursework, and school administrator classification based on review of transcript information.

Past research using the NLS-72 data set has indicated that in only about two out of three cases do individuals classified by administrators as vocational students also report themselves as having pursued a vocational program in high school. While various arguments have been advanced in the abstract concerning the virtues of relying on students' self-reports or upon administrators' classification for the purpose of investigating outcomes of vocational education, we sought to investigate the relationship between self-reported curriculum and data on types of courses taken in the last three years of high school. We first compared the coursework taken by self-reported general and vocational students, without differentiating for vocational specialty. The only differences in courses taken which exceeded one semester course (out of a total of approximately 20 in the last three years of high school) were that:

For males: -General students averaged about one more course in the social studies and fine arts category than vocational students; and
-Vocational students averaged about one more course than general students in trade and industry (T&I).

for females: -General students averaged around one more semester course in social studies and fine arts; and
 -Vocational students averaged one to two more semester courses in both business and commercial.

These are the overall results, and it should be noted that specific findings varied somewhat for groups with twelve years of schooling exactly and those with more than twelve years of school; and also for whites and blacks (in general, differences were smaller for blacks). Nevertheless, what was most striking about these comparisons was the lack of difference between the two groups on seven of eight vocational course content areas.

One hypothesis to explain this finding was that in lumping together all vocational specialty students into one category, important differences were obscured. Thus, we also compared amount of coursework taken by vocational specialty students with that taken by general students. Specifically we considered the following vocational specialty areas: for males, business, T&I, and other or rest vocational; and for females, commercial-office, home economics, and other or rest vocational. Vocational specialty areas could not be further disaggregated because of inadequate sample sizes. Nevertheless, we found greater differences in courses taken even when vocational specialties (as self-reported) were considered in only these broad groupings. Specifically we found:

for males: -Business program students average 1-2 semester courses more than general students in both business and commercial content areas;
 -T&I program students averaged 1 1/2 to 2 1/2 more semester courses than general students in both T&I and industrial arts courses.

For females: -Commercial students averaged 3 to 3 1/2 more semester courses in both business and commercial courses than general students.

These results apply to the group of individuals with twelve years of schooling exactly (that is, with no postsecondary schooling). Also, it should be noted that results differed for whites and blacks (with differences for blacks, particularly for black males, tending to be smaller than corresponding differences for whites). Nevertheless, one general point was clear, namely, that differences in coursework taken by self-reported general and vocational students appear considerably larger when at least the major vocational specialty areas are taken into account.

In order to further investigate the relationship between coursework and students' self-reported high school program, we also conducted a variety of discriminant analyses using the NLS-72 course data. Unlike simple cross-tabulations of coursework in particular areas, these discriminant analyses allowed us to examine overall patterns of coursework in particular areas. While two previous studies have applied discriminant analysis as a procedure for examining similarities and differences among students in different secondary curriculum programs, using NLS-72 data, neither of these used coursework information. We tried a variety of discriminant analyses entering course data with a variety of other information (e.g., both with and without SES data and test score results), but the overall pattern of findings may be summarized as follows: Taken either individually or collectively, course variables and SES and test score data have relatively little power to discriminate between self-reported

general and total vocational (that is undifferentiated by specialty) groups of students. Course data clearly had greater power for differentiating between general and vocational students than did either test scores or SES data. But the only courses which discriminated between self-reported vocational and general students for blacks as well as whites was trade and industry for males and commercial for females. This doubtless is a reflection of the fact that trade and industry occupations account for the largest area of male enrollment in secondary vocational education and the commercial and business specialty accounts for the largest number of female enrollments in occupational vocational education (that is, excluding non-occupational home economics). Nevertheless, two points should be noted regarding these findings. First, available course data had greater power to discriminate among whites self-reported as vocational and general students than among blacks. Second, other research suggests that more detailed information on coursework (beyond the fourteen categories of courses available in the NLS-72 data set) would likely have considerably more power to discriminate among vocational and general students.

How do test scores and socioeconomic background of high school vocational students compare with those of other students? Though the discriminant analyses just described touched indirectly on this question, our next step in reanalyzing national longitudinal data sets was to address this question directly using information from all three data sets we reanalyzed. Specifically we compared SES and test scores for different groups of individuals who had no postsecondary school -- that is, who had exactly twelve years of schooling or who had completed less than

twelve years of schooling.

SES comparisons for both the NLS-72 and LME data employed the SES composite indices available in these data sets. They indicated that for whites, both male and female, the SES background of individuals graduating from high school general and vocational specialty areas is essentially equivalent. However, for blacks, results indicated that graduates of business vocational programs, both male and female, tend to come from slightly higher SES backgrounds than blacks graduating from general high school programs.

No SES composite scores are available in the YA data set, so for these data we considered SES in terms of years of mother's education. For both white males and white females, the distributions on mother's education were very similar between general and vocational students, regardless of whether they were still in school, were early leavers, or had graduated from high school.*

Despite the lack of substantial differences in mother's education between general and vocational students, such differences did show up clearly between high school graduates and early leavers. The YA data showed that while only about 25% of high school graduates from both general and vocational programs reported their mothers as not having completed high school, nearly 60% of early leavers from each program reported such. LME data indicated some differences in SES background

* Because of insufficient sample sizes, data for blacks in the YA data set were not analyzed separately.

between early leavers and graduates, but differences were not nearly so sharp as those shown by the mother's education variable in the YA data set.

How does the academic performance of general and vocational students compare, as indicated by test scores? This question was addressed using test information from both the LME and NLS-72 data sets. Using one half standard deviation as a criterion of substantial difference, we found using LME data that the average test scores of males (both white and black) graduating from general and vocational programs were not substantially different. Similarly, NLS-72 test data indicated no substantial differences between general and vocational graduates, for any of the four sex-race groups examined. Also, it is worth noting that LME data indicated test scores of early leavers to be on average not substantially different from those of graduates. Also, for both males and females, test scores of blacks consistently were substantially different from those of whites.

From these results we drew five implications for the remainder of our analyses of outcomes associated with participation in secondary vocational education. First is that to as great an extent as possible, it is important to focus on vocational program specialty areas rather than on vocational education as a whole (since, as we saw with course data, lumping all secondary vocational students into an undifferentiated whole can mask important differences). Second, and as we suspected initially, general program students constitute a more appropriate comparison group for examining outcomes of vocational education than would

academic or college preparatory high school students. Third, considerable caution should be exercised in relying upon students' self-reports as a means of identifying individuals who participated in vocational education programs. In two of the three data sets reanalyzed, such self-reports were unfortunately the only means of identifying secondary vocational participants, but in the one data set where alternative means of identifying students' high school program were available, we sought to explore this alternative means of program identification. Fourth, in examining relations of the amount and type of coursework in vocational education with subsequent labor market outcomes, coursework in the commercial and industrial arts areas should be treated as vocational coursework or, at the least, should be represented in the analyses in a way that allows their relationship to be distinguishable from that of other more conventional academic areas. Fifth, the results summarized in this section lead us to believe that extreme caution should be exercised in interpreting race differences in outcomes associated with vocational education.

Later in this concluding chapter, we briefly describe alternative hypotheses which may account for differences between self-reports and coursework as means for identifying vocational education participants.* Also, we will

* We should explain briefly why we did not explore the third possible means available in the NLS-72 data for identifying participants in vocational education, namely, the school administrators' reports. The first reason was simply that, given constraints on time and resources available for re-analyses we could not pursue all the issues that we would have liked to. Second, in the NLS-72 data set, the administrators' reports of students' high school curriculum did not actually constitute an independent means of curriculum identification. Although some researchers using the NLS-72 data set have described it as containing "the school record indicator of actual track classifications" (Rosenbaum, 1980, p. 76), in an apparent reference to the administrators' classification, such a statement is simply untrue. The NLS-72 administrators' classifications were made on the basis of the school survey administrators' review of course transcript data. Given limited resources, we decided to focus on course data rather than administrators' classifications as an alternative means of curriculum identification because the administrators' classifications were based on the transcript data. (Also, as noted in Chapter 3, the administrators' classifications were not altogether reliable.)

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comment on possible explanations concerning race and sex differences in results, but we postpone this discussion until we summarize more of our findings.

8.4 Gainful Employment Outcomes Associated with Participation in Secondary Vocational Education Programs

The primary purpose secondary vocational education is typically seen as serving is to prepare individuals for gainful employment as semi-skilled or skilled workers. In Chapter 4, we reported on numerous analyses attempting to provide evidence as to whether that goal is being fulfilled. Before summarizing the findings from Chapter 4, let us provide a brief introduction to two methodological issues discussed in more detail there.

First is the problem of ascertaining individuals' labor force status -- a concept underlying all standard employment indicators. Unemployment rates, for example, are calculated by the Department of Labor as the ratio of the number of individuals in the labor force who are unemployed to the total number in the labor force. Thus individuals who are out of the labor force are excluded from standard calculations of unemployment rates. But determination of labor force status (in particular whether individuals are in or out of the labor force) has come to be based on a fairly elaborate set of questions. The problem this presents is that in some data sets (in particular for present purposes NLS-72, which was the primary focus of our reanalysis effort), it is impossible to reproduce standard procedures employed by the Department of Labor in calculating labor force status. Nevertheless, we were able to approximate standardized procedures using available NLS-72 data. In reanalyzing the LME and YA data we relied upon labor force classifications already available in public use files for these data sets. As long as a consistent method of determining labor force and employment status is used within any one data set, this problem is not necessarily severe for present purposes (unless one has

reason to believe that the particular method introduces critical biases regarding groups compared), but it does suggest the need for considerable caution in comparing results across different studies and data sets which may have used different methods. Also, it suggests considerable caution with respect to relying on previous research which often appears to have used single activity state questions as the only means of determining labor force or employment status.

A second general point is that our reanalyses regarding secondary vocational programs focused exclusively on individuals with no post-secondary education, that is, those with exactly 12 years of schooling for all three data sets reanalyzed, and for the LME and YA data sets, early leavers with less than twelve years of schooling. This point is important to keep in mind because many previous studies have not focused specifically on the group of individuals with exactly twelve years of schooling in analyzing the outcomes of secondary vocational education programs.

With these general points in mind, what did we find regarding employment outcomes associated with participation in secondary vocational education programs? Differences were most commonly apparent for white females, to a lesser extent for black females and to an even lesser degree for males, both white and black. Thus, we summarize findings from both descriptive and regression reanalyses separately for these three groups. Regarding outcomes for females, it should be noted that we excluded results for those indicating specialization in home economics since a large proportion of such individuals can be assumed to be in programs that are non-occupational -- that is, are not aimed at preparing young women for paid employment, but instead for unpaid work as homemakers.

White Female Commercial Graduates. Graduation from a commercial program appears to give white females an advantage over white female general graduates in terms of a number of gainful employment outcomes. Specifically, as compared with their general program peers, white female graduates of commercial programs who do not go on for postsecondary schooling tend to:

- show labor force participation rates 2-11% higher

This conclusion is drawn from our reanalyses of two national longitudinal data sets and is substantiated by findings from Grasso and Shea's (1979) reanalysis of another data set.

- show slightly less unemployment

This finding was not entirely consistent in terms of unemployment rates, but did show up in data on number of weeks unemployed in the previous year and seems to be substantiated in at least some previous research which disaggregates data by sex, race and vocational specialty area.

- work some 1-3 hours more per week

This finding was not clear in descriptive contrasts and results from the regression reanalyses were inconsistent. No directly comparable data are available from previous studies.

- work full-time as opposed to part-time some 5-17% more

This finding was evident in reanalyses of two national longitudinal data sets. Findings from previous research are not inconsistent with this result of our reanalysis, but no direct comparisons are available because of the lack of disaggregation of results by sex-race-vocational specialty groups in previous research on this outcome measure. Nevertheless there is some indication from both our own reanalyses and previous research that the full-time employment advantage of white female commercial graduates may diminish with increasing years after graduation.

- work 3-6 weeks more per year

This finding was apparent in both descriptive analyses of two national data sets and regression analyses of the NLS-72 data set. The results of a recent regression study, in which both the curriculum self-report and amount of commercial coursework were used to define vocational education participation, support this finding on a similar group with exactly twelve years of schooling.

- earn some \$10-20 more per week

Again this finding was apparent in both descriptive reanalyses and regression reanalyses and the difference is maintained even after adjusting for hours worked per week. Findings based on previous descriptive analyses are not as clear; however, the results of two recent regression studies on similar groups with exactly twelve years of schooling support this finding. Inconsistencies in previous descriptive and regression analyses may be due to: (1) different population definitions (e.g., combining results for individuals with exactly twelve years of schooling and with some postsecondary education); (2) different definitions of vocational education participation; or (3) lack of disaggregation by major vocational specialty areas.

- be employed some 12-37% more in clerical jobs

This finding was apparent in descriptive reanalyses of two data sets. In contrast white female general graduates tend more often to be employed in unskilled service jobs. Past research on one of these same data sets similarly showed larger percentages of female commercial graduates than general graduates employed in clerical positions.

- have jobs with Duncan SEI scores some 7-17 points higher

This finding was apparent in both descriptive and regression reanalyses. There appears to be a tendency, however, for SEI score differences to diminish from some 10 to 17 points at job entry to only 7 to 10 points at four years after graduation. Previous research, though scanty, also shows commercial graduates with exactly twelve years of schooling having higher occupational status (Bose) scores than general graduates.

Black Female Commercial Graduates. Data on blacks were more scanty than for whites. Outcome differences for black females were less widely apparent in the available data than for white females but where evident, tended to parallel those for white females. Specifically, in comparison with black female general graduates, black female commercial graduates were found to:

- work 0.5-3.5 more hours per week

As with white females the hours worked per week difference for black female commercial graduates tended to be greater at job entry (2.6 hours) than at the four-years-after-graduation time point (0.4 hours). No directly comparable data are available from previous studies.

- work 5-8 weeks more per year

This contrast was apparent in both descriptive reanalyses and regression reanalyses. There was no indication in these regression results that this outcome difference tended to diminish with increasing years after graduation. The results of previous regression studies offer no clear-cut support.

- earn \$15-30 more per week

This finding was apparent in both descriptive analyses and regression analyses. Outcome differences tended to diminish slightly from one to four years after graduation (from \$19 to \$15 after controlling for hours worked per week). The results of previous regression studies offer no clearcut support.

- be employed some 35-40% more in clerical jobs

- have jobs with Duncan SEI scores 8-16 points higher

Unlike the case for white females, the introduction of SES into regression analyses for black female commercial graduates did tend to reduce the magnitude of contrasts on the SEI outcome variable. In part, this is because for black females, unlike white females, those enrolled in commercial-business vocational programs tend to have higher SES than those in the general program. However, both the regression reanalyses based on curriculum self-reports and course transcript data showed significant differences from job entry to four years after graduation.

For the other four categories of gainful employment outcomes -- namely, employment related to high school training, employer satisfaction, self-employment, and job satisfaction. -- no similarly strong differences associated with graduation from a commercial program were apparent for females -- though it is worth noting that 50% of female graduates (both white and black) of commercial-office programs were found to be employed in jobs related to their secondary vocational training at entry and one year after high school graduation.

In summarizing evidence concerning positive gainful employment outcomes associated with females' participation in secondary vocational education commercial programs, we hasten to emphasize that this evidence should not be taken to mean that other secondary vocational specialty programs show any greater or lesser outcomes for females. The commercial specialty was simply the only occupational category for females represented by a sufficient number of cases to permit analysis. Also, although gainful employment advantages for female commercial graduates were apparent as long as four years after high school graduation, there appears to be a tendency, particularly for white females, for advantages to diminish in magnitude with increasing years after high school graduation.

We should note that while a variety of positive employment outcomes for females both black and white are associated with graduation from commercial programs, these results may not be viewed altogether positively by all, for it is clear that such outcomes derive largely from these young women's employment in clerical jobs. To some, this might be viewed as a sex-role stereotyped occupation, and in this regard it is worth noting that in the past vocational education, and in particular, patterns of male and female enrollment in occupational specialty areas, has been criticized for enhancing sex-role stereotyping. In our own view negative aspects of sex-

role stereotyping are certainly to be condemned, but we note that the main alternative to employment in clerical jobs, at least as represented in the contrast group employed in our study (namely, secondary general graduates without postsecondary schooling), is work in unskilled jobs. In light of this contrast, it seems to us that the apparent positive outcomes associated with females graduating from secondary commercial programs cannot and should not be dismissed merely as representing sex stereotyping.

Males. Outcome differences were less widely apparent for male than for female vocational graduates. The only cases in which consistent significant differences were found for male trade and industry or business graduates in comparison to general graduates were the following:

- white male T&I graduates tend to be employed 2-3 weeks more per year

This trend is apparent in both descriptive analyses and regression reanalyses based on curriculum self-reports, though the difference appears to be greater in the first year after job entry than four years or more after job entry. No support for this trend is provided either by regression reanalyses based on course transcript data or by previous regression studies.

- white and black male graduates of T&I programs tend overall, but not without exception, to earn slightly more per week

Both descriptive analyses and regression analyses indicate that black males graduating from T&I tend to earn slightly more (\$5-30) per week than their general program peers, but descriptive contrasts in this regard are not altogether consistent in direction, nor are regression results always statistically significant. Previous regression studies provide support for this finding for black male T&I graduates.

While the results from descriptive analyses and regression reanalyses based on curriculum self-report were inconsistent, sufficient consistency was found in the results from regression reanalyses based on T&I-industrial arts coursework and previous regression studies to indicate that this pattern may hold for white male T&I graduates as well.

- white male graduates of business programs tend to go into jobs having very slightly higher (1-5 points) Duncan SEI scores

The magnitude of differences in this regard were not large in either descriptive analyses or regression reanalyses but they were consistent in direction. Moreover, previous regression studies provide support for this finding.

Beyond these results, for which we found at least some consistency across analyses based on different data sets across time after high school graduation or between our own results and previous research, other measures of gainful employment for males showed no clear outcome differences associated with participation in secondary vocational education. Specifically, for both blacks and whites, differences tended to be small and inconsistent in direction across either data sets or time points after graduation for the following outcome measures for males:

- Labor force participation rates
- Unemployment rates
- Number of weeks of unemployment in previous year
- Number of spells of unemployment in previous year
- Hours worked per week
- Full-time versus part-time employment
- Number of weeks worked in previous year
- Percentage employed in skilled jobs.

Also, for four other types of outcomes measures of gainful employment no clear results were apparent for males. With respect to whether jobs at entry and one year after graduation are related to the vocational training received in high school, results appear to vary substantially depending on whether general subjective assessments of relevance are used, or whether relevance is determined by using standard education-occupational matching codes. Nevertheless it is worth noting that when the latter approach is

used, white male graduates of T&I programs appear to enter jobs for which their secondary training was relevant in roughly the same proportion (i.e., circa 50%) as for female commercial graduates, but for males this does not appear to translate as much as for females into gainful employment outcome advantages.

Regarding employer satisfaction, self-employment and job satisfaction of vocational graduates, we conclude in summary that no differences between outcomes for male vocational and general graduates are apparent. It should be noted, however, that in large measure the lack of clear conclusions regarding differences associated with employer satisfaction and employee satisfaction stems from two factors extraneous to the nature or quality of high school programs; namely, the lack of research data on these outcomes and the ambiguities inherent in trying to interpret the data that are available.

With regard to the largely inconclusive results pertaining to male graduates of secondary vocational programs, two caveats are warranted. First, for males we have no direct evidence on occupational specialties other than T&I and business. Hence, it should be noted that we have no direct evidence on outcomes associated with participation in other occupational specialty programs by males. Second, it should not be concluded from the evidence summarized thus far that secondary vocational education programs are necessarily more effective for females than for males. The pattern of results presented depends not only on the quality of vocational education programs but also on the quality of available evidence and the structure of labor market and other opportunities for male and female

high school graduates. Thus the relatively positive employment outcomes apparent for female commercial graduates, in contrast to the essentially null results for male T&I and business graduates, may result from a variety of factors. To make this point clear, let us briefly describe two alternative explanations. First, regarding quality of evidence, it may be that the "commercial" program for females represents a more unitary program than the rubrics of T&I and business for males. If this is so, it may be that outcomes for males associated with different types of T&I and business programs tend to average out when treated together. Second, the apparently more positive results for females may be an indirect reflection of the fact that for whatever reasons (e.g., disinterest in employment, job employment discrimination, homemaking), substantially lower proportions of female than male high school graduates are in the labor force.*

Nevertheless, one final ambiguity remains with respect to the overall results for males and females. They are based almost exclusively on comparisons between general students and vocational specialty students identified in terms of students' self-reports. It will be recalled that previous research indicated that considerable caution should be exercised in relying upon such self-reports as valid measures of student participation in vocational education. Therefore, in the one data set where high school course information was available (namely, NLS-72), we sought to check how results based on student self-reports compared with results based on high school coursework. To do this we conducted three different types of regression analyses using data on semester courses taken during high school in various areas. Regressions were conducted for three time points, namely, entry,

* See Tables 4.1.1 and 4.1.4.

one year, and four years after high school graduation. These were conducted on the four gainful employment outcome measures which showed the largest outcome differences associated with self-reported vocational specialty; namely, hours worked per week, weeks worked in previous year, weekly earnings, and Duncan SEI. In the first two types of regression analyses, we found that addition of course data to regressions based on self-reported high school program changed vocational specialty-general curriculum contrasts very little. These results were both unanticipated and perplexing for if amount of vocational coursework does not explain outcome differences associated with self-reported participation in the major vocational specialties, it raises the question of what such outcome differences really do represent. Thus, we tried a third set of regression analyses in which self-reported high school curriculum was simply excluded and which were based exclusively on course data. In these analyses, using NLS-72 data, employment outcomes were simply regressed on vocational course data (together with individual SES information). Specifically entered into these regressions were numbers of semester courses in areas corresponding to the major vocational specialty areas, namely, business, commercial, T&I, and industrial arts. We found that relatively few of the regression coefficients for vocational coursework reached the .05 level of statistical significance, specifically, only about one in five. Moreover, around one third of the significant regression coefficients were negative, meaning that taking more vocational coursework was associated with lower employment outcomes. In other words, the clear implication is that high school vocational coursework is very weakly associated with employment outcomes. In only three rough respects did the results of these vocational coursework regression analyses parallel the results of analyses based on

self-reported vocational specialty. First, for white females, coursework in business and commercial courses was associated with slightly higher number of weeks worked in the previous year. Second, for both black and white females, coursework in business and commercial courses was associated with slightly higher weekly earnings. Third, for both black and white females, business and commercial coursework was associated with slightly higher Duncan SEI scores. Nevertheless, the magnitude of differences apparent in the coursework regression analyses, even when estimated on the basis of the total number of vocational courses in terms of which self-reported vocational and general students tended to differ, was substantially smaller than differences associated with self-reported vocational specialty. This clearly indicates that high school vocational coursework explains very little of the gainful employment outcome differences associated with self-reported high school curriculum.

Why this is so remains a puzzle to us. We did not have time nor resources to study the relationship between course transcript data and student self-reports of high school curriculum programs as fully as we would have liked, and hence have no clear answer to the question of why self-reports of vocational program participation appear more strongly related to gainful employment outcomes than does vocational coursework. Nevertheless, let us briefly describe three broad hypotheses which may explain this puzzle. The three hypotheses pertain to: 1) the quality of self-reports; 2) the quality of course transcript data; and 3) the relative responsiveness of the labor market, that is potential employers, to course information and self-reports.

As noted in section 3.1, previous research clearly raises questions about the reliability of individuals' self-reports of high school curriculum programs, particularly when such reports are retrospective rather

than current. Unreliability in self-reports might explain the slight relationship noted in Chapter 3 between course data and self-reports of high school curriculum program (though it is worth reiterating that the relationship between courses and self-reported curriculum program is stronger when occupational specialities are considered separately, instead of lumping them all together in a general "vocational education" category). Nevertheless, unreliability of self-reports of vocational program participants does not explain why they appear to be more strongly related to gainful employment outcomes than vocational course transcript data.

A second possible explanation of this finding is the quality of the transcript data themselves. As far as we know, no reliability studies were ever performed on the NLS-72 course data, but it seems plausible that these data are not altogether reliable. Also, these data may simply have been coded at such a general level of specificity that they do not well represent the differential experience of vocational and general program students. This possibility is clearly suggested by the work of Cook and Alexander (1980). As described in section 3.2, using detailed course information (68 different subject matter areas), these investigators were able to predict the curriculum program of high school students as academic, general and vocational in nearly 80% of the cases studied. This clearly suggests that coursework information more detailed than that available in the NLS-72 data set (which differentiated courses into only fourteen different types) might reveal a stronger association with both student self-reports of high school program and subsequent employment outcomes.*

* Oakes (1981) in a recent paper makes a similar point about the need for detailed course information in studying high schools. Oakes showed that, on the basis of the number of courses offered by general categories, no differences in the vocational program course offerings were found among 25 secondary schools; however, in analyses by specific course content and format (e.g., regular or extended time periods; conducted in or off site), distinct differences were found among vocational programs within and among these schools.

Yet beyond these hypotheses regarding quality of self-reports and course information there is a third hypothesis, which we suspect may better explain why self-reports of vocational education participation are more strongly associated with employment outcomes than are high school course data. This hypothesis has to do with the criteria in terms of which employers decide whether or not to hire individuals. In general, employers, in making hiring decisions, may take a variety of information into account, including personal characteristics, skills, possession of a high school diploma, high school record (including courses taken), and personal references and connections. The exact balance of attention given to such information is unclear, but it seems likely that employers generally pay less attention to records and high school courses taken than to more general and obvious characteristics such as high school diploma, personal characteristics, and self-reported high school program. In other words, regardless of the exact relationship between courses taken and self-reported high school program, the labor market may simply be more responsive to the latter than the former. Although there is little general evidence available on this issue, at least some studies on the labor market for young male high school graduates are consistent with this hypothesis (Osterman, 1980). Also, this general issue, namely, the responsiveness of the labor market to various different characteristics of potential employees may help to explain why graduation from commercial vocational programs by females is more strongly associated with positive labor market outcomes than is graduation from business or trade and industry programs by males. Thurow (1979), for example, has argued that in general the youth labor market is

responsive not so much to individuals' possession of particular skills as to apparent trainability and work habits of potential employees. One exception to this general pattern which he notes is typing skills. It may be that the labor market is more responsive to some skills (e.g., typing) than to others (e.g., auto repair) because it is far easier for employers to test potential employees for some skills than for others. It is, for instance, far easier for a potential employer to give an applicant a 20-minute typing test than to test individuals on skill in auto repair or other skills acquired by males in trade and industry programs.

This discussion has been somewhat speculative, so in closing this summary of findings regarding gainful employment outcomes associated with secondary vocational education, let us return to our primary question. Putting aside the various uncertainties outlined about the responsiveness of the labor market to various characteristics of potential employees and in light of results of our literature review and reanalyses based both on student self-reports and on the NLS-72-transcript data, does secondary vocational education make a difference in gainful employment outcomes? Our best answer to this question is the following: For females, participation in commercial-business vocational programs, in contrast to general high school programs, appears to be related to higher employment opportunities as indicated in terms of weeks worked per year, weekly earnings, and Duncan SEI. For males, both black and white, participation in the two major high school vocational areas, namely, business and trade and industry, is not clearly and consistently associated with most indicators of gainful employment. In other words, evidence indicates that on the whole male vocational graduates fare no better or worse than male general graduates.

8.5 Other Outcome Variables Associated with Participation in Vocational Education

In this section we discuss available evidence concerning four other types of intended outcomes of secondary vocational education programs, namely:

- occupational knowledge and skills
- occupational advancement,
- years of secondary school attended, and
- citizenship.

Evidence concerning these outcomes was drawn from our three general sources of evidence, namely, non-national studies, previous national studies, and reanalyses of national longitudinal data sets.

Occupational Knowledge and Skills. Available evidence on the occupational skills and knowledge attainment of secondary vocational students is meager. Indeed, data on occupational skills are so meager as to preclude any unqualified overall conclusion. The situation regarding occupational knowledge is only slightly better. Recent national data suggest a very slight tendency for vocational students to have more knowledge of occupations (specifically to be able to identify correctly the duties of selected occupations) than general program high school students. However, it should be stressed that high school program differences in this regard (1) tend to be very slight; (2) have not been adjusted for variables such as SES which might help explain variation; and (3) in any case are considerably smaller than apparent race differences associated with occupational knowledge.

Occupational Advancement. The main problem in assessing evidence on this intended outcome is the operationalization of the construct "occupational advancement." It obviously connotes changes in occupation over time, but also implies not just change, but change in a positive direction. It

is possibly because of problems in measuring such a construct that relatively little previous research appears to have been conducted on this intended outcome of vocational education. Since there is no widely agreed upon measure of this construct, we simply used the measure of this construct employed in the only relevant studies previously reported; namely, changes in Duncan SEI scores over time. While the crudeness of this measure as an indicator of "occupational advancement" certainly should be kept in mind, the findings suggest that while vocational graduates show no greater occupational advancement than general graduates, neither do they show any less. This rough equality in the advancement measure between vocational and general program graduates stands in contrast to apparent differences associated with race and sex. Specifically, in the first year after high school graduation females show greater advancement on average than males, but in the interval between the first and fourth years after high school graduation, males tend to show greater advancement in terms of Duncan SEI scores. Also, black males tend to show lower rates of advancement than white males, though black females show rates of advancement equal to or slightly higher than those of white females. These findings regarding males are notably consistent with Osterman's (1980) recent work on the structure of the youth labor market. Focusing exclusively on young males who enter the labor market immediately after high school graduation, and drawing on a variety of types of evidence, Osterman argues that upon initial labor market entry male youth often undergo a period of employment instability, a period of settling down, and because of this "there is little relationship between first job after school and later

jobs" (p. 154). The greater advancement in SEI scores for females than for males in the first year or so after high school suggests, however, that this pattern may not hold for young females as much as for males. If this is so, it provides another possible explanation for why we found different outcome results for females than for males. The hypothesis is simply that while males tend to undergo a period of employment instability after high school graduation, females upon entry into the labor market after high school graduation tend not to undergo such a period of employment instability, but instead more often enter jobs which they continue for longer periods of time.

As one possible mediator of future occupational advancement, we also examined participation in on-the-job training programs and apprenticeships. No differences in training program patterns were associated with participation in secondary vocational or general programs. Graduates from both curricula appear to have the same opportunity for such training. Again, in contrast to this rough equality between curricula within sex-race groups, differences in training were associated with race and sex, specifically with males tending to receive more on-the-job training than females, and white more than blacks. This finding may help to explain why males after the initial year or two of job entry tend to show more occupational advancement than females (as measured in terms of SEI changes)--namely, their apparently greater opportunity for on-the-job training and apprenticeships may lead to greater advancement in the longer run, even though it may entail some short-term sacrifice in terms of advancement. Also, as already discussed in section 5.2, it is reasonable to hypothesize

that the greater frequency of on-the-job training and apprenticeship experiences for males is due to the greater frequency of such opportunities in industrial and unionized jobs in which males tend to be employed, as opposed to office and clerical jobs in which female high school graduates are more often employed.

Years of Secondary Schooling Attained. Another intended goal of vocational education is that it should help increase the "holding power of the schools," that is, it should help retain students in high school who otherwise would drop out of school before high school graduation. There are three major problems in examining this proposition. First, deriving precise estimates of dropout rates for participants in different high school programs requires longitudinal studies tracing individuals in different programs between say, grade 10 and high school graduation. Unfortunately most of the available data bearing on the issue of dropouts is only cross-sectional, comparing, for example, the last high school curriculum program of high school graduates and early leavers. Second, even for longitudinal studies that are available (e.g., Grasso and Shea, 1979b), results are ambiguous because of non-response problems--it is not known whether non-respondents did not answer survey inquiries because they had dropped out of school or for other reasons. Third, precise answers to the question of dropouts of different high school programs would require taking into account the yearly enrollment changes of students between different programs while still in high school (for example, from general

programs into vocational programs and vice versa). None of the available research deals adequately with these three major problems. Nor were we able in reanalyzing YA data in cross-sectional fashion to solve these problems (the NLS-72 data, since it was initially gathered on high school seniors, is drawn almost exclusively from high school graduates). Nevertheless, available evidence in terms of both previous research and our own reanalyses is consistently consonant with the proposition that secondary vocational education does have somewhat lower dropout rates than secondary general programs. Though specific evidence on the question is very scanty, it should also be noted, however, that previous research on dropout rates and other outcomes as well, both suggest that dropout rates may vary as much between specialty areas within vocational education, as between secondary vocational and general programs overall.

Citizenship. Vocational education has also long been viewed as promoting citizenship among its participants. The major problem in assessing the extent to which this intention has been met is finding appropriate indicators of citizenship. To the extent that this intended outcome has been studied at all, it has been examined in past research in terms of voting behavior. These data showed no significant differences in voting behavior between vocational and nonvocational graduates who had no postsecondary schooling. Reanalyses of two NLS-72 survey questions pertaining to voting and registering to vote similarly showed no significant curriculum differences. Even if they had, it would seem unwarranted to us to draw broader conclusions about the relative efficacy of different high school curriculum programs in preparing individuals for citizenship on the basis of voting behavior, since citizenship surely involves far more than merely registering to vote or voting.

8.6 Description of Postsecondary Vocational Education Participants

If we conclude that some forms of secondary vocational education are widely associated with at least some gainful employment outcomes, what can we say about postsecondary vocational education? Before discussing our findings in regard to this question in the next section, in this section we first review and discuss what we learned about who goes into postsecondary vocational programs and how they gain entrance into such programs.

One aim of federal support for secondary vocational education is that it should help prepare students for advanced vocational training at the postsecondary level. In previous literature we could find no evidence on admissions requirements set out by postsecondary institutions offering vocational education programs. Therefore, we undertook a survey of a national random sample of accredited postsecondary vocational schools, technical institutions and junior and community colleges presumed to offer vocational programs below the baccalaureate level. From this survey, we found that the vast majority of such schools require only a regular high school diploma or an equivalency degree for admissions. Most such schools offering postsecondary vocational programs do not have specific course requirements either for general admissions or for admission to broad programs of study. In cases where courses are required, they tend to be academic high school courses rather than technical or vocational courses. It thus appears that technical or vocational coursework prerequisites for admission into advanced technical programs typically can be fulfilled

after entry into such postsecondary institutions and need not necessarily be met at the secondary level. From these findings, we conclude that secondary programs providing students with nothing more than a high school diploma generally meet the congressionally specified goal for secondary vocational programs to prepare individuals for postsecondary education for careers "requiring other than a baccalaureate or advanced degree," at least in that high school diplomas are the only credential generally required for admissions into institutions offering such postsecondary education programs.

When we excluded high school graduates apparently pursuing baccalaureate programs, we found that roughly equal percentages (about 45%) of public high school vocational and general graduates of 1972 pursued postsecondary education below the baccalaureate level. There was, however, a somewhat greater tendency for vocational graduates to pursue postsecondary vocational as opposed to postsecondary academic programs. Most of those enrolled in postsecondary programs within the first two years after high school graduation were enrolled full-time. This was true for both general and vocational graduates, though there was a tendency for the former to more often attend four-year colleges, while those pursuing postsecondary vocational programs tended more often to do so in vocational-technical postsecondary institutions. Among postsecondary vocational enrollees, males tended to specialize in mechanical and engineering technology programs (54 to 61% across different groups) whereas females tended to specialize in the office and clerical area (34 to 57%) and in health services (14 to 26%). Among postsecondary vocational enrollees generally, some 40-50% report

earning a certificate, license or 2- or 3-year degree within roughly two years of high school graduation. In recounting these results from the NLS-72 data set, we should point out that the categories used in the NLS-72 survey to describe postsecondary vocational occupational specialties are different from those used more recently by the National Center for Educational Statistics in describing postsecondary vocational enrollments. For this reason, and also because of small sample sizes available, and the large number of postsecondary enrollees who did not report their program of study, we did not attempt to reanalyze NLS-72 data separately by particular specialty areas.

Before conducting analyses on gainful employment outcomes of postsecondary vocational education participants, we first compared them with other groups in terms of both SES and test scores. Specifically, we compared groups of individuals separately by sex-race group, having different combinations of secondary (vocational or general) and postsecondary (none, academic, vocational, or some but unspecified as to type) schooling. We found that differences in SES scores across the secondary-postsecondary groups to be quite small (generally a quarter of a standard deviation or less) although race differences were substantial (about a half-standard deviation in SES between blacks and whites). In terms of test scores, there was a slight tendency for high school general graduates to score higher than high school vocational graduates (except for black females, for whom this pattern was reversed) and for those in postsecondary academic programs to score slightly higher than those in postsecondary vocational programs. Though differences were slight in magnitude, this pattern was evident for both the reading and math test scores available in the NLS-72 data set.

We found also that patterns of postsecondary attendance corresponded at least roughly with plans expressed for postsecondary education while in high school of those who went on for postsecondary education: some 62-87% had expressed plans for doing so, while of those who did not go on for postsecondary schooling, some 26 to 50% had indicated plans. Individuals with such unfulfilled plans tend more often to be blacks than whites. Within the sex-race groups, equivalent percentages of high school graduates from vocational and general programs had not pursued their plans. Reports of applying to postsecondary schools suggested that one proximal cause for unrealized plans was simply that many individuals with plans for postsecondary schooling had often not applied for such schooling. There was, however, no marked difference between vocational and general program graduates in the extent to which they pursued their plans by applying to one or more postsecondary institutions. Reports of admissions among those who had made applications indicated that the vast majority of those who applied to postsecondary institutions were accepted by at least one institution. Overall these data suggest that inability to gain admissions is not a prime reason for high school vocational education graduates who would like to pursue postsecondary education to fail to do so -- a finding which parallels our survey finding that the only credential generally recognized for admission to institutions offering postsecondary education below the baccalaureate level is a high school diploma.

8.7 Gainful Employment Outcomes Associated with Participation in Postsecondary Vocational Education

If gaining admission into postsecondary vocational programs is fairly easy, and since substantial numbers of high school graduates do proceed to take postsecondary education, both academic and vocational, below the baccalaureate level, the natural next question is whether such advanced education makes a difference. We examined this question in terms of a variety of gainful employment outcomes. Although the available evidence, in terms of both our reanalyses and previous literature, is relatively meager, this is what we found. In comparison to public high school graduation without postsecondary education, participation in postsecondary education below the baccalaureate level does appear to be associated with several kinds of gainful employment advantages, including lower unemployment and higher occupational status. However, available evidence also suggests that employment advantages associated with postsecondary education below the baccalaureate level are not as great as, or at least are no greater than, those associated with college graduation. In previous literature these two facts have been interpreted in different ways. Some researchers apparently hold that the standard of comparison for postsecondary vocational education ought to be college graduation. However, others more often use high school graduation as a standard of comparison. The apparent outcomes associated with postsecondary vocational education clearly tend to differ depending upon which comparison is used.

In our view, the more appropriate standard of comparison is other forms of vocational education below the baccalaureate level. Using this basis of comparison, evidence concerning gainful employment outcomes

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associated with postsecondary education is mixed, with some comparisons suggesting advantages to postsecondary vocational education, and others suggesting advantages to postsecondary "academic" education below the baccalaureate level. Previous research concerning postsecondary vocational education is similarly mixed indicating employment advantages for some kinds of postsecondary vocational education (e.g., secretarial training) but no advantages for other kinds. Such findings clearly suggest that employment outcomes vary as much between different kinds of postsecondary vocational education as between vocational and nonvocational postsecondary education below the baccalaureate level. In this regard, it is worth noting that postsecondary vocational education appears to be even more diverse than secondary vocational education in terms of both types of institutions in which it is offered (Wulfsberg, 1980, p. 580) and enrollment in different occupational specialty areas (Ibid., p. 582). In the latter regard, fully two thirds of secondary level enrollments in 1978-79 were in just two program areas (office-occupations and trade and industrial) whereas of the postsecondary level, only slightly more than 50% of postsecondary enrollments were in these two program areas. More fundamentally, the distinction between vocational and nonvocational education seems far less clear at the postsecondary level than at the secondary level. While postsecondary vocational education aims at preparing students for gainful employment above unskilled levels, so does "nonvocational" postsecondary education below the baccalaureate level. Given such a blurring of vocational and nonvocational education at the postsecondary level, it seems hardly surprising that postsecondary vocational education leads to no clearcut employment advantages in comparison to "nonvocational" postsecondary education.

8.8 Does Vocational Education Make a Difference?

Putting aside for the moment the numerous caveats and uncertainties which we have previously pointed out concerning available evidence, how can we in conclusion answer the question in the title of this report: Does vocational education make a difference?

Our overall answer to this question is a qualified yes. Evidence indicates that some forms of vocational education for some types of students are associated with a variety of gainful employment advantages. Such advantages were most widely apparent in evidence concerning females, both white and black, who graduated from high school commercial-business programs and did not go on for postsecondary education. For this group, participation in vocational education, whether identified in terms of self-reports or in terms of high school coursework in business and commercial areas, appears to significantly enhance employment opportunities for as long as four years after high school graduation, as indicated by the socioeconomic status of jobs held by graduates, the number of weeks worked per year, and weekly earnings. These advantages appear to be closely associated with the fact that female graduates of high school business-commercial programs frequently enter clerical jobs. This result might, of course, be viewed as a sort of sex-role stereotyping, a channeling of young women into traditionally female occupations. Obviously such an interpretation would not necessarily be viewed as a positive outcome for vocational education. Hence, it is worth noting that the main alternative to such clerical employment for female commercial graduates, at least as represented in the employment patterns of female general program graduates, appears to be unskilled jobs. Thus,

in our view, the gainful employment advantages associated with females' graduation from secondary commercial programs should definitely not be dismissed as mere sex-role stereotyping.

Evidence concerning gainful employment outcomes associated with participation in secondary vocational education programs by males is far less consistent. In analyses based on student self-reports or in terms of high school occupational coursework, white male graduates of business programs tend to go into jobs with slightly higher status, and both white and black male graduates of trade and industry programs tend to earn very slightly more than comparable graduates of high school general programs who do not go on for postsecondary schooling. But on other gainful employment outcome measures, such as unemployment rates, hours worked per week and weeks worked per year, there appeared to be essentially no differences between male graduates of high school trade and industry and business programs on the one hand and male general graduates on the other.

On other outcomes associated with participation in secondary vocational education evidence was, overall, similarly spotty. Secondary vocational education programs generally appear to prepare students with the credentials necessary for advantaged education below the baccalaureate level, if for no other reason, because the only prerequisite typically required by postsecondary institutions offering such programs is the high school diploma. In this regard, another apparent outcome of secondary vocational education is that it may help keep students in high school who would likely drop out of school if vocational education programs were not available. Evidence in this regard is not of terribly high quality, but the preponderance of

evidence that is available is consistent with the proposition that vocational education at the high school level does help to keep students in school who otherwise would drop out. Though evidence on the holding power of secondary vocational programs is very limited, this sort of consequence, namely, keeping students in school who otherwise would drop out, may be one of the most important outcomes of vocational education, for we found that early high school leavers do less well on a variety of employment indicators than high school graduates.

Evidence concerning occupational knowledge and skills, occupational advancement, and citizenship suggests that no clear differences are associated with participation in secondary vocational education as compared with secondary general programs. This essentially null result overall may, however, be due as much to the quality of available evidence as to the quality of vocational education offerings at the secondary level.

Regarding postsecondary education, we found that substantial proportions of secondary vocational education graduates do go on for some form of postsecondary schooling. Using data on the high school class of 1972, we found that around 50% of vocational graduates go on for some form of postsecondary schooling within four years of high school graduation. Gaining admission into postsecondary schools does not appear to be a significant impediment to attendance, for we found that among those who applied for admissions virtually all reported being accepted by at least one institution.

Data on postsecondary vocational education as opposed to other forms of postsecondary education below the baccalaureate level were fairly meager.

In general we found that postsecondary education below the baccalaureate level is associated with employment advantages as compared with high school graduation without postsecondary schooling. However, we found no clear evidence that postsecondary vocational education, as compared with postsecondary nonvocational programs below the baccalaureate level, was associated with any employment advantages. However, some evidence does suggest that, as was indicated at the secondary level, outcomes may vary as much between different kinds of postsecondary vocational education as between vocational and nonvocational postsecondary education below the baccalaureate level.

In offering this overall summary, we nevertheless wish to stress the fact that different answers to the question of whether vocational education makes a difference are easily attainable depending on the extent to which vocational specialty programs are considered separately by different kinds of individuals and depending on the standard of comparison used in drawing inferences about any differences. On the first point, we have repeatedly found at both the secondary and postsecondary levels of education, that evidence on outcomes associated with vocational education leads to different answers depending on whether the vocational specialty areas are treated separately. When the specialty areas are not disaggregated, the evidence frequently suggests no advantage to participation in vocational education; in contrast, the evidence tends to point to advantages for different kinds of individuals when particular vocational specialty areas are considered separately.

On the second point, the standard of comparison used in our effort to piece together evidence on outcomes associated with vocational

education has been nonvocational programs at comparable educational levels, that is, general high school programs at the secondary level and "academic" programs below the baccalaureate level at the postsecondary level. However, other standards of comparison easily could lead to different answers. If one compared outcomes of vocational education with those of individuals having fewer years of schooling, a less qualified answer to our overall question would be in order. Specifically, at both the secondary and postsecondary levels, vocational education generally appears to be associated with noteworthy employment advantages over those who do not have similar levels of education, that is, those who do not graduate from high school or those with no postsecondary schooling.

Nevertheless, we should also point out that from another perspective, the advantages associated with participation in vocational education are fairly limited. Specifically, even the relatively strong employment advantages associated with females' graduation from high school commercial programs still leaves them, on average, earning some 10-30% less than male graduates of high school commercial-business programs. In other words, even though some employment advantages are associated with participation in vocational education, they apparently are not sufficient in magnitude to eliminate some of the labor market inequities associated with sex or race. Obviously, vocational education cannot be expected to eliminate such inequities, but the contrast makes clear the fact that employment outcomes associated with vocational education are fairly modest in comparison to differences associated with sex and race.

8.9 Remaining Questions

As the last section implicitly suggests, we have in conclusion been able to derive only the broad outlines of an answer to the question of whether vocational education makes a difference in employment and other opportunities of individuals who participate in it. In reviewing available evidence we have also tried to determine major sources of uncertainty which suggest avenues for future inquiry. While in the text of this report, we have suggested numerous questions worthy of additional research, in this concluding section we point attention to the six general issues which seem to us as most worth scrutinizing more closely.

Do the advantages of female graduates of secondary commercial programs persist beyond four years after high school graduation? Perhaps the single clearest finding of our study has been that in comparison to general program completion, graduation from a secondary commercial program is associated with a variety of employment advantages for females, both black and white, for as long as four years after high school graduation. Nevertheless, data also indicated that some advantages appeared to decrease between the first and four year time points beyond graduation. Thus, a question of some importance is whether such advantages tend to diminish or even fade out completely beyond this period.

Do vocational programs actually increase the holding power of high schools? As we indicated in section 5.3, a variety of evidence is consistent with the proposition that dropout rates of secondary vocational education programs are lower than those of secondary general programs. However, as we also pointed out, the available evidence on this question is none too good, primarily because much of it is cross-sectional rather than longitudinal, and because it generally fails to take into account rates of transfers

between vocational, general and academic high school programs. Nevertheless, further research on this question seems to us to be quite important. For if vocational programs do help to prevent high school dropouts, this could be one of the most important consequences of secondary vocational programs. As we saw in chapter 4, early leaving at least among males is associated with a variety of employment disadvantages. In calling for further research on the dropout issue, we should note that some recent research has downplayed the significance of dropping out of high school. Jencks et al. (1979) wrote:

Our findings place a number of widespread presumptions in doubt. The most significant of these is that high school dropouts are economically disadvantaged largely because they fail to finish high school. Our results suggest that the apparent advantages enjoyed by high school graduates derive to a significant extent from their prior characteristics, not from their schooling. Unless high school attendance is followed by a college education, its economic value appears to be quite modest. (p. 189)

However, when one turns to the evidence on which this conclusion is based, one finds that even after controlling for background and test scores, the apparent occupational status and earnings advantages associated with completing twelve instead of eight years of schooling are still generally significant (on the order of 3-6 SEI points* for occupational status, and 19-40% greater earnings with the exception of one data set, see pp. 165-166; 178-9 respectively). Thus while controls, most notably for family background, do appear to diminish the apparent advantage of high school graduation, we think that Jencks et al. may overstate their own evidence on this point. Advantages associated with high school graduation remain more than insignificant even when controls are introduced. Moreover, as suggested by some of

* Only the lower figure was indicated significant (i.e., twice its standard error). The apparent reason for lack of significance was a relatively small sample size.

the data reviewed in Chapter 4, there may be other employment advantages associated with high school graduation beyond the two measures (namely, occupational status and earnings) on which Jencks et al. focus. Moreover, high school graduation is generally a prerequisite for postsecondary schooling, where returns to education may be greater. Thus, we continue to adhere to the "widespread presumption" that students are economically disadvantaged when they fail to finish high school, and thus to argue for further inquiry into the relationship between vocational education and high school completion.

What is the exact relationship between self-reports of vocational education participation and vocational course-taking? This, we think, is one of the biggest questions raised by our study, which we have been able to only partially explore. As we showed in Chapter 3, in the NLS-72 data set there is a remarkably slim relationship between self-reports of vocational participation and amount of vocational coursework. The relationship is somewhat better when the aggregate vocational group is disaggregated into vocational specialty areas, but even then, there appears to be a fairly slim relationship between vocational courses taken and self-reports. This is, of course, only one form of a much more general issue -- namely, the validity of self-reports used in much survey research. In general, we think that validity of survey self-reports is too often taken for granted, but the issue raised with respect to self-reports of vocational education participation is especially intriguing for we found that such self-reports are associated with larger employment outcome differences than is the amount of vocational coursework taken. In section 8.3, we described three broad sets of hypotheses which might explain this finding, but at present we simply have little direct evidence with which to test the validity of any of them. Also, we should note that while we have begun to

explore this issue at the secondary level, virtually no data at all have been available to address the relationship between courses and self reports of vocational study at the postsecondary level.

Are there better ways to represent "organized programs of study" in vocational education? As noted in Chapter 3, we viewed the object of our study as "organized programs of study" in vocational education. By examining amounts of coursework in vocational specialty areas, we think our research has proceeded further towards operationalization of this definition of vocational education than has most previous national research, which generally has relied either on self-reports of vocational participation on aggregate amount of vocational coursework. Nevertheless, even the taking of three or four semester courses in, say, business vocational courses, does not mean an individual is necessarily following an organized program of study. In a crude way, the distinction between occupational and nonoccupational vocational programs represents an effort to distinguish organized programs of study, from course-taking which is not. Nevertheless, it seems to us that future research would do well to seek a better means of measuring the extent to which students at both secondary and postsecondary levels are following organized programs of study in vocational education of particular types.

What factors explain the relatively large percentages of secondary vocational education graduates who go on for some form of postsecondary schooling? We found that substantial proportions of secondary vocational education graduates go on for some form of postsecondary schooling. In the NLS-72 data set, for example, it was found that around 50% of the vocational graduates of the

high school class of 1972 went on for some form of postsecondary schooling within four years of graduation. At a minimum this finding belies to the contention of some recent critics (e.g., Rosenbaum, 1976) who have suggested that secondary vocational education (and indeed nonacademic secondary programs generally) represent dead-end educational opportunities. At the same time, however, the fact that large proportions of secondary vocational education appear to be going on for postsecondary education raises questions about the traditional relationship between secondary and postsecondary education. Traditionally, secondary vocational programs have been viewed as terminal, beyond which individuals enter into the job market or family life, but do not pursue further formal education. The fact that nearly half of secondary vocational graduates now appear to be pursuing advanced education clearly raises questions about why individuals who have completed vocational programs and presumably could enter the labor market instead are seeking advanced education. Is it because of a lack of available jobs, feelings of insufficient training at the secondary level, strivings for upward mobility via increased education, or what? We have not addressed such questions in our report but it seems to us quite obvious that the simple fact of large large numbers of secondary vocational graduates continuing on for more education, raises important questions about how secondary and postsecondary educational program offerings can be better coordinated. We suspect that additional research into factors associated with postsecondary attendance by secondary vocational education graduates could help inform such coordination.

How can better information be acquired about vocational specialty programs? One of the most important implications of our study is that answers to the question of whether vocational education makes a difference can vary

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markedly when the different vocational specialties are considered separately. At the secondary level, we were able to consider separately only the major specialties, namely, commercial-business for females and males and trade and industry for males, but even these distinctions made it clear that different specialties can be associated with markedly different outcomes. Thus it seems to us that one clear priority for future research on vocational education is to acquire better and more detailed information on particular vocational specialty programs and the experiences of students in these different specialty programs.

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APPENDIX A-1. NLS-72: DESCRIPTION OF NLS-72 SAMPLE/POPULATION FORMING BASIS OF HURON ANALYSES

Table

- 1.1 Record of Cases Deleted from Public Use File in Constructing Huron Study Analysis File
- 1.2 Description of Grand Total Sample (Unweighted) by Curriculum Classification and Sex-Race Groups
- 1.3 Description of Population (Weighted Sample) by Curriculum Classification and Sex-Race Groups
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- 1.6 Description of Subsample (Unweighted) Who Were Employed as of Four Years out of High School by Curriculum Classification and Sex-Race Groups
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- 1.8 Description of Subsample (Unweighted) Who Had Course Transcript Data by Curriculum Classification and Sex-Race Groups
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- 1.10 Description of Subsample (Unweighted) with No Postsecondary Education (12 Years Exactly) as of Four Years out of High School Who Had Course Transcript Data by Curriculum Classification and Sex-Race Groups
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- 1.14 Description of Subsample (Unweighted) Who Were Both Employed as of Each Time Point and Had Course Transcript Data by Curriculum Classification and Sex-Race Groups
- 1.15 Description of Subsample (Unweighted) Who Were Both Employed as of Each Time Point and Had Course Transcript Data by Educational Level-Curriculum Classification and Sex-Race Groups

TABLE A-1.1 NLS-72: Record of Cases Deleted from Public Use File in Constructing Huron Study Analysis File

Public Use File - Grand Total number of cases			22,652
<u>Deletion Stage</u>	<u>Level</u>	<u>Description of Deletion Criterion</u>	<u>No. Cases Deleted</u>
1	1	High School attended private or parochial	1,525
	2	Both self-reported high school curriculum and school-reported SRIF high school curriculum academic	5,930
	3	Race unknown or other than white or black	1,814
	4	Sex unclassified	3
	5	Self-reported high school curriculum unclassified	29
	6	Self-reported high school curriculum academic (although school-reported SRIF high school curriculum either vocational or general)	<u>1,817</u>
		Total number of cases deleted stage 1	<u>11,118</u>
		Total number of cases in Study Analysis file at end of Stage 1	<u>11,534</u>
2	1	Classified as attending postsecondary 4 years or more by 3rd follow-up	546
	1	Classified as attending postsecondary less than 4 years by 3rd follow-up but as attending full-time either fall 1974 or fall 1975 (or both)	1,704
	1	Not able to classify postsecondary status due to nonresponse on cluster of variables used to classify postsecondary	728
	2	No postsecondary (classified as 12 years exactly) but did not respond to one of three follow-ups	256
	2	Classified as attending postsecondary less than 4 years and not attending full time either fall 1974 or fall 1975 but did not respond to one of three follow-ups	<u>730</u>
		Total number cases deleted Stage 2	<u>3,964</u>
		Total number cases in Study analysis file at end of Stage 2	<u>7,570</u>

<u>Deletion Stage</u>	<u>Level</u>	<u>Description of Deletion Criterion</u>	<u>No. Cases Deleted</u>
3	1	Adjusted student weight (W17) equal to zero ^a	<u>400</u>
		Total number of cases in Study Analyses file at end of final stage 3	<u>7,170</u>
			<u>7,570</u>

^a W17 is appropriate weight for respondents to baseyear or extended baseyear item subset and first, second and third follow-up questionnaires (see Table 7, p. 22 and pp. 8-25, Levinsohn, et al., 1978, Vol. I).

TABLE A-1.2 NLS-72: Description of Grand Total Sample (Unweighted) by Curriculum Classification and Sex-Race Groups

X3	COUNT ROW PCT COL PCT	X26					ROW TOTAL
		IGENERAL	M - BUS F - OFF	M - T&I F - H EC	REST	VOC	
		0	1	2	3		
MALE - WHITE	1	1665 61.8	141 5.2	583 21.6	307 11.4	2696 37.6	
MALE - BLACK	2	266 53.1	46 9.2	127 25.3	62 12.4	501 7.0	
FEMALE - WHITE	3	1709 52.3	1189 36.4	102 3.1	270 8.3	3270 45.6	
FEMALE - BLACK	4	340 48.7	203 29.1	61 8.7	94 13.5	698 9.7	
COLUMN TOTAL		3980 55.5	1579 22.0	873 12.2	733 10.2	7165 100.0	

NUMBER OF MISSING OBSERVATIONS = 5*

* 5 vocational who did not indicate specialty area who were pooled with "rest" vocational category.

TABLE A-1.3 NLS-72: Description of Population (Weighted sample^a) by Curriculum Classification and Sex-Race Groups

X26	COUNT COL PCT	X3				ROW TOTAL
		MALE - W HITE	MALE - B LACK	FEMALE - W HITE	FEMALE - B LACK	
GENERAL	0	1309681 60.6	35140 55.4	1288530 51.2	39598 48.6	1672949 55.2
M - BUS F - OFF	1	27130 5.3	5305 8.4	1210314 37.3	23780 29.2	1266529 21.9
M - T&I F - H EC	2	1117665 23.0	15421 24.3	18168 3.2	7212 8.8	1158465 13.0
REST VOC	3	56446 11.0	7539 11.9	46891 8.3	10924 13.4	121800 10.0
COLUMN TOTAL		510922 41.9	63405 5.2	563903 46.2	81513 6.7	1219742 100.0

NUMBER OF MISSING OBSERVATIONS = 156 (N=5)

^a Weights represent hundreds.

TABLE A-1.4 NLS-72: Description of Grand Total Sample (Unweighted)
by Educational Level-Curriculum Classification and
Sex-Race Groups

ROW COL	PCT PCT	HS GEN - HS VOC -		HS GEN - HS VOC -		HS GEN - HS VOC -		HS GEN - HS VOC -		HS GEN - HS VOC -		ROW TOTAL
		IPST NONE	PST NONE	PST ACAD	PST ACAD	PST VOC	PST VOC	PST MDC	PST MDC			
x3		1	2	3	4	5	6	7	8			
MALE - WHITE	1	936	552	239	76	247	215	243	190	2698		
		34.7	20.5	8.9	2.8	9.2	8.0	9.0	7.0	37.6		
MALE - BLACK	2	138	121	44	24	32	47	52	43	501		
		27.5	24.2	8.8	4.6	6.4	9.4	10.4	8.6	7.0		
FEMALE - WHITE	3	944	920	223	99	325	338	216	266	3272		
		28.9	28.1	6.8	3.0	10.0	10.3	6.6	6.3	45.6		
FEMALE - BLACK	4	163	180	55	41	80	85	42	53	699		
		23.3	25.8	7.9	5.9	11.4	12.2	6.0	7.6	9.7		
COLUMN TOTAL		2181	1773	561	240	655	685	553	492	7170		
		30.4	24.7	7.8	3.3	9.6	9.6	7.7	6.9	100.0		

TABLE A-1.5 NLS-72: Description of Grand Total Population (Weighted)
by Educational Level-Curriculum Classification and Sex-
Race Groups

ROW COL	PCT PCT	HS GEN - HS VOC -		HS GEN - HS VOC -		HS GEN - HS VOC -		HS GEN - HS VOC -		HS GEN - HS VOC -		ROW TOTAL
		IPST NONE	PST NONE	PST ACAD	PST ACAD	PST VOC	PST VOC	PST MDC	PST MDC			
x3		1	2	3	4	5	6	7	8			
MALE - WHITE	1	177895	107072	3726	11244	45365	39886	42716	40311	511,215		
		47.5	35.3	46.8	35.4	39.5	34.1	47.3	46.3	41.9		
MALE - BLACK	2	18084	14620	5509	2676	4210	5933	7338	5036	63,406		
		1.8	1.8	5.9	6.7	3.7	5.1	8.1	5.8	5.2		
FEMALE - WHITE	3	159631	159519	37729	18403	56211	61599	34985	36067	564,137		
		42.6	52.6	40.4	45.8	49.0	52.6	38.7	41.4	46.2		
FEMALE - BLACK	4	18800	21771	6400	4885	9033	9644	5365	5684	81,584		
		5.0	7.2	6.9	12.2	7.9	8.2	5.9	6.5	6.7		
COLUMN TOTAL		374111	302982	93354	40208	114819	117062	90404	87098	1,220,338		
		30.7	24.8	7.6	3.3	9.4	9.6	7.4	7.1			

TABLE A-1.6 NLS-72: Description of Subsample (Unweighted) Who Were Employed as of Four Years out of High School by Curriculum Classification and Sex-Race Groups

X3	X26								ROW TOTAL
	COUNT	GENERAL		M - BUS		M - T&I		RLST VOC	
	ROW COL PCT	I 0 I	I 1 I	I 2 I	I 3 I	I	I		
MALE - WHITE	1	1390	120	504	265			2279	
		61.0	5.3	22.1	11.6			42.8	
MALE - BLACK	2	196	35	103	48			382	
		51.3	9.2	27.0	12.6			7.2	
FEMALE - WHITE	3	1082	649	63	182			2176	
		49.7	39.0	2.9	8.4			40.9	
FEMALE - BLACK	4	227	150	42	67			466	
		46.7	30.9	8.6	13.8			9.1	
COLUMN TOTAL		2695	154	712	552			5323	
		54.4	21.7	13.4	10.6			100.0	

NUMBER OF MISSING OBSERVATIONS = 56

TABLE A-1.7 NLS-72: Description of Subsample (Unweighted) Who Were Employed as of Four Years out of High School by Educational Level-Curriculum Classification and Sex-Race Groups

X3	X54												ROW TOTAL
	COUNT	GEN - HS VOC		GEN - HS VOC									
	ROW COL PCT	I 1 I	I 2 I	I 3 I	I 4 I	I 5 I	I 6 I	I 7 I	I 8 I	I	I		
MALE - WHITE	1	615	461	189	66	198	156	190	157			2280	
		35.7	21.1	8.3	2.9	8.7	8.2	8.3	6.9			42.8	
MALE - BLACK	2	105	95	73	21	36	37	32	33			382	
		27.5	24.9	6.6	5.5	6.8	9.7	8.4	8.6			7.2	
FEMALE - WHITE	3	554	617	156	73	236	251	136	154			2177	
		25.4	28.3	7.2	3.6	10.8	11.5	6.2	7.1			40.9	
FEMALE - BLACK	4	109	126	35	31	56	70	28	33			487	
		22.2	25.9	7.2	6.4	11.5	14.4	5.7	6.8			9.1	
COLUMN TOTAL		1580	1319	413	191	516	544	386	377			5326	
		29.7	24.8	7.6	3.6	9.7	10.2	7.2	7.1			100.0	

NUMBER OF MISSING OBSERVATIONS = 51

TABLE A-1.8 NLS-72: Description of Subsample (Unweighted) Who Had Course Transcript Data by Curriculum Classification and Sex-Race Groups

		X26								
		COUNT	GENERAL		M - BUS		M - T&I		REST VOC	ROW
ROW	PCT				F - OFF	F - H	EC			TOTAL
COL	PCT		0	1	2	3				
X3										
1	MALE - WHITE	1592	134	555	290				2571	
		61.9	5.2	21.6	11.3				57.6	
2	MALE - BLACK	254	44	119	60				477	
		53.2	9.2	24.9	12.6				7.0	
3	FEMALE - WHITE	1626	1144	98	253				3121	
		52.1	36.7	3.1	8.1				45.6	
4	FEMALE - BLACK	325	194	58	91				668	
		48.7	29.0	8.7	13.6				9.8	
	COLUMN TOTAL	3797	1516	830	694				6837	
		55.5	22.2	12.1	10.2				100.0	

TABLE A-1.9 NLS-72: Description of Subsample (Unweighted) Who Had Course Transcript Data by Educational Level-Curriculum Classification and Sex-Race Groups

		X54																	
		COUNT	GEN - HS VOC		GEN - HS VOC		GEN - HS VOC		ROW										
ROW	PCT		PST	NONE	PST	NONE	PST	ACAD	PST	ACAD	PST	VOC	PST	VOC	P	MDC	PST	MDC	TOTAL
COL	PCT		1	2	3	4	5	6	7	8									
X3																			
1	MALE - WHITE	809	529	228	73	236	205	229	174										2573
		34.9	20.6	8.9	2.8	9.2	8.0	8.0	6.8										37.6
2	MALE - BLACK	133	114	39	22	31	44	51	43										477
		27.9	23.9	8.2	4.6	6.5	9.2	10.7	9.0										7.0
3	FEMALE - WHITE	897	881	217	95	313	324	199	197										3123
		28.7	28.2	6.9	3.0	10.0	10.4	6.4	6.3										45.6
4	FEMALE - BLACK	157	170	53	40	75	81	40	53										669
		23.5	25.4	7.9	6.0	11.2	12.1	6.0	7.9										9.8
	COLUMN TOTAL	2096	1694	537	230	655	654	519	467										6642
		30.5	24.8	7.8	3.4	9.6	9.6	7.6	6.8										100.0

TABLE A-1.10 NLS-72: Description of Subsample (Unweighted) with No Postsecondary Education (12 Years Exactly) as of Four Years out of High School Who Had Course Transcript Data By Curriculum Classification and Sex-Race Groups

		X26								
		COUNT								
ROW	PCT	GENERAL	M - BUS	M - T&I	REST	VOC	PCW			
COL	PCT	I	F - OFF	F - H	EC	I	TOTAL			
		I	0	I	1	I	2	I	3	I
X3										
1	I	899	I	67	I	286	I	174	I	1426
MALE - WHITE	I	63.0	I	4.7	I	20.1	I	12.2	I	37.7
	I		I		I		I		I	
2	I	153	I	22	I	62	I	30	I	247
MALE - BLACK	I	53.8	I	8.9	I	25.1	I	12.1	I	6.5
	I		I		I		I		I	
3	I	897	I	685	I	69	I	127	I	1778
FEMALE - WHITE	I	50.4	I	38.5	I	3.9	I	7.1	I	47.1
	I		I		I		I		I	
4	I	157	I	94	I	33	I	43	I	327
FEMALE - BLACK	I	48.0	I	28.7	I	10.1	I	13.1	I	8.7
	I		I		I		I		I	
COLUMN		2086		868		450		374		3778
TOTAL		55.2		23.0		11.9		9.9		100.0

TABLE A-1.11 NLS-72: Description of Subsample (Unweighted) with Some Postsecondary Education as of Four Years out of High School Who Had Course Transcript Data by Curriculum Classification and Sex-Race Groups

		X26								
		COUNT								
ROW	PCT	GENERAL	M - BUS	M - T&I	REST	VOC	ROW			
COL	PCT	I	F - OFF	F - H	EC	I	TOTAL			
		I	0	I	1	I	2	I	3	I
X3										
1	I	623	I	67	I	269	I	116	I	1145
MALE - WHITE	I	60.5	I	5.9	I	23.5	I	10.1	I	37.4
	I		I		I		I		I	
2	I	121	I	22	I	57	I	30	I	230
MALE - BLACK	I	52.6	I	9.6	I	24.8	I	13.0	I	7.5
	I		I		I		I		I	
3	I	729	I	459	I	20	I	126	I	1343
FEMALE - WHITE	I	54.3	I	34.2	I	2.2	I	9.4	I	43.9
	I		I		I		I		I	
4	I	148	I	100	I	25	I	48	I	341
FEMALE - BLACK	I	49.3	I	29.3	I	7.3	I	14.1	I	11.1
	I		I		I		I		I	
COLUMN		1711		648		330		320		3049
TOTAL		55.9		21.2		12.4		10.5		100.0

TABLE A-1.12 NLS-72: Description of Subsample (Unweighted) Who Were Employed as of Each Time Point by Educational Level and by Curriculum Classification and Sex-Race Groups

A. MALES

Entry- 12 yrs	COUNT	X26			
		IGENERAL	M - BUS F - OFF	M - T&I F - H EC	REST VOC
	1	824	60	265	167
		62.6	4.6	20.1	12.7
	2	114	20	52	30
		52.8	9.3	24.1	13.9
Yr 1 - 12 yrs	1	824	61	263	168
		62.6	4.6	20.0	12.8
	2	109	21	60	27
		50.0	9.7	27.8	12.5
Yr 4 - 12 yrs	1	813	59	263	158
		62.9	4.6	20.3	12.2
	2	105	18	53	24
		52.5	9.0	26.5	12.0
Yr 4 - postsec	1	577	61	241	107
		58.5	6.2	24.4	10.9
	2	91	17	50	24
		50.0	9.3	27.5	13.2

TABLE A-1.12 (continued)

B. FEMALES

Entry - 12 yrs	COUNT ROW PCT COL PCT	X26				
		GENERAL	M - BUS F - OFF	M - TII F - H EC	REST	VOC
		0	1	2	3	
FEMALE - WHITE	3	710 47.5	611 40.9	58 3.9	115 7.7	
FEMALE - BLACK	4	105 44.5	79 33.5	17 7.2	35 14.8	
Yr 1 - 12 yrs						
FEMALE - WHITE	3	712 47.8	614 41.2	55 3.7	109 7.3	
FEMALE - BLACK	4	126 48.8	78 30.2	19 7.4	35 13.6	
Yr 4 - 12 yrs						
FEMALE - WHITE	3	554 47.3	481 41.1	46 3.9	90 7.7	
FEMALE - BLACK	4	108 46.2	73 31.2	22 9.4	31 13.2	
Yr 4 - postsec						
FEMALE - WHITE	3	528 52.5	368 36.6	17 1.7	92 9.2	
FEMALE - BLACK	4	119 47.2	77 30.6	20 7.9	38 14.3	

TABLE A-1.13 NLS-72: Description of Subsample (Unweighted) Who Were Employed as of Each Time Point by Educational Level-Curriculum Classification by Sex-Race Groups

A. MALES

		X54			
		COUNT	I		
		ROW	FCT	IHS GEN - HS VOC -	
		COL	PCT	IPST NONE PST NONE	
Entry - 12 yrs		I	1	I	2 I
		I		I	I
	1	I	824	I	494 I
MALE - WHITE		I	62.5	I	37.5 I
		I		I	I
		I		I	I
	2	I	114	I	102 I
MALE - BLACK		I	52.8	I	47.2 I
		I		I	I
		I		I	I

Yr 1 - 12 yrs		I	824	I	493 I
MALE - WHITE		I	62.6	I	37.4 I
		I		I	I
		I		I	I
	2	I	108	I	108 I
MALE - BLACK		I	50.0	I	50.0 I
		I		I	I
		I		I	I

Yr 4 - 12 yrs		I	813	I	481 I
MALE - WHITE		I	62.8	I	37.2 I
		I		I	I
		I		I	I
	2	I	105	I	95 I
MALE - BLACK		I	52.5	I	47.5 I
		I		I	I
		I		I	I

		X54												
		COUNT	I		I		I		I		I			
		ROW	FCT	IHS GEN - HS VOC -	HS GEN - HS VOC -	HS GEN - HS VOC -	HS GEN - HS VOC -	HS GEN - HS VOC -	HS GEN - HS VOC -	HS GEN - HS VOC -	HS GEN - HS VOC -	HS GEN - HS VOC -	PCW	
		COL	PCT	IPST ACAD PST ACAD PST VOC	IPST ACAD PST VOC	TOTAL								
Yr 4 - postsec		I	3	I	4	I	5	I	6	I	7	I	8	I
		I		I	I	I	I	I	I	I	I	I	I	
	1	I	189	I	68	I	198	I	186	I	190	I	157	I
MALE - WHITE		I	19.2	I	6.7	I	20.1	I	18.9	I	19.3	I	15.9	I
		I		I	I	I	I	I	I	I	I	I	I	
		I		I	I	I	I	I	I	I	I	I	I	
	2	I	33	I	21	I	26	I	37	I	32	I	33	I
MALE - BLACK		I	18.1	I	11.5	I	14.3	I	20.3	I	17.6	I	18.1	I
		I		I	I	I	I	I	I	I	I	I	I	
		I		I	I	I	I	I	I	I	I	I	I	

TABLE A-1.11 NLS-72: Description of Subsample (Unweighted) Who Were Both Employed as of Each Time Point and Had Course Transcript Data by Curriculum Classification and Sex-Race Groups

A. MALES

Entry - 12 yrs	X3	COUNT	X26			
			IGENERAL	M - BUS	M - T&I	REST VOC
			COL PCT	F - OFF	F - H EC	
		0	1	2	3	
		1	791	58	256	158
	MALE - WHITE	62.6	4.6	20.3	12.5	
		2	111	19	49	28
	MALE - BLACK	53.6	9.2	23.7	13.5	
Yr 1 - 12 yrs		1	703	59	253	159
	MALE - WHITE	62.7	4.7	20.0	12.6	
		2	106	20	56	26
	MALE - BLACK	51.0	9.6	26.9	12.5	
Yr 4 - 12 yrs		1	779	57	255	149
	MALE - WHITE	62.8	4.6	20.6	12.0	
		2	102	17	49	23
	MALE - BLACK	53.4	8.9	25.7	12.0	
Yr 4 - postsec		1	548	57	227	99
	MALE - WHITE	58.9	6.1	24.4	10.6	
		2	85	16	47	24
	MALE - BLACK	49.4	9.3	27.3	14.0	

TABLE A-1.14 (continued)

		X26								
		I	GENERAL	M - BUS	M - T&I	REST	VOC			
		I	F - OFF	F - H	EC					
		I	0	1	2	3	I			
Entry - 12 yrs										
	3	I	674	I	586	I	54	I	108	I
FEMALE - WHITE		I	47.4	I	41.2	I	3.8	I	7.6	I
		I		I		I		I		I
	4	I	99	I	75	I	15	I	33	I
FEMALE - BLACK		I	44.6	I	33.8	I	6.8	I	14.9	I
		I		I		I		I		I
Yr 1 - 12 yrs										
	3	I	673	I	591	I	51	I	102	I
FEMALE - WHITE		I	47.5	I	41.7	I	3.6	I	7.2	I
		I		I		I		I		I
	4	I	102	I	74	I	17	I	34	I
FEMALE - BLACK		I	49.4	I	30.0	I	6.9	I	13.8	I
		I		I		I		I		I
Yr 4 - 12 yrs										
	3	I	529	I	460	I	42	I	86	I
FEMALE - WHITE		I	47.4	I	41.2	I	3.8	I	7.7	I
		I		I		I		I		I
	4	I	104	I	69	I	21	I	31	I
FEMALE - BLACK		I	46.2	I	30.7	I	9.3	I	13.8	I
		I		I		I		I		I
Yr 4 - postsec										
	3	I	503	I	354	I	17	I	88	I
FEMALE - WHITE		I	52.3	I	36.8	I	1.8	I	9.1	I
		I		I		I		I		I
	4	I	113	I	74	I	19	I	35	I
FEMALE - BLACK		I	46.9	I	30.7	I	7.9	I	14.5	I
		I		I		I		I		I

TABLE A-1.15 NLS-72: Description of Subsample (Unweighted) Who Were Both Employed as of Each Time Point and Had Course Transcript Data by Educational Level-Curriculum Classification and Sex-Race Groups

A. MALES

		X54			
		COUNT	IHS GEN - HS VOC -		
ROW PCT	COL PCT	IPST	ACAD	PST	NONE
Entry - 12 yrs		1	1	2	
X3		-----	-----	-----	-----
MALE - WHITE		1	791	474	
			62.5	37.5	
MALE - BLACK		2	111	96	
			53.6	46.4	
Yr 1 - 12 yrs		-----	-----	-----	-----
MALE - WHITE		1	793	472	
			62.7	37.3	
MALE - BLACK		2	106	102	
			51.0	49.0	
Yr 4 - 12 yrs		-----	-----	-----	-----
MALE - WHITE		1	779	462	
			62.8	37.2	
MALE - BLACK		2	102	89	
			53.4	46.6	

		X54							
		COUNT	IHS GEN - HS VOC -		HS GEN - HS VOC -		HS GEN - HS VOC -		
ROW PCT	COL PCT	IPST	ACAD	PST	ACAD	PST	VOC	PST	VOC
Yr 4 - postsec		1	3	4	5	6	7	8	
X3		-----	-----	-----	-----	-----	-----	-----	-----
MALE - WHITE		1	180	63	190	177	178	143	
			19.3	6.8	20.4	19.0	19.1	15.4	
MALE - BLACK		2	29	19	25	35	31	33	
			16.9	11.0	14.5	20.3	18.0	19.2	

TABLE A-1.15 (continued)

B. FEMALES

Entry - 12 yrs	COUNT	X54		IHS GEN - HS VOC -									
		IPST NONE	PST NONE	IPST NONE	PST NONE								
FEMALE - WHITE	3	674	47.4	748	52.6								
FEMALE - BLACK	4	99	44.6	123	55.4								
Yr 1 - 12 yrs	3	673	47.5	744	52.5								
FEMALE - BLACK	4	122	49.4	125	50.6								
Yr 4 - 12 yrs	3	529	47.4	588	52.6								
FEMALE - BLACK	4	104	46.2	121	53.8								
Yr 4 - postsec	3	154	16.0	70	7.3	224	23.3	241	25.0	125	13.0	149	15.5
FEMALE - BLACK	4	33	13.6	30	12.4	53	21.9	66	27.3	27	11.2	53	13.6



APPENDIX A-2. LME: DESCRIPTION OF LME SAMPLES/POPULATIONS AT THREE TIME POINTS FORMING BASIS OF HURON ANALYSES

Table

- 2.1 Record of Cases Deleted from Public Use File in Constructing Huron Study Analysis Files for Entry Year, Year 4 and Year 10
- 2.2 Description of Grand Total Sample (Unweighted) of Males for Each Time Point by Educational Level-Curriculum Classification and Race
- 2.3 Description of Population (Weighted Sample) of Males for Each Time Point by Educational Level-Curriculum Classification and Race
- 2.4 Description of Grand Total Sample (Unweighted) of Males for Entry Year by Year of Entry and Educational Level-Curriculum Classification and Race
- 2.5 Description of Grand Total Sample (Unweighted) of males for Four Years out of High School by Year and Educational Level-Curriculum Classification and Race
- 2.6 Description of Grand Total Sample (Unweighted) of Males for Ten Years out of High School by Year and Educational Level-Curriculum Classification and Race
- 2.7 Description of Subsample (Unweighted) Who Were Employed at Each Time Point by Educational Level-Curriculum Classification and Race
- 2.8 Description of Subsample (Unweighted) of Males Who Were Employed as of Entry Year by Year of Entry and Educational Level-Curriculum Classification and Race
- 2.9 Description of Subsample (Unweighted) of Males Who Were Employed as of Four Years out of High School by Year and Educational Level-Curriculum Classification and Race
- 2.10 Description of Subsample (Unweighted) of Males Who Were Employed as of Ten Years out of High School by Year and Educational Level-Curriculum Classification and Race

TABLE A-2.1 LME: Record of Cases Deleted from Public Use File in constructing Huron Study Analysis Files for Entry Year, Year 4, and Year 10

			<u>Entry Yr.</u>	<u>Year 4</u>	<u>Year 10</u>
Public Use File - Grand Total number of cases			5,225	5,225	5,225
<u>Deletion Stage</u>	<u>Level</u>	<u>Description of Deletion Criterion^a</u>			
1	1	Race other than white or black	65	65	65
	2	Self-reported high school curriculum academic	1,591	1,591	1,591
	2	High school curriculum not reported	618	618	618
	3	Year of birth not recorded	<u>8</u>	<u>8</u>	<u>8</u>
	Total number cases deleted stage 1		2,282	2,282	2,282
	Total number cases in Study Analysis file at end of Stage 1		<u>2,947</u>	<u>2,943</u>	<u>2,943</u>
2	1	Not able to classify by target year whether early leaver or 12 yrs completed due to chronic missing data problem	21	28	9
	1	Of those out of high school at target year, those not able to classify by target year whether 12 years exactly or attended some postsecondary due to chronic missing data on postsecondary variables	341	857	1,767
	1	Of those out of high school at target year those classified as attending some postsecondary	<u>458</u>	<u>686</u>	<u>396</u>
	Total number cases deleted Stage 2		820	1,571	2,172
	Total number cases in Study Analysis files at end of Stage 2		<u>2,123</u>	<u>1,377</u>	<u>771</u>

Deletion Stage	Level	Description of Deletion Criterion ^a	Entry Yr.	Year 4	Year 10
			2,123	1,372	771
3	1	Those not responding to the survey in a target year so that no labor market information for the target year would be recorded	71	83	17
	2	Early leavers who reported completing 12 years of school in 1976 survey	--	54	22
	Total number cases deleted Stage 3		71	137	39
	Total number cases in Study Analysis files at end of Stage 3		<u>2,052</u>	<u>1,235</u>	<u>732</u>
4	1	Those for whom the target year was prior to 1966 or in 1972 or 1974 or would be later than 1976 so that no labor market information for the target year would either be recorded or available	751	345	193
	Total number cases deleted Stage 4		751	345	193
	Total number cases in Final Study Analysis files		<u>1,301</u>	<u>890</u>	<u>539</u>

^a Due to large number of nonresponses to question(s) asking whether last high school attended was public or nonpublic, cases who had attended a nonpublic school could not be deleted.

Table 1 - Description of Grand Total Sample (Unweighted) of Males for Entry Year of Year of Entry and Educational Level-Curriculum Classification and Race

A. Black Males

YEAR	COUNT	EDUCATIONAL LEVEL						TOTAL
		HS GEN	HS BUS	HS VOC	HS GEN	HS BUS	HS VOC	
COL PCT	I	1	2	3	4	5	6	TOTAL
TOT PCT	I	I	I	I	I	I	I	
1966	1	42	2	13	31	4	8	120
		35.0	33.3	31.7	15.9	23.5	14.8	25.2
1967	2	34	1	10	48	3	21	107
		22.9	16.7	24.4	24.6	17.6	20.4	22.5
1968	3	39	0	9	37	2	15	102
		23.9	0.0	22.0	19.0	11.3	27.8	21.4
1969	4	21	2	5	36	7	9	80
		12.9	33.3	12.2	19.5	41.2	16.7	16.8
1970	5	2	0	4	28	1	8	43
		1.2	0.0	9.8	14.4	5.9	14.8	9.0
1971	6	3	1	0	14	0	3	21
		1.8	16.7	0.0	7.2	0.0	5.6	4.4
1976	11	2	0	0	1	0	0	3
		1.2	0.0	0.0	0.5	0.0	0.0	0.6
COLUMN TOTAL		163	6	41	195	17	54	476
		34.2	1.3	8.6	41.0	3.6	11.3	100.0

B. White Males

YEAR	COUNT	EDUCATIONAL LEVEL						TOTAL
		HS GEN	HS BUS	HS VOC	HS GEN	HS BUS	HS VOC	
COL PCT	I	1	2	3	4	5	6	TOTAL
TOT PCT	I	I	I	I	I	I	I	
1966	1	113	4	8	84	6	20	235
		48.9	57.1	25.8	20.7	17.3	17.2	28.5
1967	2	52	0	9	80	6	25	172
		22.5	0.0	29.0	19.8	17.1	21.6	20.8
1968	3	6	2	6	77	12	27	150
		11.3	28.6	19.4	19.0	34.3	23.3	18.2
1969	4	25	1	3	82	8	29	149
		10.8	14.3	9.7	20.2	22.9	25.0	17.9
1970	5	7	0	3	62	3	14	89
		3.0	0.0	9.7	15.3	8.6	12.1	10.8
1971	6	6	0	0	17	0	1	24
		2.6	0.0	0.0	4.2	0.0	0.9	2.9
1973	8	0	0	2	2	0	0	4
		0.0	0.0	6.5	0.5	0.0	0.0	0.5
1975	10	1	0	0	1	0	0	2
		0.4	0.0	0.0	0.2	0.0	0.0	0.2
1976	11	1	0	0	0	0	0	1
		0.4	0.0	0.0	0.0	0.0	0.0	0.1
COLUMN TOTAL		231	7	31	405	35	116	825
		28.0	0.8	3.8	49.1	4.2	14.1	100.0

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TABLE A-2.5 LME: Description of Grand Total Sample (Unweighted) of Males for Four Years Out of High School by Year and Educational Level-Curriculum Classification and Race

A. Black Males										
COUNT	ROW PCT	X54F						ROW TOTAL		
		IHS	GEN	HS BUS	HS VOC	HS GEN	HS BUS		HS VOC	
		ERLY	LVR	ERLY	LVR	ERLY	LVR		ERLY	LVR
		12 YRS		12 YRS	12 YRS					
TOT PCT	1	2	3	4	5	6	TOTAL			
1966	1	13	0	0	17	1	2	33		
		12.9	0.0	0.0	12.2	14.3	7.4	11.1		
1967	2	12	0	0	9	0	1	22		
		11.9	0.0	0.0	6.5	0.0	3.7	7.4		
1968	3	15	0	1	9	0	4	29		
		14.9	0.0	5.3	6.5	0.0	14.8	9.8		
1969	4	17	0	5	13	1	4	40		
		16.8	0.0	26.3	9.4	14.3	14.8	13.5		
1970	5	10	1	4	23	1	6	45		
		9.9	25.0	21.1	16.5	14.3	22.2	15.2		
1971	6	19	2	6	34	3	4	68		
		10.0	50.0	31.6	24.5	42.9	14.8	22.9		
1973	8	9	1	3	27	1	6	47		
		0.9	25.0	15.0	19.4	14.3	22.2	15.8		
1975	10	3	0	0	6	0	0	9		
		3.0	0.0	0.0	4.3	0.0	0.0	3.0		
1976	11	3	0	0	1	0	0	4		
		3.0	0.0	0.0	0.7	0.0	0.0	1.3		
COLUMN TOTAL		101	4	19	139	7	27	297		
TOTAL		34.0	1.3	6.4	46.8	2.1	9.1	100.0		

B. White Males										
COUNT	ROW PCT	X54F						ROW TOTAL		
		IHS	GEN	HS BUS	HS VOC	HS GEN	HS BUS		HS VOC	
		ERLY	LVR	ERLY	LVR	ERLY	LVR		ERLY	LVR
		12 YRS		12 YRS	12 YRS					
TOT PCT	1	2	3	4	5	6	TOTAL			
	1	12	1	3	50	5	9	80		
		10.9	50.0	13.6	15.2	18.5	8.7	13.5		
1967	2	19	0	2	39	2	7	69		
		17.3	0.0	9.1	11.9	7.4	6.8	11.6		
1968	3	13	0	3	22	4	12	54		
		11.8	0.0	13.6	6.7	14.8	11.7	9.1		
1969	4	15	0	2	30	2	10	59		
		13.6	0.0	9.1	9.1	7.4	9.7	9.9		
1970	5	13	0	2	44	2	16	77		
		11.8	0.0	9.1	13.4	7.4	15.5	13.0		
1971	6	23	0	6	74	7	22	132		
		20.9	0.0	27.3	22.5	25.9	21.4	22.3		
1973	8	11	1	1	58	5	26	102		
		10.0	50.0	4.5	17.6	10.5	25.2	17.2		
1975	10	4	0	0	10	0	0	14		
		3.6	0.0	0.0	3.0	0.0	0.0	2.4		
1976	11	0	0	3	2	0	1	6		
		0.0	0.0	13.6	0.6	0.0	1.0	1.0		
COLUMN TOTAL		110	2	22	329	27	103	593		
TOTAL		18.5	0.3	3.7	55.5	4.6	17.4	100.0		

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TABLE A-2.6 LME: Description of Grand Total Sample (Unweighted) of Males for Ten Years Out of High School by Year and Educational Level-Curriculum Classification and Race

X54T											
A. Black Males											
COUNT	I	IHS GEN	- HS BUS	- HS VOC	- HS GEN	- HS BUS	- HS VOC	- HS GEN	- HS BUS	- HS VOC	ROW TOTAL
COL PCT	I	ERLY LVR	ERLY LVR	ERLY LVR	12 YRS						
TOT PCT	I	1 I	2 I	3 I	4 I	5 I	6 I	7 I	8 I	9 I	
1967	2	I	3 I	0 I	0 I	0 I	0 I	0 I	0 I	0 I	3
		I	I	I	I	I	I	I	I	I	2.0
		I	4.6 I	0.0 I							
		I	I	I	I	I	I	I	I	I	
1968	3	I	4 I	1 I	1 I	0 I	1 I	0 I	0 I	0 I	7
		I	I	I	I	I	I	I	I	I	4.7
		I	6.2 I	33.3 I	11.1 I	0.0 I	25.0 I	0.0 I	0.0 I	0.0 I	
		I	I	I	I	I	I	I	I	I	
1969	4	I	10 I	0 I	2 I	2 I	0 I	1 I	1 I	1 I	15
		I	I	I	I	I	I	I	I	I	10.1
		I	15.4 I	0.0 I	22.2 I	4.1 I	0.0 I	5.6 I	5.6 I	5.6 I	
		I	I	I	I	I	I	I	I	I	
1970	5	I	11 I	0 I	3 I	9 I	0 I	3 I	3 I	3 I	26
		I	I	I	I	I	I	I	I	I	17.6
		I	16.9 I	0.0 I	33.3 I	18.4 I	0.0 I	16.7 I	16.7 I	16.7 I	
		I	I	I	I	I	I	I	I	I	
1971	6	I	1 I	1 I	0 I	4 I	0 I	3 I	3 I	3 I	9
		I	I	I	I	I	I	I	I	I	6.1
		I	1.5 I	33.3 I	0.0 I	8.2 I	0.0 I	16.7 I	16.7 I	16.7 I	
		I	I	I	I	I	I	I	I	I	
1973	8	I	13 I	0 I	0 I	5 I	0 I	1 I	1 I	1 I	17
		I	I	I	I	I	I	I	I	I	12.8
		I	20.0 I	0.0 I	0.0 I	10.2 I	0.0 I	5.6 I	5.6 I	5.6 I	
		I	I	I	I	I	I	I	I	I	
1975	10	I	15 I	0 I	3 I	16 I	2 I	5 I	5 I	5 I	39
		I	I	I	I	I	I	I	I	I	26.4
		I	20.0 I	0.0 I	33.3 I	32.7 I	50.0 I	27.8 I	27.8 I	27.8 I	
		I	I	I	I	I	I	I	I	I	
1976	11	I	10 I	1 I	0 I	13 I	1 I	5 I	5 I	5 I	30
		I	I	I	I	I	I	I	I	I	20.3
		I	15.4 I	33.3 I	0.0 I	26.5 I	25.0 I	27.8 I	27.8 I	27.8 I	
		I	I	I	I	I	I	I	I	I	
COLUMN TOTAL		65	3	9	49	4	18	148	148	148	
		43.9	2.0	6.1	33.1	2.7	12.2	100.0	100.0	100.0	

X54T											
B. White Males											
COUNT	I	IHS GEN	- HS BUS	- HS VOC	- HS GEN	- HS BUS	- HS VOC	- HS GEN	- HS BUS	- HS VOC	ROW TOTAL
COL PCT	I	ERLY LVR	ERLY LVR	ERLY LVR	12 YRS						
TOT PCT	I	1 I	2 I	3 I	4 I	5 I	6 I	7 I	8 I	9 I	
1966	1	I	1 I	1 I	0 I	0 I	0 I	0 I	0 I	0 I	2
		I	I	I	I	I	I	I	I	I	0.5
		I	1.0 I	100.0 I	0.0 I	0.0 I	0.0 I	0.0 I	0.0 I	0.0 I	
		I	I	I	I	I	I	I	I	I	
1967	2	I	6 I	0 I	1 I	0 I	0 I	0 I	0 I	0 I	7
		I	I	I	I	I	I	I	I	I	1.8
		I	5.8 I	0.0 I	7.7 I	0.0 I					
		I	I	I	I	I	I	I	I	I	
1968	3	I	14 I	0 I	2 I	2 I	0 I	0 I	0 I	0 I	18
		I	I	I	I	I	I	I	I	I	4.6
		I	13.5 I	0.0 I	15.4 I	1.0 I	0.0 I	0.0 I	0.0 I	0.0 I	
		I	I	I	I	I	I	I	I	I	
1969	4	I	14 I	0 I	3 I	23 I	2 I	4 I	4 I	4 I	46
		I	I	I	I	I	I	I	I	I	11.8
		I	13.5 I	0.0 I	23.1 I	11.5 I	14.3 I	6.8 I	6.8 I	6.8 I	
		I	I	I	I	I	I	I	I	I	
1970	5	I	15 I	0 I	1 I	36 I	4 I	12 I	12 I	12 I	68
		I	I	I	I	I	I	I	I	I	17.4
		I	14.4 I	0.0 I	7.7 I	18.0 I	28.6 I	20.3 I	20.3 I	20.3 I	
		I	I	I	I	I	I	I	I	I	
1971	6	I	16 I	0 I	2 I	40 I	4 I	15 I	15 I	15 I	77
		I	I	I	I	I	I	I	I	I	19.7
		I	15.4 I	0.0 I	15.4 I	20.0 I	28.6 I	25.4 I	25.4 I	25.4 I	
		I	I	I	I	I	I	I	I	I	
1973	8	I	11 I	0 I	2 I	38 I	1 I	5 I	5 I	5 I	57
		I	I	I	I	I	I	I	I	I	14.6
		I	10.6 I	0.0 I	15.4 I	19.0 I	7.1 I	8.5 I	8.5 I	8.5 I	
		I	I	I	I	I	I	I	I	I	
1975	10	I	13 I	0 I	2 I	27 I	1 I	9 I	9 I	9 I	52
		I	I	I	I	I	I	I	I	I	13.3
		I	12.5 I	0.0 I	15.4 I	13.5 I	7.1 I	15.3 I	15.3 I	15.3 I	
		I	I	I	I	I	I	I	I	I	
1976	11	I	14 I	0 I	0 I	34 I	2 I	14 I	14 I	14 I	64
		I	I	I	I	I	I	I	I	I	16.4
		I	13.5 I	0.0 I	0.0 I	17.0 I	14.3 I	23.7 I	23.7 I	23.7 I	
		I	I	I	I	I	I	I	I	I	
COLUMN TOTAL		104	1	13	200	14	59	391	391	391	
		26.6	0.3	3.3	51.2	3.6	15.1	100.0	100.0	100.0	

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TABLE A-2.8 LME: Description of Subsample (Unweighted) of Males Who Were Employed as of Entry Year by Year of Entry and Educational Level-Curriculum Classification and Race

A. Black Males

X54E											ROW	TOTAL				
COUNT	I	IHS	GEN	- HS	BUS	- HS	VOC	- HS	GEN	- HS	BUS	- HS	VOC	-	ROW	TOTAL
COL PCT	IERLY	LVR	ERLY	LVR	ERLY	LVR	12 YRS	-	ROW	TOTAL						
TOT PCT	I	1	I	2	I	3	I	4	I	5	I	6	I	-	ROW	TOTAL
1966	1	I	27	I	2	I	7	I	25	I	3	I	6	I	70	19.7
		I	25.7	I	33.3	I	21.2	I	15.5	I	20.0	I	16.7	I		
1967	2	I	27	I	1	I	9	I	39	I	3	I	8	I	37	24.4
		I	25.7	I	16.7	I	27.3	I	24.2	I	20.0	I	22.2	I		
1968	3	I	31	I	0	I	9	I	34	I	2	I	10	I	86	24.2
		I	29.5	I	0.0	I	27.3	I	21.1	I	13.3	I	27.8	I		
1969	4	I	14	I	2	I	4	I	30	I	6	I	7	I	63	17.7
		I	13.3	I	33.3	I	12.1	I	18.6	I	40.0	I	19.4	I		
1970	5	I	2	I	0	I	4	I	20	I	1	I	4	I	31	9.7
		I	1.9	I	0.0	I	12.1	I	12.4	I	6.7	I	11.1	I		
1971	6	I	2	I	1	I	0	I	12	I	0	I	1	I	16	4.5
		I	1.9	I	16.7	I	0.0	I	7.5	I	0.0	I	2.8	I		
1976	11	I	2	I	0	I	0	I	1	I	0	I	0	I	3	0.8
		I	1.9	I	0.0	I	0.0	I	0.6	I	0.0	I	0.0	I		
COLUMN TOTAL			105		6		33		161		15		36		356	100.0
			29.5		1.7		9.3		45.2		4.2		10.1			

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X54E											ROW	TOTAL				
COUNT	I	IHS	GEN	- HS	BUS	- HS	VOC	- HS	GEN	- HS	BUS	- HS	VOC	-	ROW	TOTAL
COL PCT	IERLY	LVR	ERLY	LVR	ERLY	LVR	12 YRS	-	ROW	TOTAL						
TOT PCT	I	1	I	2	I	3	I	4	I	5	I	6	I	-	ROW	TOTAL
1966	1	I	56	I	3	I	5	I	69	I	5	I	17	I	155	23.5
		I	37.6	I	75.0	I	19.2	I	19.9	I	16.7	I	16.2	I		
1967	2	I	43	I	0	I	9	I	69	I	5	I	21	I	147	22.3
		I	28.9	I	0.0	I	34.6	I	19.9	I	16.7	I	20.0	I		
1968	3	I	19	I	0	I	6	I	67	I	11	I	27	I	130	19.7
		I	12.8	I	0.0	I	23.1	I	19.4	I	36.7	I	25.7	I		
1969	4	I	20	I	1	I	2	I	70	I	6	I	27	I	126	19.1
		I	13.4	I	25.0	I	7.7	I	20.2	I	20.0	I	25.7	I		
1970	5	I	5	I	0	I	2	I	54	I	3	I	13	I	77	11.7
		I	3.4	I	0.0	I	7.7	I	15.6	I	10.0	I	12.4	I		
1971	6	I	4	I	0	I	0	I	14	I	0	I	0	I	18	2.7
		I	2.7	I	0.0	I	0.0	I	4.0	I	0.0	I	0.0	I		
1973	8	I	0	I	0	I	2	I	2	I	0	I	0	I	4	0.6
		I	0.0	I	0.0	I	7.7	I	0.6	I	0.0	I	0.0	I		
1975	10	I	1	I	0	I	0	I	1	I	0	I	0	I	2	0.3
		I	0.7	I	0.0	I	0.0	I	0.3	I	0.0	I	0.0	I		
1976	11	I	1	I	0	I	0	I	0	I	0	I	0	I	1	0.2
		I	0.7	I	0.0	I	0.0	I	0.0	I	0.0	I	0.0	I		
COLUMN TOTAL			149		4		26		346		30		105		660	100.0
			22.0		0.6		3.9		52.4		4.5		15.9			

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TABLE A-2.9 LME: Description of Subsample (Unweighted of Males Who Were Employed As of Four Years out of High School by Year and Educational Level-Curriculum Classification and Race

A. Black Males

B. White Males

X4CHK	X54F										ROW TOTAL
	COUNT	IHS GEN - HS BUS - HS VOC			HS GEN - HS BUS - HS VOC			ROW			
	PCT	I	2	3	4	5	6		TOTAL		
1966	1	11	0	0	16	1	2	30	11.8		
1967	2	10	0	0	9	0	1	20	7.9		
1968	3	13	0	1	9	0	4	27	10.6		
1969	4	16	0	4	13	1	2	36	14.2		
1970	5	9	1	4	21	1	6	42	16.5		
1971	6	12	1	4	31	3	2	53	20.9		
1973	8	6	1	2	24	1	5	39	15.4		
1975	10	2	0	0	4	0	0	6	2.4		
1976	11	1	0	0	0	0	0	1	0.4		
COLUMN TOTAL	80	3	15	127	7	22	254	100.0			
	31.5	1.2	5.9	50.0	2.8	8.7					

X4CHK	X54F										ROW TOTAL
	COUNT	IHS GEN - HS BUS - HS VOC			HS GEN - HS BUS - HS VOC			ROW			
	PCT	I	2	3	4	5	6		TOTAL		
1966	1	11	1	3	48	5	9	77	14.1		
1967	2	16	9	2	37	2	7	64	11.7		
1968	3	12	0	3	22	4	12	53	9.7		
1969	4	13	0	2	26	2	8	51	9.3		
1970	5	12	0	1	39	1	14	67	12.2		
1971	6	21	0	5	70	6	20	122	22.3		
1973	8	9	1	1	53	5	25	94	17.2		
1975	10	4	0	0	10	0	0	14	2.6		
1976	11	0	0	3	2	0	1	6	1.1		
COLUMN TOTAL	98	2	20	307	25	96	548	100.0			
	17.9	0.4	3.5	56.0	4.6	17.5					

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TABLE A-2.10 LME: Description of Subsample (Unweighted) of Males Who Were Employed as of Ten Years out of High School by Year and Educational Level-Curriculum Classification and Race

A. Black Males

B. White Males

X54T										
ROW	PCT	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	ROW
COL	PCT	IERLY LVR	TOTAL							
TOT	PCT	1	2	3	4	5	6	6	6	
1967	2	2	0	0	0	0	0	0	0	2
		3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
1968	3	4	1	1	0	1	0	0	0	7
		5.9	50.0	12.5	0.0	50.0	0.0	0.0	0.0	5.5
1969	4	8	0	2	2	0	1	1	1	13
		13.8	0.0	25.0	4.9	0.0	5.9	5.9	5.9	10.2
1970	5	11	0	7	7	0	3	3	3	23
		19.0	0.0	25.0	17.1	0.0	17.6	17.6	17.6	18.0
1971	6	1	0	0	3	0	3	3	3	7
		1.7	0.0	0.0	7.3	0.0	17.6	17.6	17.6	5.5
1973	8	10	0	0	5	0	1	1	1	16
		17.2	0.0	0.0	12.2	0.0	5.9	5.9	5.9	12.5
1975	10	13	0	3	15	1	4	4	4	36
		22.4	0.0	37.5	36.6	50.0	23.5	23.5	23.5	26.1
1976	11	9	1	0	9	0	5	5	5	24
		15.5	50.0	0.0	22.0	0.0	29.4	29.4	29.4	18.8
COLUMN TOTAL		58	2	8	41	2	17	17	17	128
TOTAL		45.3	1.6	6.3	32.0	1.6	13.3	13.3	13.3	100.0

X54T										
ROW	PCT	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	IHS GEN - HS BUS - HS VOC -	ROW
COL	PCT	IERLY LVR	TOTAL							
TCT	PCT	1	2	3	4	5	6	6	6	
1966	1	1	1	0	0	0	0	0	0	2
		1.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
1967	2	6	0	1	0	0	0	0	0	7
		6.3	0.0	7.7	0.0	0.0	0.0	0.0	0.0	1.9
1968	3	14	0	2	2	0	0	0	0	18
		14.6	0.0	15.4	1.0	0.0	0.0	0.0	0.0	4.9
1969	4	14	0	3	23	2	4	4	4	46
		14.6	0.0	23.1	12.0	14.3	7.4	7.4	7.4	12.4
1970	5	14	0	1	35	4	12	12	12	66
		14.6	0.0	7.7	18.2	28.6	22.2	22.2	22.2	17.8
1971	6	15	0	2	39	4	13	13	13	73
		15.6	0.0	15.4	20.3	28.6	24.1	24.1	24.1	19.7
1973	8	9	0	2	36	1	5	5	5	53
		9.4	0.0	15.4	18.8	7.1	9.3	9.3	9.3	14.3
1975	10	11	0	2	25	1	8	8	8	47
		11.5	0.0	15.4	13.0	7.1	14.8	14.8	14.8	12.7
1976	11	12	0	0	32	2	12	12	12	58
		12.5	0.0	0.0	16.7	14.3	22.2	22.2	22.2	15.7
COLUMN TOTAL		96	1	13	192	14	54	54	54	376
TOTAL		25.9	0.3	3.5	51.9	3.8	14.6	14.6	14.6	100.0

NUMBER OF MISSING OBSERVATIONS = 4

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APPENDIX A-3. YA: DESCRIPTION OF YA SAMPLE/POPULATION FORMING BASIS OF
HURON ANALYSIS

Table

- 3.1 Record of Cases Deleted from Public Use File in Constructing Huron Study Analysis File
- 3.2 Description of Grand Total Sample (Unweighted) -- Both In and Out of High School -- by Curriculum Classification and Sex-Race Groups
- 3.3 Description of Population (Weighted Sample) - Both in and Out of High School - by Curriculum Classification and Sex-Race Groups
- 3.4 Description of Grand Total Sample (Unweighted) -- Both In and Out of High School -- by Educational Level-Curriculum Classification and Sex-Race Groups
- 3.5 Description of Grand Total Out of High School Sample (Unweighted) by Age Groups and by Curriculum Classification and Sex-Race Groups
- 3.6 Description of Out of High School Subsample (Unweighted) Who Were Employed as of Survey Week by Age Groups and by Educational Level-Curriculum Classification and Sex-Race Groups
- 3.7 Description of Out of High School Subsample (Unweighted) Who Were Employed as of Survey Week by Educational Level-Curriculum Classification and Sex-Race Groups

TABLE A-3.1 YA: Record of Cases Deleted from Public Use File in Constructing Huron Study Analysis File

Public Use File - Grand Total number of cases				12,686
<u>Delection Stage</u>	<u>Level</u>	<u>Description of Deletion Criterion</u>	<u>No. Cases Deleted</u>	
1	1	Self-reported high school curriculum academic	3,388	
	1	High school curriculum not reported ^a	1,148 ^a	
	2	Those who reported general or vocational curriculum who were attending (or had last attended) a nonpublic high school	253	
	3	Reported attending postsecondary 4 years or more	11	
	3	Some inconsistency was found in high school/postsecondary attendance-enrollment information used in classifying educational level	<u>175</u>	
		Total number cases deleted Stage 1		<u>4,975</u>
		Total number cases in Final Study Analysis file		<u><u>7,711</u></u>

^a Since 2,372 cases on the public use file reported they had completed grade 8 or less, this question was inappropriate for a number of these cases.

TABLE A3.3: YA: Description of Population (Weighted Sample^a)
 -- Both In and Out of High School -- by Curriculum
 Classification and Sex-Race Groups

	General	M-Bus F-Office	M-T&I F-H Ec.	Rest Voc	Row Total
Male-White	5852850 75.5	153268 2.0	1288865 16.6	460114 5.9	7755097 39.8
Male-Black	1108494 78.3	47271 3.3	17583 12.1	88126 6.2	1415474 7.3
Male-Hispanic	461386 79.2	18714 3.2	69787 12.0	32904 5.6	582791 3.0
Female-White	5778950 75.3	1169591 15.2	74532 1.0	654707 8.5	7677780 39.5
Female-Black	1123274 78.1	153936 10.7	28167 2.0	133645 9.3	1439022 7.4
Female-Hispanic	453606 78.4	72811 12.6	6763 1.2	45306 7.8	578486 3.0
Column Total	14779924 76.0	1615457 8.3	1639777 8.4	1414801 7.3	19449952 ^b 100.0

a Weights represent hundreds.

b Differences in totals due to rounding error.

TABLE A-3.4 YA: Description of Grand Total Sample (Unweighted) -- Both In and Out of High School -- by Educational Level-Curriculum Classification And Sex-Race Groups

X3	COUNT ROW FCT COL PCT	X54 Out of High School												In High School			ROW TOTAL
		HS GEN - HS VOC - HS BUS -			HS GEN - HS VOC - HS BUS -			HS GEN - HS VOC - HS BUS -			HS GEN - HS VOC - HS BUS -						
		12 YRS	12 YRS	12 YRS	12 YRS	12 YRS	12 YRS	12 YRS	12 YRS	12 YRS	SOME PST	SOME PST	SOME PST	SOME PST	SOME PST		
MALE - WHITE	1	354	65	6	332	112	6	313	126	9	712	198	17	2250			
		15.7	2.9	0.3	14.8	5.0	0.3	13.9	5.6	0.4	31.6	8.8	0.8	29.6			
MALE - BLACK	2	169	27	3	164	36	7	95	26	4	394	92	22	999			
		16.9	2.7	0.3	12.4	3.6	0.7	9.5	2.6	0.4	39.4	9.2	2.2	13.1			
MALE - HISPANIC	3	118	12	3	43	23	2	69	11	1	215	54	10	561			
		21.0	2.1	0.5	7.7	4.1	0.4	12.3	2.0	0.2	38.3	9.6	1.8	7.4			
FEMALE - WHITE	4	312	17	15	363	40	103	332	69	91	710	69	101	2241			
		13.9	0.8	0.7	16.2	1.8	4.6	14.8	3.1	4.1	31.7	3.9	4.5	29.5			
FEMALE - BLACK	5	140	9	9	123	23	18	138	21	37	364	62	43	987			
		14.2	0.9	0.9	12.5	2.3	1.8	14.0	2.1	3.7	36.9	6.3	4.4	13.0			
FEMALE - HISPANIC	6	106	5	7	48	8	7	69	17	19	226	18	38	568			
		18.7	0.9	1.2	8.5	1.4	1.2	12.1	3.0	3.3	39.8	3.2	6.7	7.5			
COLUMN TOTAL		1199	135	43	1033	242	143	1016	270	161	2621	512	231	7606			
		15.8	1.8	0.6	13.6	3.2	1.9	13.4	3.5	2.1	34.5	6.7	3.0	170.0			

NUMBER OF MISSING OBSERVATIONS = 105

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TABLE A-3.5 YA: Description of Grand Total Out of High School Sample (Unweighted) by Age Groups and by Curriculum Classification and Sex-Race Groups

A. Males - Age 18 - 19

X3	COUNT	X54										
		ROW PCT	IHS GEN	HS VOC	HS BUS	HS GEN	HS VOC	HS BUS	HS GEN	HS VOC	HS BUS	HS BUS
		COL PCT	IERLY LVR	ERLY LVR	ERLY LVR	12 YRS	12 YRS	12 YRS	SOME PST	SOME PST	SOME PST	SOME PST
MALE - WHITE	1	145	33	1	96	54	1	96	36	0		
MALE - BLACK	2	67	14	2	44	8	2	36	7	1		
MALE - HISPANIC	3	44	8	2	18	9	0	29	6	0		

B. Males - Age 20 - 22

MALE - WHITE	1	135	22	3	233	58	5	216	90	9		
MALE - BLACK	2	70	9	1	79	28	5	59	19	3		
MALE - HISPANIC	3	45	3	0	24	14	2	40	5	1		

C. Females - Age 18 - 19

X3	COUNT	X54										
		ROW PCT	IHS GEN	HS VOC	HS BUS	HS GEN	HS VOC	HS BUS	HS GEN	HS VOC	HS BUS	HS BUS
		COL PCT	IERLY LVR	ERLY LVR	ERLY LVR	12 YRS	12 YRS	12 YRS	SOME PST	SOME PST	SOME PST	SOME PST
FEMALE - WHITE	4	113	5	4	146	24	46	127	28	13		
FEMALE - BLACK	5	58	4	3	56	9	7	55	11	15		
FEMALE - HISPANIC	6	44	3	2	12	3	3	27	5	6		

D. Females - Age 20 - 22

FEMALE - WHITE	4	120	7	6	214	15	56	204	41	57		
FEMALE - BLACK	5	56	2	4	65	14	11	83	10	22		
FEMALE - HISPANIC	6	37	1	2	36	5	4	42	12	13		

NUMBER OF MISSING OBSERVATIONS = 422

* Ages outside range 18 - 22

TABLE A-3.6 YA: Description of Out of High School Subsample (Unweighted) Who Were Employed as of Survey Week by Age Groups and by Educational Level-Curriculum Classification and Sex-Race Groups

A. Males - Age 18 - 19

		X54											
COUNT		IHS GEN - HS VOC - HS BUS - HS GEN - HS VOC - HS BUS - HS GEN - HS VOC - HS BUS -											
ROW	PCT	IHS	GEN	HS	VOC	HS	BUS	HS	GEN	HS	VOC	HS	BUS
COL	PCT	IERLY	LVR	ERLY	LVR	ERLY	LVR	12	YRS	12	YRS	12	YRS
		SOME PST			SOME PST			SOME PST					
		7	8	9									
X3		1	72	23	1	60	33	0	30	26	0		
	MALE - WHITE	29.4	9.4	0.4	24.5	13.5	0.0	12.2	10.6	0.0			
		2	37	5	1	22	6	1	11	3	0		
	MALE - BLACK	43.0	5.8	1.2	25.6	7.0	1.2	12.8	3.5	0.0			
		3	22	6	2	10	8	0	6	3	0		
	MALE - HISPANIC	38.6	10.5	3.5	17.5	14.0	0.0	10.5	5.3	0.0			

B. Males - Age 20 - 22

X3		1	61	11	1	123	33	1	75	43	4		
	MALE - WHITE	17.3	3.1	0.3	34.9	9.4	0.3	21.3	12.2	1.1			
		2	44	2	0	38	12	1	17	5	1		
	MALE - BLACK	36.7	1.7	0.0	31.7	10.0	0.8	14.2	4.2	0.8			
		3	27	3	0	15	7	1	21	3	1		
	MALE - HISPANIC	34.6	3.8	0.0	19.2	9.0	1.3	26.9	3.8	1.3			

C. Females - Age 18 - 19

		X54											
COUNT		IHS GEN - HS VOC - HS BUS - HS GEN - HS VOC - HS BUS - HS GEN - HS VOC - HS BUS -											
ROW	PCT	IHS	GEN	HS	VOC	HS	BUS	HS	GEN	HS	VOC	HS	BUS
COL	PCT	IERLY	LVR	ERLY	LVR	ERLY	LVR	12	YRS	12	YRS	12	YRS
		SOME PST			SOME PST			SOME PST					
		7	8	9									
		4	43	0	2	78	12	36	47	9	13		
	FEMALE - WHITE	17.9	0.0	0.8	32.5	5.0	15.0	19.6	3.8	5.4			
		5	7	0	1	22	3	4	6	5	2		
	FEMALE - BLACK	14.0	0.0	2.0	44.0	6.0	8.0	12.0	10.0	4.0			
		6	13	1	0	8	2	3	9	1	5		
	FEMALE - HISPANIC	31.0	2.4	0.0	19.0	4.8	7.1	21.4	2.4	11.9			

D. Females - Age 20 - 22

		4	42	2	2	93	6	34	77	21	28		
	FEMALE - WHITE	13.8	0.7	0.7	30.5	2.0	11.1	25.2	6.9	9.2			
		5	12	0	0	27	7	6	24	2	7		
	FEMALE - BLACK	14.1	0.0	0.0	31.8	8.2	7.1	28.2	2.4	8.2			
		6	9	0	1	22	3	4	20	5	10		
	FEMALE - HISPANIC	12.2	0.0	1.4	29.7	4.1	5.4	27.0	6.8	13.5			

NUMBER OF MISSING OBSERVATIONS = 426

TABLE A-3.7 YA: Description of Out of High School Subsample (Unweighted) Who Were Employed as of Survey Week by Educational Level-Curriculum Classification and Sex-Race Groups

A. Male - Early leavers
Age 18 - 19

COUNT	ROW PCT	X26				
		IGENERAL	M - BUS F - OFF	M - T&I F - H EC	REST	VOC
1	72	0	1	17	6	
MALE - WHITE	75.0	1.0	17.7	6.3		
2	37	1	3	2		
MALE - BLACK	86.0	2.3	7.0	4.7		
3	22	2	3	3		
MALE - HISPANIC	73.3	6.7	10.0	10.0		

B. Male - 12 Years Exactly
Age 18 - 19

1	60	0	24	9		
MALE - WHITE	64.5	0.0	25.8	9.7		
2	22	1	4	2		
MALE - BLACK	75.9	3.4	13.8	6.9		
3	10	0	7	1		
MALE - HISPANIC	55.6	0.0	38.9	5.6		

C. Male - Some Postsecondary
Age 18 - 19

1	30	0	18	8		
MALE - WHITE	53.6	0.0	32.1	14.3		
2	11	0	1	2		
MALE - BLACK	78.6	0.0	7.1	14.3		
3	6	0	3	0		
MALE - HISPANIC	66.7	0.0	33.3	0.0		

Age 20 - 22

COUNT	ROW PCT	X26				
		IGENERAL	M - BUS F - OFF	M - T&I F - H EC	REST	VOC
1	61	1	9	2		
MALE - WHITE	83.6	1.4	12.3	2.7		
2	44	0	0	2		
MALE - BLACK	95.7	0.0	0.0	4.3		
3	27	0	3	0		
MALE - HISPANIC	90.0	0.0	10.0	0.0		

Age 20 - 22

1	123	1	24	9		
MALE - WHITE	78.3	0.6	15.3	5.7		
2	38	1	9	3		
MALE - BLACK	74.5	2.0	17.6	5.9		
3	15	1	6	1		
MALE - HISPANIC	65.2	4.3	26.1	4.3		

Age 20 - 22

1	75	4	37	6		
MALE - WHITE	61.5	3.3	30.3	4.9		
2	17	1	4	1		
MALE - BLACK	73.9	4.3	17.4	4.3		
3	21	1	3	0		
MALE - HISPANIC	84.0	4.0	12.0	0.0		

TABLE A-3.7 (continued)

D. Females - Early Leavers

		Age 18 - 19					
		x26					
		GENERAL	M - BUS	M - T&I	REST	VOC	
		F - OFF F - H EC					
		0	1	2	3		

FEMALE - WHITE	4	43	2	0	0		
	I	95.6	4.4	0.0	0.0		
	I						
FEMALE - BLACK	5	7	1	0	0		
	I	87.5	12.5	0.0	0.0		
	I						
FEMALE - HISPANIC	6	13	0	0	1		
	I	92.9	0.0	0.0	7.1		
	I						

		Age 20 - 22					
		x26					
		GENERAL	M - BUS	M - T&I	REST	VOC	
		F - OFF F - H EC					
		0	1	2	3		

FEMALE - WHITE	4	42	2	0	2		
	I	91.3	4.3	0.0	4.3		
	I						
FEMALE - BLACK	5	12	0	0	0		
	I	100.0	0.0	0.0	0.0		
	I						
FEMALE - HISPANIC	6	9	1	0	0		
	I	90.0	10.0	0.0	0.0		
	I						

E. Females - 12 Years Exactly

		Age 18 - 19					
		x26					
		GENERAL	M - BUS	M - T&I	REST	VOC	
		F - OFF F - H EC					
		0	1	2	3		

FEMALE - WHITE	4	93	34	1	5		
	I	69.9	25.6	0.0	3.8		
	I						
FEMALE - BLACK	5	27	6	1	6		
	I	67.5	15.0	2.5	15.0		
	I						
FEMALE - HISPANIC	6	22	4	0	3		
	I	75.9	13.8	0.0	10.3		
	I						

		Age 20 - 22					
		x26					
		GENERAL	M - BUS	M - T&I	REST	VOC	
		F - OFF F - H EC					
		0	1	2	3		

FEMALE - WHITE	4	78	36	4	8		
	I	61.9	28.6	3.2	6.3		
	I						
FEMALE - BLACK	5	22	4	2	1		
	I	75.9	13.8	6.9	3.4		
	I						
FEMALE - HISPANIC	6	8	3	1	1		
	I	61.5	23.1	7.7	7.7		
	I						

F. Females - Some Postsecondary

		Age 18 - 19					
		x26					
		GENERAL	M - BUS	M - T&I	REST	VOC	
		F - OFF F - H EC					
		0	1	2	3		

FEMALE - WHITE	4	47	13	1	8		
	I	68.1	18.8	1.4	11.6		
	I						
FEMALE - BLACK	5	6	2	1	4		
	I	46.2	15.4	7.7	30.8		
	I						
FEMALE - HISPANIC	6	9	5	0	1		
	I	60.0	33.3	0.0	6.7		
	I						

		Age 20 - 22					
		x26					
		GENERAL	M - BUS	M - T&I	REST	VOC	
		F - OFF F - H EC					
		0	1	2	3		

FEMALE - WHITE	4	77	28	3	18		
	I	61.2	22.2	2.4	14.3		
	I						
FEMALE - BLACK	5	24	7	0	2		
	I	72.7	21.2	0.0	6.1		
	I						
FEMALE - HISPANIC	6	20	10	0	5		
	I	57.1	28.6	0.0	14.3		
	I						

NUMBER OF MISSING OBSERVATIONS = 426

TABLE B-1.1 Average Number of Semester Courses Taken in Last Three Years of High School for General and Vocational Graduates with No Postsecondary Education (12 years exactly) as of Four Years Out of High School (weighted results)

Content Area	M-W		M-B		F-W		F-B	
	Gen	Total Voc						
English	4.63	4.48	4.24	4.02	4.60	4.31	4.54	4.42
Math	2.33	2.18	2.26	2.44	1.91	1.71	2.65	2.24
Science & Foreign Lang.	2.98	2.32	2.44	2.32	2.78	2.36	3.58	2.64
Social Studies & Fine Arts	5.63	4.73	5.04	4.08	6.00	4.61	5.14	4.91
Agriculture	0.55	0.64	0.87	0.63	0.03	0.01	0.03	0.03
Business	1.13	1.04	0.78	0.60	2.81	5.47	1.69	3.65
Commercial Distributive Education	1.36	1.36	0.77	0.77	3.44	6.06	1.95	3.68
Health Occup.	0.18	0.35	0.29	0.27	0.14	0.31	0.50	0.40
Home Economics	0.08	0.03	0.01	0.03	0.08	0.11	0.62	0.15
T & I	0.18	0.12	0.27	0.14	1.85	1.24	1.79	1.45
Ind. Arts	2.03	3.38	1.05	2.25	0.14	0.27	0.27	0.40
Ind. Arts	2.77	2.93	1.35	1.21	0.21	0.24	0.29	0.26
Total number Semester Course	23.85	23.56	19.37	18.76	23.99	26.70	23.05	24.23

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TABLE B-1.2 Average Number of Semester Courses Taken in Last Three Years of High School for General and Vocational Graduates with Some Postsecondary Education as of Four Years Out of High School (weighted results)

Content Area	M-W		M-B		F-W		F-B	
	Gen	Total Voc						
English	4.54	4.42	4.12	4.48	4.65	4.55	3.92	3.70
Math	2.63	2.26	2.71	2.61	2.21	1.81	2.06	1.68
Science and Foreign Lang.	3.18	2.37	3.06	3.02	3.24	2.76	2.68	2.34
Social Studies & Fine Arts	5.57	4.52	5.26	4.74	6.30	5.25	4.82	4.11
Agriculture	0.49	0.61	0.66	0.39	0.05	0.03	0.04	0.03
Business	1.13	0.97	1.11	0.94	2.60	4.87	2.01	2.80
Commercial Distributive Education	1.43	1.35	1.05	1.14	3.06	5.50	2.17	2.64
Health Occup.	0.13	0.32	0.18	0.27	0.18	0.28	0.16	0.26
Home Economics	0.06	0.04	0.06	0.12	0.10	0.21	0.43	0.27
T & I	0.15	0.08	0.21	0.02	1.65	1.25	1.56	1.21
Ind. Arts	1.73	3.31	1.15	2.41	0.25	0.28	0.22	0.45
Total Number Semester Course	2.08	2.88	1.70	1.62	0.19	0.16	0.45	0.14
	23.12	23.13	21.27	21.76	24.48	26.95	20.52	19.63

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APPENDIX B-2. NLS-72: High School Graduates (12 years exactly) -
Average semesters of courses taken 7/69-6/72 by
selected curriculum groups and sex-race groups
(Weighted Results)

VARIABLE AVERAGED... X101 ENGLISH - TOTAL SEMS AFTER 7-69

		X26					
MEAN I		GENERAL	BUS-COMM	T&I - M	REST VOC	ROW	
COUNT I			-OFF	H C F		TOTAL	
		0 I	1 I	2 I	3 I		
X3		I-----I	I-----I	I-----I	I-----I	I-----I	
	1 I	4.63 I	4.52 I	4.55 I	4.32 I	4.57	
MALE - WHITE	I 166923 I	I 14040 I	I 56829 I	I 30611 I	I 268403		
	2 I	4.27 I	3.52 I	4.1 I	3.52 I	4.14	
MALE - BLACK	I 17493 I	I 2400 I	I 7330 I	I 3439 I	I 30662		
	3 I	4.61 I	4.38 I	4.08 I	3.91 I	4.45	
FEMALE - WHITE	I 152772 I	I 120158 I	I 11448 I	I 19221 I	I 303600		
	4 I	4.63 I	4.63 I	4.33 I	3.78 I	4.49	
FEMALE - BLACK	I 18515 I	I 11222 I	I 4390 I	I 4843 I	I 38969		
COLUMN TOTAL		4.60	4.40	4.45	4.09	4.49	
		355704	147820	79997	58114	641634	

VARIABLE AVERAGED... X102 MATH - TOTAL SEMS AFTER 7-69

		X26					
MEAN I		GENERAL	BUS-COMM	T&I - M	REST VOC	ROW	
COUNT I			-OFF	H C F		TOTAL	
		0 I	1 I	2 I	3 I		
X3		I-----I	I-----I	I-----I	I-----I	I-----I	
	1 I	2.33 I	2.45 I	2.08 I	2.21 I	2.27	
MALE - WHITE	I 166923 I	I 14040 I	I 56829 I	I 30611 I	I 268403		
	2 I	2.28 I	2.41 I	2.49 I	2.25 I	2.34	
MALE - BLACK	I 17493 I	I 2400 I	I 7330 I	I 3439 I	I 30662		
	3 I	1.92 I	1.78 I	1.40 I	1.50 I	1.82	
FEMALE - WHITE	I 152772 I	I 120158 I	I 11448 I	I 19221 I	I 303600		
	4 I	2.70 I	2.25 I	2.31 I	1.98 I	2.44	
FEMALE - BLACK	I 18515 I	I 11222 I	I 4390 I	I 4843 I	I 38969		
COLUMN TOTAL		2.17	1.89	2.03	1.96	2.07	
		355704	147820	79997	58114	641634	

 VARIABLE AVERAGED... X103 SC & FOR LANG - TOTAL SEMS AFTER 7-69

		X26					
		MEAN I					
X3	COUNT	GENERAL	BUS-COMM	T&I - M	REST VOC	ROW	TOTAL
		0	1	2	3		
		OFF.	HEC-F				
MALE - WHITE	1	3.00	2.70	2.15	2.39	2.73	
	I	166923	14040	56829	30611	268403	
MALE - BLACK	2	2.46	2.19	2.59	1.71	2.39	
	I	17493	2400	7330	3439	30662	
FEMALE - WHITE	3	2.78	2.39	2.60	1.99	2.57	
	I	152772	120158	11448	19221	303600	
FEMALE - BLACK	4	3.61	2.86	2.30	2.30	3.08	
	I	18515	11222	4390	4843	38969	
COLUMN TOTAL		2.91	2.45	2.26	2.21	2.66	
		355704	147820	79997	58114	641634	

 VARIABLE AVERAGED... X104 SOC ST & FINE ARTS - TOTAL SEMS AFTER

		X26					
		MEAN I					
X3	COUNT	GENERAL	BUS-COMM	T&I - M	REST VOC	ROW	TOTAL
		0	1	2	3		
		OFF.	HEC-F				
MALE - WHITE	1	5.62	5.24	4.69	4.64	5.29	
	I	166923	14040	56829	30611	268403	
MALE - BLACK	2	5.07	4.32	4.01	3.93	4.63	
	I	17493	2400	7330	3439	30662	
FEMALE - WHITE	3	6.02	4.62	5.61	3.92	5.32	
	I	152772	120158	11448	19221	303600	
FEMALE - BLACK	4	5.31	4.67	4.94	4.88	5.03	
	I	18515	11222	4390	4843	38969	
COLUMN TOTAL		5.75	4.68	4.77	4.38	5.26	
		355704	147820	79997	58114	641634	

 VARIABLE AVERAGED... X107 COMMERCIAL - TOTAL SEMS AFTER 7-69

		X26					
		MEAN I					
X3	COUNT I	GENERAL	BUS-COMM -OFF	T&I - M H&C - F	REST VOC	ROW TOTAL	
	I	0 I	1 I	2 I	3 I		
MALE - WHITE	1 I	1.37 I	4.04 I	0.87 I	1.00 I	1.36	
	I	166923 I	14040 I	56829 I	30611 I	268403	
MALE - BLACK	2 I	0.78 I	1.94 I	0.43 I	0.62 I	0.77	
	I	17493 I	2400 I	7330 I	3439 I	30662	
FEMALE - WHITE	3 I	3.44 I	6.91 I	2.75 I	2.73 I	4.74	
	I	152772 I	120158 I	11448 I	19271 I	303600	
FEMALE - BLACK	4 I	2.01 I	4.82 I	1.95 I	2.58 I	2.88	
	I	18515 I	11222 I	4390 I	4843 I	38969	
COLUMN TOTAL		2.26	6.40	1.16	1.68	3.02	
		355704	147820	79997	58114	641634	

 VARIABLE AVERAGED... X108 DISTRIB ED - TOTAL SEMS AFTER 7-69

		X26					
		MEAN I					
X3	COUNT I	GENERAL	BUS-COMM OFF	T&I - M H&C - F	REST VOC	ROW TOTAL	
	I	0 I	1 I	2 I	3 I		
MALE - WHITE	1 I	0.18 I	0.11 I	0.13 I	0.87 I	0.24	
	I	166923 I	14040 I	56829 I	30611 I	268403	
MALE - BLACK	2 I	0.29 I	0.0 I	0.11 I	0.77 I	0.28	
	I	17493 I	2400 I	7330 I	3439 I	30662	
FEMALE - WHITE	3 I	0.14 I	0.22 I	0.09 I	0.99 I	0.22	
	I	152772 I	120158 I	11448 I	19221 I	303600	
FEMALE - BLACK	4 I	0.49 I	0.31 I	0.14 I	0.87 I	0.44	
	I	18515 I	11222 I	4390 I	4843 I	38969	
COLUMN TOTAL		0.18	0.21	0.12	0.60	0.25	
		355704	147820	79997	58114	641634	

 VARIABLE AVERAGED... X109 HEALTH OCCUP - TOTAL SEMS AFTER 7-69

		X26						
		MEAN I	GENERAL		BUS-COMM	T&I - M	REST VOC	ROW
		COUNT I	-OFF		H&C - F			TOTAL
		I	0 I	1 I	2 I	3 I	I	
X3								
	1	I	0.08 I	0.01 I	0.03 I	0.02 I		0.06
MALE - WHITE		I	166923 I	14040 I	56829 I	30611 I		268403
	2	I	0.01 I	0.0 I	0.06 I	0.0 I		0.02
MALE - BLACK		I	17493 I	2400 I	7330 I	3439 I		36662
	3	I	0.08 I	0.06 I	0.48 I	0.17 I		0.09
FEMALE - WHITE		I	152772 I	120158 I	11448 I	19221 I		303600
	4	I	0.61 I	0.19 I	0.15 I	0.07 I		0.37
FEMALE - BLACK		I	18515 I	11222 I	4390 I	4843 I		38969
COLUMN TOTAL			0.10	0.07	0.10	0.07		0.09
			355704	147820	79997	58114		641634

 VARIABLE AVERAGED... X110 HOME ECON - TOTAL SEMS AFTER 7-69

		X26						
		MEAN I	GENERAL		BUS-COMM	T&I - M	REST VOC	ROW
		COUNT I	-OFF		H&C - F			TOTAL
		I	0 I	1 I	2 I	3 I	I	
X3								
	1	I	0.18 I	0.13 I	0.07 I	0.22 I		0.15
MALE - WHITE		I	166923 I	14040 I	56829 I	30611 I		268403
	2	I	0.27 I	0.33 I	0.14 I	0.0 I		0.22
MALE - BLACK		I	17493 I	2400 I	7330 I	3439 I		30662
	3	I	1.86 I	1.08 I	3.37 I	0.98 I		1.55
FEMALE - WHITE		I	152772 I	120158 I	11448 I	19221 I		303600
	4	I	1.76 I	0.80 I	3.38 I	1.32 I		1.61
FEMALE - BLACK		I	18515 I	11222 I	4390 I	4843 I		38969
COLUMN TOTAL			0.99	0.96	0.73	0.55		0.91
			355704	147820	79997	58114		641634

 VARIABLE AVERAGED... X111 TRADE & INDUS - TOTAL SEMS AFTER 7-69

		X26					
		MEAN					
X3	COUNT	GENERAL	BUS-COMM	T&I - M	REST VOC	ROW	TOTAL
		0	1	2	3		
		OFF	HEC-F				
1	1	2.03	1.17	4.72	1.96	2.55	
MALE - WHITE	166923	14040	56829	30611	268403		
2	1	1.06	1.66	2.45	2.17	1.57	
MALE - BLACK	17493	2400	7330	3439	30662		
3	1	0.14	0.14	0.24	1.09	0.20	
FEMALE - WHITE	152772	120016	11448	19221	303457		
4	1	0.27	0.26	0.49	0.66	0.34	
FEMALE - BLACK	18515	11222	4390	4843	38969		
COLUMN TOTAL		1.08	0.27	3.64	1.58	1.26	
		355704	147677	79997	58114	641491	

 VARIABLE AVERAGED... X112 INDUS ARTS - TOTAL SEMS AFTER 7-69

		X26					
		MEAN					
X3	COUNT	GENERAL	BUS-COMM	T&I - M	REST VOC	ROW	TOTAL
		0	1	2	3		
		OFF	HEC-F				
1	1	2.74	1.70	3.86	1.92	2.83	
MALE - WHITE	166923	14040	56829	30611	268403		
2	1	1.35	0.68	1.60	0.73	1.29	
MALE - BLACK	17493	2400	7330	3439	30662		
3	1	0.21	0.23	0.14	0.35	0.22	
FEMALE - WHITE	152772	120158	11448	19221	303600		
4	1	0.28	0.36	0.12	0.18	0.27	
FEMALE - BLACK	18515	11222	4390	4843	38969		
COLUMN TOTAL		1.46	0.38	2.92	1.18	1.37	
		355704	147820	79997	58114	641634	

APPENDIX B-3 NLS-72: High School Graduates (12 years exactly) -
Discriminant Analysis (Weighted)^a

MODEL: MALE-WHITE SSE 57382.82 F RATIO 8.78
 DFE 1399 PROB>F 0.0001
DEP VAR: X21 MSE 41.312327 R-SQUARE 0.0759
 HS CURRICULUM COMPOSITE

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T	VARIABLE LABEL
INTERCEPT	1	0.356939	0.194080	1.8391	0.0661	
X4RAW	1	0.018579	0.022786	0.8154	0.4150	SES COMPOSITE RAW SCORE
X12	1	0.002301942	0.001731949	1.3291	0.1640	BASIC SKILLS - READING SCALED X
X13	1	0.002493877	0.001855255	1.3442	0.1791	BASIC SKILLS - MATH. SCALED X
X101	1	-0.010894	0.00754619	-1.4436	0.1491	ENGLISH - TOTAL SEMS AFTER 7-69
X102	1	-0.014498	0.00805697	-1.7990	0.0722	MATH - TOTAL SEMS AFTER 7-69
X103	1	0.022025	0.005552122	3.9670	0.0001	SC & FOR LANG - TOTAL SEMS AFTER 7-69
X104	1	0.017597	0.004428302	3.9739	0.0001	SOC ST & FINE ARTS - TOTAL SEMS AFTER 7-69
X112	1	0.008347804	0.004168586	2.0026	0.0454	INDUS ARTS - TOTAL SEMS AFTER 7-69
X111	1	-0.027150	0.003747274	-7.2452	0.0001	TRADE & INDUS - TOTAL SEMS AFTER 7-69
X107	1	-0.021664	0.007994134	-2.7100	0.0068	COMMERCIAL - TOTAL SEMS AFTER 7-69
X106	1	0.015329	0.008247337	1.8587	0.0633	BUSINESS - TOTAL SEMS AFTER 7-69
X110	1	0.025073	0.018907	1.3262	0.1850	HOME ECON - TOTAL SEMS AFTER 7-69
X115	1	-0.012936	0.006219942	-2.0798	0.0377	AGRIC-DIST-HEALTH - TOTAL SEM AFTER 7-69

MODEL: MALE-BLACK SSE 5957.22 F RATIO 3.49
 DFE 222 PROB>F 0.0001
DEP VAR: X21 MSE 26.834323 R-SQUARE 0.1696
 HS CURRICULUM COMPOSITE

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T	VARIABLE LABEL
INTERCEPT	1	-0.361495	0.432712	-0.8354	0.4044	
X4RAW	1	-0.031308	0.066773	-0.4689	0.6396	SES COMPOSITE RAW SCORE
X12	1	0.004619378	0.004675675	0.9980	0.3242	BASIC SKILLS - READING SCALED X
X13	1	0.019650	0.005662685	3.4700	0.0006	BASIC SKILLS - MATH. SCALED X
X101	1	-0.00859023	0.023336	-0.3681	0.7131	ENGLISH - TOTAL SEMS AFTER 7-69
X102	1	-0.012052	0.025192	-0.4784	0.6328	MATH - TOTAL SEMS AFTER 7-69
X103	1	-0.00193825	0.018876	-0.1027	0.9183	SC & FOR LANG - TOTAL SEMS AFTER 7-69
X104	1	0.027986	0.013897	2.0139	0.0452	SOC ST & FINE ARTS - TOTAL SEMS AFTER 7-69
X112	1	0.034871	0.015987	2.1812	0.0302	INDUS ARTS - TOTAL SEMS AFTER 7-69
X111	1	-0.043694	0.012620	-3.4623	0.0006	TRADE & INDUS - TOTAL SEMS AFTER 7-69
X107	1	-0.037939	0.025730	-1.4745	0.1418	COMMERCIAL - TOTAL SEMS AFTER 7-69
X106	1	0.009559067	0.022855	0.4193	0.6762	BUSINESS - TOTAL SEMS AFTER 7-69
X110	1	0.071426	0.047460	1.5050	0.1338	HOME ECON - TOTAL SEMS AFTER 7-69
X115	1	0.005694013	0.015285	0.3725	0.7099	AGRIC-DIST-HEALTH - TOTAL SEM AFTER 7-69

^aCurriculum classification: General coded 1; vocational coded 0.

Table B-3 (Continued)

MODEL: FEMALE-WHITE SSE 60233.03 F-RATIO 30.21
 DFE 1717 PROB>F 0.0001
 DEP VAR: X21 MSE 35.080392 R-SQUARE 0.1861
 HS CURRICULUM COMPOSITE

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T	VARIABLE LABEL
INTERCEPT	1	0.423644	0.165977	2.5524	0.0108	
X4RAW	1	-0.000720279	0.021479	-0.0335	0.9733	SES COMPOSITE RAW SCORE
X12	1	0.002476686	0.001491523	1.6605	0.0970	BASIC SKILLS - READING SCALED X
X13	1	-0.00104844	0.001665565	-0.6295	0.5291	BASIC SKILLS - MATH. SCALED X
X101	1	0.020544	0.007131322	2.8808	0.0040	ENGLISH - TOTAL SEMS AFTER 7-69
X102	1	-0.00397674	0.007659544	-0.5192	0.6037	MATH - TOTAL SEMS AFTER 7-69
X103	1	-0.000398358	0.004913677	-0.0811	0.9354	SC & FOR LANG - TOTAL SEMS AFTER 7-69
X104	1	0.023560	0.003817993	6.1708	0.0001	SOC ST & FINE ARTS - TOTAL SEMS AFTER 7-69
X112	1	-0.020490	0.011699	-1.7514	0.0800	INDUS ARTS - TOTAL SEMS AFTER 7-69
X111	1	-0.033711	0.010132	-3.3270	0.0009	TRADE & INDUS - TOTAL SEMS AFTER 7-69
X107	1	-0.030833	0.003427912	-8.9947	0.0001	COMMERCIAL - TOTAL SEMS AFTER 7-69
X106	1	-0.015003	0.002880422	-5.2085	0.0001	BUSINESS - TOTAL SEMS AFTER 7-69
X110	1	0.024057	0.005226066	4.6034	0.0001	HOME ECON - TOTAL SEMS AFTER 7-69
X115	1	-0.040278	0.009507781	-4.2363	0.0001	AGRIC-DIST-HEALTH - TOTAL SEM AFTER

MODEL: FEMALE-BLACK SSE 7755.013 F RATIO 3.80
 DFE 291 PROB>F 0.0001
 DEP VAR: X21 MSE 26.649528 R-SQUARE 0.1451
 HS CURRICULUM COMPOSITE

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T	VARIABLE LABEL
INTERCEPT	1	0.749945	0.374190	2.0042	0.0460	
X4RAW	1	-0.141984	0.059036	-2.4050	0.0168	SES COMPOSITE RAW SCORE
X12	1	-0.000475841	0.004380957	-0.1086	0.9136	BASIC SKILLS - READING SCALED X
X13	1	-0.00175677	0.005646755	-0.3111	0.7559	BASIC SKILLS - MATH. SCALED X
X101	1	0.002214208	0.017518	0.1264	0.8995	ENGLISH - TOTAL SEMS AFTER 7-69
X102	1	0.019710	0.020017	0.9847	0.3256	MATH - TOTAL SEMS AFTER 7-69
X103	1	0.018451	0.009909308	1.8620	0.0636	SC & FOR LANG - TOTAL SEMS AFTER 7-69
X104	1	0.001928392	0.012171	0.1584	0.8742	SOC ST & FINE ARTS - TOTAL SEMS AFTER 7-69
X112	1	-0.00735154	0.023658	-0.3107	0.7562	INDUS ARTS - TOTAL SEMS AFTER 7-69
X111	1	-0.027490	0.019171	-1.4339	0.1527	TRADE & INDUS - TOTAL SEMS AFTER 7-69
X107	1	-0.027906	0.010865	-2.5685	0.0107	COMMERCIAL - TOTAL SEMS AFTER 7-69
X106	1	-0.013375	0.009538825	-1.4022	0.1619	BUSINESS - TOTAL SEMS AFTER 7-69
X110	1	0.0008178823	0.013150	0.0622	0.9504	HOME ECON - TOTAL SEMS AFTER 7-69
X115	1	0.024917	0.011260	2.2130	0.0277	AGRIC-DIST-HEALTH - TOTAL SEM AFTER

Table C-1.1. NLS-72: Average SES Composite Scores^a for High School Graduates (12 Years Exactly) (Weighted Results)

		VALUE.. 1 12 YRS EXACTLY					
VARIABLE AVERAGED...		X4RAW SES COMPOSITE RAW SCORE					
		X26					
	MEAN	GENERAL	M - BUS	M - T&I	REST VOC	ROW	
	COUNT		F - OFF	.F - H EC		TOTAL	
		0	1	2	3		
X3							
	1	2.09593	2.09428	2.07483	2.00689	2.07285	
MALE - WHITE		177388	14479	59339	32546	283752	
	2	1.59110	1.67909	1.58188	1.57257	1.59335	
MALE - BLAC..		18017	2511	8068	3963	32558	
	3	2.04068	2.04945	1.88678	1.97430	2.03377	
FEMALE - WHITE		159034	125717	12233	21393	318377	
	4	1.42704	1.71979	1.43466	1.50758	1.52358	
FEMALE - BLACK		18673	11705	4582	5404	40364	
COLUMN TOTAL		2.01453	2.02264	1.93728	1.92606	1.99845	
		373112	154412	84222	63306	675052	

^a The SES composite raw scores were based on a scale that ranged from negative to positive. In order to make all scores positive, a constant of 2.3374 was added to all scores, the lowest score in our analysis file (see Appendix A-1, Table A-1.2) being -2.3373.

Table C-1.2. LMI: Average Socioeconomic Index Scores for Male Early Leavers and High School Graduates (12 Years Exactly) for Subpopulations Representing Three Time Points (Weighted Results)

A. ENTRY YEAR

		X55E						
		MEAN I	HS GEN -		HS VOCB-		HS VOCB-	
		COUNT I	ERLY LVR	ERLY LVR	12 YRS	12 YRS	12 YRS	12 YRS
		I	1 I	2 I	3 I	5 I	6 I	4 I
Males								
X2								
	0	I	86.97 I	81.80 I	83.91 I	98.16 I	87.58 I	90.47 I
BLACK		I	16410 I	5436 I	19842 I	2209 I	5865 I	8073 I
	1	I	102.53 I	96.68 I	102.88 I	103.18 I	100.08 I	100.79 I
WHITE		I	77879 I	12506 I	142401 I	11789 I	39414 I	51203 I
	COLUMN TOTAL		99.82	92.17	100.56	102.39	98.46	99.39
			94289	17942	162244	13997	45279	59276

B. FOUR YEARS OUT OF HIGH SCHOOL

		X55F						
		MEAN I	HS GEN -		HS VOCB-		HS VOCB-	
		COUNT I	ERLY LVR	ERLY LVR	12 YRS	12 YRS	12 YRS	12 YRS
		I	1 I	2 I	3 I	5 I	6 I	4 I
Males								
X2								
	0	I	80.39 I	81.71 I	82.83 I	* I	* I	87.96 I
BLACK		I	11437 I	2482 I	19905 I	I	I	4334 I
	1	I	88.24 I	87.16 I	99.07 I	99.66 I	100.97 I	100.68 I
WHITE		I	39022 I	8120 I	123262 I	10541 I	36647 I	47188 I
	COLUMN TOTAL		86.46	85.88	96.82	98.33	99.97	99.61
			50459	10602	143067	11504	40019	51527

C. TEN YEARS OUT OF HIGH SCHOOL

		X55T						
		MEAN I	HS GEN -		HS VOCB-		HS VOCB-	
		COUNT I	ERLY LVR	ERLY LVR	12 YRS	12 YRS	12 YRS	12 YRS
		I	1 I	2 I	3 I	5 I	6 I	4 I
Males								
X2								
	0	I	* I	* I	87.15 I	* I	* I	89.61 I
BLACK		I	I	I	8362 I	I	I	3320 I
	1	I	* I	* I	99.05 I	95.78 I	99.17 I	98.46 I
WHITE		I	I	I	72696 I	5373 I	20290 I	25663 I
	COLUMN TOTAL				97.82	92.81	98.66	97.45
					81058	6018	22971	28989

* Insufficient sample size.

Table C-1.3. YA: White Males - Distribution on Mother's Education for Early Leavers and High School Graduates (12 Years Exactly) out of School and Students in School (Weighted Results)

A. OUT OF HIGH SCHOOL

		X55											
COUNT		IHS GEN - HS VOC - HS GEN -			M - BUS		M - T&I		REST VOC		HS VOC -		
COL FCT		IERLY LVR	ERLY LVR	12 YRS									
Mother's Educ.		1	2	3	II	1	2	3	4				
1	LT H.S.	1454706	1117163	1255160	II *	74993	1971	77596					
		59.1	59.1	25.2	II	28.8	2.8	22.8					
2	H.S. COMPLETED	1275318	71967	1629250	II *	1151105	64124	216950					
		35.2	36.3	62.2	II	59.1	92.2	64.4					
3	SOME COLLEGE	41501	4831	66297	II *	32689	2284	34983					
		5.3	2.5	6.6	II	12.6	3.3	10.3					
4	COMPLETED 4-YR C	10975	4149	41567	II *	1413	1168	6612					
		1.4	2.1	4.1	II	0.5	1.7	0.8					
5	MORE THAN 4 YRS	0	0	19239	II *	0	0	5201					
		0.0	0.0	1.9	II	0.0	0.0	1.7					
COLUMN TOTAL		782499	198159	1011541	:	260290	69587	139941	11				
		10.7	2.7	13.8		10.3	5.1	4.6					

B. IN HIGH SCHOOL

		INHSXAGE							
COUNT		IHS GEN		INHS GEN		INHS VOC		INHS VOC	
COL FCT		14-15	16-18	14-15	16-18				
Mother's Educ.		1	2	3	4				
1	LT H.S.	1269520	1371615	63409	1166404				
		22.8	25.8	31.8	33.1				
2	H.S. COMPLETED	1677562	1776564	110062	1300991				
		57.2	53.9	56.3	54.0				
3	SOME COLLEGE	1150512	1141139	13195	137533				
		12.7	9.8	6.6	6.3				
4	COMPLETED 4-YR C	66283	1130997	10627	139066				
		5.6	9.1	5.3	5.6				
5	MORE THAN 4 YRS	20139	21186	0	5513				
		1.7	1.5	0.0	0.9				
COLUMN TOTAL		1184006	1441599	199493	593277	34			
		34.6	42.2	5.8	17.4				

* Insufficient sample size/

Table C-1.4. YA: White Females - Distribution on Mother's Education for High School Graduates (12 years Exactly) out of School and Students in School (Weighted Results)

A. OUT OF HIGH SCHOOL

Mother's Educ.	X26										
	COUNT		IGENERAL				REST VOC - HS VOC -				
	COL	FCT	IGENERAL	F - OFF	F - H	EC	REST VOC	HS VOC -	12 YRS		
	I	0	I	1	I	2	I	3	I	4	I
LT H.S.	1	1360967	1132436	I	*	I	25656	I	1164614	I	
	I	35.7	I	34.7	I		I	32.5	I	35.2	I
H.S. COMPLETED	2	1551773	1232158	I	*	I	42038	I	1275314	I	
	I	54.6	I	60.8	I		I	53.3	I	55.8	I
SOME COLLEGE	3	145250	10777	I	*	I	11237	I	122013	I	
	I	4.5	I	2.8	I		I	14.2	I	4.7	I
COMPLETED 4-YR C	4	147834	15677	I	*	I	0	I	15677	I	
	I	4.7	I	1.5	I		I	0.0	I	1.2	I
MORE THAN 4 YRS	5	15262	1612	I	*	I	0	I	1612	I	
	I	0.5	I	0.2	I		I	0.0	I	0.1	I
COLUMN TOTAL		1011026	381660				78933	1	468240		
TOTAL		68.3	25.8				5.3		6.4		

B. IN HIGH SCHOOL

Mother's Educ.	INHSXAGE								
	COUNT		INHS GEN		INHS VOC				
	COL	FCT	INHS GEN	INHS VOC	INHS GEN	INHS VOC			
	I	1	I	2	I	3	I	4	I
LT H.S.	1	1450288	1391228	I	54419	1158064	I		
	I	34.3	I	27.9	I	28.8	I	32.1	I
H.S. COMPLETED	2	1644385	1729950	I	1100347	1274493	I		
	I	49.1	I	52.1	I	53.1	I	54.2	I
SOME COLLEGE	3	1104797	1130632	I	9724	147647	I		
	I	8.0	I	9.3	I	5.1	I	9.7	I
COMPLETED 4-YR C	4	182643	1100418	I	12729	19575	I		
	I	6.3	I	7.2	I	6.7	I	2.0	I
MORE THAN 4 YRS	5	129447	149026	I	11737	0	I		
	I	2.2	I	3.5	I	6.2	I	0.0	I
COLUMN TOTAL		1311559	1401152		185475	402451			
TOTAL		38.6	41.3		5.6	14.5			

* Insufficient sample size.

Table C-2.2. NLS-72: Average Reading and Math Test Scores for High School Graduates (12 Years Exactly) (Weighted Results)

							VALUE..	1	12 YRS EXACTLY		
*****							*****				
VARIABLE AVERAGED...	X12	BASIC SKILLS - READING SCALED X					*****				
*****							*****				
							X26				
MEAN I	COUNT I	GENERAL	M - BUS F - OFF	M - T&I F - H EC	REST VOC	ROW TOTAL					
		0 I	1 I	2 I	3 I						
X3		-----I-----I-----I-----I-----I									
1	I	46.78 I	44.70 I	45.63 I	44.58 I	46.14					
MALE - WHITE	I	125952 I	10912 I	46846 I	25768 I	209477					
		-----I-----I-----I-----I-----I									
2	I	39.72 I	36.90 I	37.23 I	38.35 I	38.75					
MALE - BLACK	I	11723 I	1743 I	4609 I	2611 I	20685					
		-----I-----I-----I-----I-----I									
3	I	47.73 I	48.22 I	44.21 I	43.89 I	47.54					
FEMALE - WHITE	I	112024 I	100499 I	9340 I	16055 I	237917					
		-----I-----I-----I-----I-----I									
4	I	38.98 I	42.14 I	36.95 I	39.15 I	39.75					
FEMALE - BLACK	I	11061 I	8147 I	3039 I	3987 I	26233					
		-----I-----I-----I-----I-----I									
COLUMN TOTAL		46.54	47.33	44.40	43.57	46.17					
		260759	121300	63835	48420	494313					

							VALUE..	1	12 YRS EXACTLY		
*****							*****				
VARIABLE AVERAGED...	X13	BASIC SKILLS - MATH. SCALED X					*****				
*****							*****				
							X26				
MEAN I	COUNT I	GENERAL	M - BUS F - OFF	M - T&I F - H EC	REST VOC	ROW TOTAL					
		0 I	1 I	2 I	3 I						
X3		-----I-----I-----I-----I-----I									
1	I	47.16 I	46.62 I	45.71 I	45.20 I	46.56					
MALE - WHITE	I	125952 I	10912 I	46846 I	25768 I	209477					
		-----I-----I-----I-----I-----I									
2	I	40.22 I	37.41 I	38.25 I	35.66 I	38.97					
MALE - BLACK	I	11723 I	1743 I	4609 I	2611 I	20685					
		-----I-----I-----I-----I-----I									
3	I	45.02 I	46.05 I	42.97 I	43.92 I	45.30					
FEMALE - WHITE	I	112024 I	100499 I	9340 I	16055 I	237917					
		-----I-----I-----I-----I-----I									
4	I	37.89 I	39.56 I	36.96 I	37.43 I	38.23					
FEMALE - BLACK	I	11061 I	8147 I	3039 I	3987 I	26233					
		-----I-----I-----I-----I-----I									
COLUMN TOTAL		45.54	45.54	44.35	43.62	45.20					
		260759	121300	63835	48420	494313					

APPENDIX D-1. DETAILS OF CROSS-TABULAR PROCEDURES

In the descriptive and coursework analyses, average statistics were computed for demographic and outcome variables in a standard sex x race x self-reported curriculum x educational level (early leaver, 12 years exactly, some nonbaccalaureate postsecondary) format. In cases where the level of measurement of the variable was continuous (or it was represented as a 1-0 dichotomy), the average statistics were mean values or proportions.* Where the level of measurement was nominal or ordinal (e.g., mother's education), the average statistics were the proportions of each subgroup falling into each of the categories or levels of the variable.**

In general, statistics (such as means, proportions) produced without applying sampling/attrition weights will be different than those computed with weights; the magnitude of such differences varies generally with the size of the subpopulation for which the statistics are derived. Though it is possible that findings for both weighted and unweighted results may be highly comparable, the best rule to follow is to use weights if they are available, since the potential of bias in the results always

* These were obtained using BREAKDOWN or CROSSBREAK procedures in SPSS. All computer analyses were conducted at the Harvard University Computation Center.

**These were obtained using the CROSSTABS procedures of SPSS.

is present in unweighted results. One example of dramatic differences between weighted and unweighted results is provided by the race composition of the YA subsample used in our reanalyses. The racial composition of males and females, aged 14-21, in each form was as follows:

	Unweighted	Weighted
White	59.1%	79.3%
Black	26.2%	14.7%
Hispanics	14.9%	6.0%

Since the sample design for YA overrepresented minorities, the weighting adjusts the overrepresented groups to approximate their representation in the total population. The weighted results above are nearly identical to the population characteristics of the total YA baseyear sample in the public use file.*

Each of the three data sets reanalyzed includes baseyear sampling weights that could be used to adjust for biases due to any members sampled not being represented among the respondents to the baseyear survey. The NLS-72 public use file also contains attrition weights associated with each follow-up survey and combinations of follow-up patterns that allow adjusting for biases due to attrition from the baseyear sample of respondents (Levinsohn et al., 1978, Vol. 1, pp. 8-23). Since the YA public use file available for this study contained only the baseyear survey data, the baseyear sampling weight was the appropriate weight to use. However, the LME public use file which contained follow-up data

* White, 80.0%; black, 13.7%; Hispanic, 6.3%.

through 1976 for the young male cohort contained no attrition weights.* The weight used in deriving the population characteristics and averages on outcome variables for each of the three data sets was as follows:

✓ LME. The baseyear sampling weight included in the public use file was applied standardly in deriving percentages and means.

NLS-72. One of the criteria used in defining the reanalysis subsample identified in section 2.4 for NLS-72 was that the individual had responded to all three follow-up surveys (1973, 1974, and 1976). This enabled applying the same weight (W17) in deriving percentages and means for any variables included in the NLS-72 analyses. W17 is the appropriate attrition/sampling weight for respondents to the baseyear survey (or extended baseyear item subset) and all three follow-up surveys (Levinsohn et al., 1978, Vol. 1, pp. 8-23; especially Table 7, p. 22). Applying the same weight in analyses of outcomes over time avoided one potential source of variation in differences associated with curriculum over time.** If, for example, our results showed a difference in weekly earnings between business and general graduates one year after high school graduation and no difference in weekly earnings four years after high

* The Bureau of Census has recently calculated attrition weights for the LME follow-up surveys. We were able to obtain a supplemental tape containing these weights, but the tape arrived too late to be used in the reanalyses conducted for this study. Further, our strategy of approximating particular time points out of high school (entry, 4 years and 10 years) required pooling labor market information collected over a span of ten different chronological years. Applying different attrition weights to these results and then pooling them would confound any differences.

** David Wiley suggested this strategy for the reason stated. W17 was the weight used by Wiley and Harnischfeger (1980) in their study.

school graduation, one hypothesis for the difference could be differences in the sample composition for each year. If different weights had been applied to the data for each time point, questions could be raised as to whether the sample composition for each year was the same.

YA. Since all data included in the reanalyses of YA were collected in the 1979 baseyear survey, the sampling weight for the 1979 baseyear sample available on the YA public use file was standardly used in deriving percentages and means.

S

APPENDIX D-2. DETAILS OF REGRESSION PROCEDURES

Section 2.5 provided a general overview of the four types of analyses underlying the reanalyses conducted as part of this study. Regression procedures were used in three of these four types of analyses: basic regressions, detailed regressions and coursework analyses. This appendix documents the characteristics of the multiple regression procedures common to all regression analyses.

Ordinary least squares (OLS) estimation procedures were used for all the multiple regression analyses performed as part of the reanalyses in this study. OLS estimation procedures have been used, with one exception, in past regression analyses reported in the literature based on national longitudinal data sets in which some proxy of participation in a vocational curriculum or some indication of the amount of vocational coursework was included. The exception was a study reported by Meyer and Wise (1980), in which maximum likelihood estimation procedures were used.*

OLS regression procedures were used for all the gainful employment outcome variables identified in Table 2.3.1 as "continuous" measures. They can also be used appropriately for outcome variables that are represented as dichotomies (coded 0 and 1).** However, there is one problem with using a linear model to fit values to a dichotomous dependent variable: the linear model does not constrain the fitted values of the

* More specifically, probit and tobit procedures were used by Meyer and Wise. However, in a more recent work, Meyer (1981) uses ordinary least squares procedures and notes some advantages of such procedures over the "more expensive multinomial logit or probit models."

**The regression coefficients in this case represent the probability of being associated with the zero or one state.

dependent variable to lie within the unit interval and predictions greater than one or less than zero can be obtained (Buchele, 1976, p. 67). In contrast, the estimation procedures based on a logit model cause the dependent variable to asymptote within the zero-one boundaries. There seems general agreement among methodologists, however, that the linear model closely approximates the logit model when the splits on the dependent variable are not extreme (e.g., Buchele, 1976, p. 68; Markus, 1979, p. 37). In the case of the gainful employment outcome variables identified in Table 2.3.1, the splits on some variables by curriculum comparison groups were considered too extreme to use OLS regression procedures. Specifically, these variables included: labor force participation status, unemployment status, full-time vs. part-time work status, and self-employment status (see Table 2.3.1). Results reported for these latter variables are restricted to those derived from the cross-tabular descriptive analyses.

All the regression analyses were weighted. As described for the cross-tabular analyses in Appendix D-1, weight W17 in the NLS-72 public use file was standardly applied.* While the application of this weight was necessary to obtain unbiased estimates of the regression coefficients, the standard errors associated with the regression coefficients are not unbiased. Standard errors (or variances) and significance tests were designed for simple random samples, and the national sample represented by the NLS-72 sample is a multiple-stage cluster sample. The solution to this problem unfortunately is not a simple application of a correct formula for calculating an unbiased variance. The correction is a function not only

* The weighted regressions were all conducted using the SYSREG procedure in SAS.

of the sampling design but also of the relationship of each particular variable with the sampling clusters. The question of the appropriate or even necessary methods for solving this problem is an open one and subject to different emphases in different disciplines (Davis & Levinsohn, 1979, p. 88). One typical way of handling this problem has been to apply a correction factor to the standard error in order to assess whether the estimate is significant, but a great deal of guessing and rather crude rules-of-thumb are involved in these corrections (Glenn, 1977). If we had relied wholly on the results of significance tests then this problem would have been of more concern to us. However, as was discussed in section 2.6, our assessment of results was based not so much on tests of statistical significance as on overall patterns of consistency in results across data sets, time points, related outcome measures and between results of reanalyses and those of previous research.

All the regression analyses were performed using a pairwise option rather than a listwise option for handling incomplete data.* As described in Section 2.4, one of the criteria for selecting respondents for the NLS-72 reanalysis data set was that the individual had participated in all three follow-ups. While this, of course, reduced the potential incomplete data problem, even when respondents participate in a survey, they seldom provide complete data on all questions asked. However, we found that given the many variables on which complete data were required, including course transcript data and the variables required to classify their labor force participation status for each time point, the number of cases with incomplete data on any one variable in particular regression analyses was quite small.

* The CORR procedure in SAS was used to calculate weighted variance-covariance matrices from the raw data. The regression analyses were performed on the weighted variance-covariance matrices using SYSRIG in SAS.

APPENDIX E. SUPPLEMENTAL DATA ON POSTSECONDARY ENROLLMENT PATTERNS

The results reported in section 6.2 (and subsequent sections in Chapters 6 and 7) are based on a population which differs in two important ways from ones typically treated in past studies of postsecondary enrollment patterns: (1) academic high school graduates were excluded (see section 2.1.1), and (2) baccalaureate program enrollees or graduates were excluded (see introduction to section 6.1). As discussed in section 6.1, federal Vocational Education legislation includes preparation for postsecondary education as a goal for secondary vocational education, but indicates that such preparation should be that required for entry into non-baccalaureate postsecondary programs. It was for this reason that we based our postsecondary enrollment comparisons on a population which excludes those who are most likely to have pursued a baccalaureate program. Data on postsecondary enrollment for such a "nonbaccalaureate population" of postsecondary enrollees are reported in Table 6.2.1. Those results show that the general and vocational high school graduates have roughly equal likelihood of pursuing nonbaccalaureate postsecondary education.

This result does, of course, not necessarily pertain to the broader question of enrollment in postsecondary including both baccalaureate and nonbaccalaureate programs. Indeed, previous research has indicated that the likelihood of enrollment in a postsecondary education is greater for general high school graduates than for vocational high school graduates. In order to provide a broader perspective for viewing the results reported in section 6.2 (and in effect to provide a bridge between our own results and those of previous studies), this appendix describes differences in postsecondary enrollment between general and vocational public high school

graduates when no restriction is placed on the nature of the postsecondary program (i.e., baccalaureate or nonbaccalaureate).

Table 6.2.1 was based on the 7,170 cases described in Table A-1.4 (see Table A-1.1 for record of cases deleted from the total NLS-72 sample). Prior to imposing the postsecondary restriction on the NLS-72 sample, the study population was defined to include whites and blacks of each sex who self-reported they were enrolled in a vocational or general program in a public high school. Thus, as indicated in the first stage in Table A-1.1, any cases were deleted from the NLS-72 sample who self-reported they were attending a private or parochial high school, were enrolled in an academic high school program, were not white or black (i.e., were another race or unclassified), or did not report their sex. At the end of the first deletion stage, there were a total of 11,534 cases remaining in the study population. A further 728 cases were eliminated because they could not be classified as either having ever attended or not attended a postsecondary institution. Thus, the results reported in this appendix are based on a grand total of 10,806 NLS-72 respondents (white or black) who had been enrolled in a public high school general or vocational program (as self-reported) in the senior year in high school.

The results reported in Table E-1 for the larger population indicate that general high school graduates enroll in postsecondary education in general (including both baccalaureate and nonbaccalaureate programs) at a greater rate than vocational graduates; in comparison to 54.3 percent of the vocational high school graduates, 62.5 percent of the general high school graduates enrolled in a postsecondary institution at some time by four years out of high school. Note, however, that the differential in

rate of postsecondary enrollment varies by sex. For males, both black and white, general high school graduates enrolled in postsecondary institutions only 5% more than vocational high school graduates. A similar differential pertained for black females. However, for white females, 60.8 percent of general high school graduates enrolled in postsecondary institutions, but only 48.4 percent of vocational high school graduates, a 12.4 percent difference. The breakdown by postsecondary major (academic or vocational) in Table E-1 indicates that the greater enrollment for the general graduates derives mainly from enrollment in academic postsecondary programs. Table E-2, which compares postsecondary enrollment by type of institution, shows that the greater enrollment in academic programs by general high school graduates is mainly in four-year institutions.

In sum, the results reported in this appendix make it clear why the results reported in section 6.2 regarding the rates of postsecondary enrollment for vocational and general high school graduates differ from those of previous research addressed to this topic. If attention is restricted as in section 6.2 to enrollments in postsecondary programs below the baccalaureate level (approximated in our analyses as being in postsecondary institutions in the first or second years after high school graduation but not full time in the third or fourth years after graduation), then we find that rates of postsecondary enrollment are approximately equal for vocational and general public high school graduates. In this respect, it appears that the Congressionally stated intent of secondary vocational programs to prepare students for postsecondary education below the baccalaureate level is being met. However, if we place no such restriction on type of postsecondary education, as in this appendix, then it is apparent that general

public high school graduates, at least in the high school class of 1972, tend to enroll in postsecondary institutions at a higher rate than vocational public high school graduates.

The differences in the overall rate of enrollment were not found to be large (i.e., differences averaged about 5 percent for males and 3 percent for females), but were consistent in direction across both sex and race groups. The differences in overall postsecondary enrollment rates derive from the fact that general high school graduates tend to enroll in academic postsecondary programs at rates 10-15% above vocational high school graduates, even though vocational high school graduates tend to enroll in vocational postsecondary programs at rates 4-8% greater than general high school graduates (all as self-reported).

TABLE E-1: Enrollment in Postsecondary Education (Both Baccalaureate and Nonbaccalaureate) by Secondary Curriculum (General vs. Vocational) and Sex-Race Group NLS-72 (Unweighted Percentages)

Secondary General Graduates

	HS Gen PS None	HS Gen PS Acad	HS Gen PS Voc	HS Gen PS MDC	HS Gen PS Total
Male-White	37.6	28.4	15.5	18.6	62.4
Male-Black	35.3	27.8	11.3	25.6	64.7
Female-White	39.2	27.1	18.7	15.0	60.8
Female-Black	31.3	29.2	22.1	17.3	68.7
Column Total	37.5	27.9	17.0	17.6	62.5

Secondary Vocational Graduates

	HS Voc PS None	HS Voc PS Acad	HS Voc PS Voc	HS Voc PS MDC	HS Voc PS ^a Total
Male-White	43.2	13.0	21.7	22.1	56.8
Male-Black	40.2	16.2	19.3	24.3	59.8
Female-White	51.6	10.7	22.3	15.5	48.4
Female-Black	35.0	18.1	26.3	20.5	65.0
Column Total	45.7	12.8	22.4	19.1	54.3

^aPS MDC - Those identified as having enrolled in postsecondary programs for whom information was unavailable regarding whether they pursued academic or vocational programs.

TABLE E-2: Type of Institutions Last Attended by Enrollees in Postsecondary Programs (Baccalaureate and Nonbaccalaureate), NLS-72

	Baccalaureate- Nonbaccalaureate Population ^a	Nonbaccalaureate Population ^b
Four-Year College	22.2	12.4
Two-Year Junior or Community College	25.5	26.3
Voc., Trade, Business or Other Career Training School	19.9	28.3
Other	1.9	2.1
Type Unrepresented	30.5	30.9

^aType of institution associated with postsecondary enrollees described in Table E-1. Based on unweighted percentages.

^bType of institution associated with postsecondary enrollees described in Table 6.2.1. Based on weighted percentages.

APPENDIX F. SUMMARY OF FINDINGS FROM PREVIOUS REGRESSION STUDIES

Tables F-1 and F-2 summarize the relationships between vocational education participation and gainful employment outcomes reported in previous regression studies based on the NLS-72 and LME data sets, respectively. In noting the relationships found, we indicate for each sex-race subgroup (or pooled group) whether the differences between the vocational curriculum group and the general group (or the outcomes associated with vocational coursework) were significant and the direction of the difference. The notation used in these tables is as follows:

- (None) = not significant at the .05 level (or greater than or equal to two standard errors)
- (+) = vocational education group identified was significantly greater than general group
- (-) = vocational education group identified was significantly less than general group; however this symbol is never used because the vocational education group was never significantly less than the general group.

Immediately following the above symbols, the exact nature of the vocational education representation is specified in the tables. "NR" in the tables indicates separate results for a particular sex-race subgroup were "not reported."

All but one of the studies summarized in these tables provided some indication of the statistical significance of the regression coefficients reported either by indicating the standard errors, t values, or by indicating particular levels of significance attained. Wiley and Harnischfeger (1980) did not report the results of any significance tests or standard errors associated with the regression coefficients so interpretations provided in their text for the respective regression coefficients are noted in the table.

While a .05 level was used as the overall criterion for the significant differences reported in these tables, borderline cases in which a .10 level was attained are noted.

TABLE F-1: Summary of Findings of Regression Studies Based on NLS-72 Data Set. by Gainful Employment Outcomes Examined.

Study	Educ Level Represented	Source Used to Define Voc. Ed. Participation	Follow up Year Represented	A. Hourly Earnings			
				M-W	M-B	F-W	F-B
Neuman et al. (1977, 1978)	12 Yrs. & Postsec.	Curr. Source not identified (either self-report or sch. admin.)	1973	Males and Females Pooled (Race Pooled) (none) pooled voc.			
Wise & Hammischfeger	12 Yrs. & Postsec.	Course Data-Solution Aggregated Across Curr.	1972	(consistently positive but not large) Total class hours of voc. ed.	NR	NR	NR
			1976	(not consistent or large) Total hours of voc. ed.	NR	NR	NR
		Course Data-3 separate solutions by sch. admin. curr. classif. (acad., gen., pooled voc.)	1972, 1976	(effects not consistent) Total class hours of voc. ed.	NR	(effects not consistent) Total class hours of voc. ed.	NR
Meer & Wise	12 Yrs. & Postsec.	First F U question whether had h.s. job training	1972, 1973, 1974, 1975, 1976	Males - race pooled (none) h.s. job training		NR	NR
Meer (1981)	12 Yrs. Exactly	Course data-solution aggregated across curr.	1974, 1976	Males - race pooled (none) percent of gr. total voc. ed. course work		Females - race pooled (+) percent of commercial course work	
			1974	(+) pooled voc. (+) T & I (none) commercial		(+) pooled voc (+) commercial	
		1976	(+) pooled voc (+) T & I (+) commercial		(+) pooled voc (+) commercial		

TABLE F-1 Summary of Findings of Regression Studies Based on NLS-72 Data Set by Gainful Employment Outcomes Examined.

Study	Educ Level Represented	Source Used to Define Voc. Ed. Participation	Follow-up Year Represented	M-W	M-B	F-W	F-B
<u>A. Hourly Earnings</u>							
Meyer (1981) (cont.)	12 Yrs. Exactly	School admin. classif. ^c	1974, 1976	(none) pooled voc		(none) pooled voc	
		First F U question on h.s. job training ^e	1974, 1976	(none) h.s. job training		(+) h.s. job training	
Gustman & Steinmeier (1981)	12 Yrs. Exactly	Self-reported curr.	1976	NR	NR	(+) office bus. ^d	NR
<u>B. Weekly Earnings</u>							
Wiley & Harnischfeger (1980)	12 Yrs. & postsec	Course data -	1972, 1976	Same findings as reported for hourly earnings			
Meyer (1981)	12 Yrs. Exactly	Course data - solution aggregated across curr.	1974, 1976	<u>Males - race pooled</u> (none) percent of gr. total voc. ed. coursework		<u>Females - race pooled</u> (+) percent of commercial coursework	
		Self-reported curr.	1974	(+ pooled voc (+) T & I (none) commercial		(+ pooled voc (+) commercial	
			1976	(+ pooled voc (+) T & I (+) commercial		(+ pooled voc (+) commercial	
		School admin. classif. ^c	1974, 1976	(none) pooled voc		(none) pooled voc	
		First F U question on h.s. job training ^c	1974, 1976	(none) h.s. job training		(+ h.s. job training	

TABLE F-1 Summary of Findings of Regression Studies Based on NLS-72 Data Set by Careful Employment
(cont'd) Outcomes Examined.

Study	Educ Level Represented	Source Used to Define Voc. Id. Participation	Follow-up Year Represented	M-W	M-B	F-W	F-B
<u>B. Weekly Earnings (Cont.)</u>							
Gustman & Steinmeier (1981)	12 Yrs. Exactly	Self-reported Curr	1976	none) Comm. none) Rest. Voc. none) T & I	(none) Comm. (none) Rest. Voc. NR - T & I	none) total voc ed	none) total voc ed
		Course Data	1976	none) total voc ed	(none) total voc ed	none) total voc ed	(none) total voc ed
<u>C = Hours Worked Weekly</u>							
Larsen & Schfeger (1981)	12 Yrs. & Postsec	Course data-solution aggregated across curr.	1972	considerably greater ^a) total class hours of voc ed	NR	NR	NR
			1976	marginally greater ^a) total class hours of voc ed	NR	NR	NR
			1972, 1976	effects not consistent ^b) total class hrs of voc ed	NP	NR	NR
<u>D. # Weeks Worked in Previous Year</u>							
Velez & Wise (1987)	12 Yrs. & Postsec.	First F U Question whether had h.s. job or training	1972-73	Males - race pooled (none) h.s. job training (+ h.s. job training ^e)	--	--	--
			1973-74				
			1974-75				
			1975-76				

Table F-1 Summary of Findings of Regression Studies Based on NLS-72 Data Set by Gainful Employment
(cont'd) Outcomes Examined

Study	Educ Level Represented	Source Used to Define Voc. Ed. Participation	Follow-up Year Represented	M	F-B	F-W	F-B
D. # Weeks ^o Worked in Previous Year (Cont.)							
Meyer 1981	12 Yrs Exactly	Course data - solution aggregated across curr.	1974, 1976	Males - race pooled (none) percent of gr total voc ed course work		Females - race pooled (+) percent of commercial course work	
		Self-reported curr. ^e	1974, 1976	(none) pooled voc (none) T & I (none) comm.		(+) pooled voc (+) comm.	
		Sch. Admin. classif. ^e	1974, 1976	(none) pooled voc (none) pooled voc		(+) pooled voc (none) pooled voc	
		First F U Question on h.s. job training ^e	1974, 1976	(none) h.s. job training		(+) h.s. job training	
Gustman & Steinmeier (1981)	12 Yrs. Exactly	Self-reported curr.	1976	(none) comm. (none) rest voc (none) T&I	(none) comm. (none) rest voc NR - T&I	(none) comm. ^f (none) rest voc	(none) comm. (none) rest voc
		Course data	1976	(none)	(none) total sem voc ed	(none) total sem voc ed	(none) total sem voc ed

- a. No significant tests or st. errors of regression coefficients reported by Wiley and Harnischfeger.
- b. Results not consistent enough to be sure if the effects interact with program and sex or if their separate effects are poorly estimated after removal of the considerable variation over programs" (Wiley and Harnischfeger, 1980, p. 111).
- c. Results for alternative curr. definitions were reported by Meyer. Any contracts which were equal to or greater than twice their st. error are reported here as indicating significant effects.
63. The hourly earning finding was reported in the text by Gustman and Steinmeier only for F-W. They noted a significant positive effect was found only when those persons with missing test data were included in the analysis. Regression coefficient for 1975-76 greater than twice its st. error.
- Not significant at 95% level, however, was reported as significant at 90% level by Gustman and Steinmeier.

TABLE F-2. Summary of Findings of Regression Studies Based on LME Data Sets by Gainful Employment Outcomes Examined.

Study	Educ. Level Represented	Follow-up Yr Represented	M-W	M-B	F-W	F-B
			<u>A. Hourly Earnings</u>			
Grasso (1975)	12 Yrs. Exactly	1969	(none) comm. (none) rest voc	NR	--	--
Grasso & Shea (1979b)	12 Yrs. Exactly	1971,M 1972,F	(none) comm. (none) rest voc	(none) comm. (none) rest voc	(+) comm. (none) rest voc	(+) comm. (none) rest voc
			<u>Males - race pooled</u>			
	10-11 Yrs. 12 Yrs. 13-15 Yrs. } <u>Less</u>	1971	(none) comm or rest voc		NR	NR
Hofferth (1980)	12 Yrs. or Less	3 Yrs. out h.s.	(none) comm. (none) rest voc	(none) comm. (none) rest voc	(none) comm. (none) rest voc	(none) comm. (none) rest voc
		5 Yrs. out h.s.	(none) comm. (+) rest voc	(none) comm. (none) rest voc	(+) comm. (none) rest voc	(none) comm. (none) rest voc
		10 Yrs. out h.s.	(none) comm. (none) rest voc	(none) comm. (none) rest voc	(none) comm. (-) rest voc	(+) comm. (none) rest voc
			<u>B. Weekly Earnings</u>			
Gustman & Steinmeier (1981)	12 Yrs. Exactly	4 Yrs. out h.s.	(none) comm. (none) rest voc	(none) rest voc	(+) comm. (none) rest voc	(none) comm.
			<u>C. Annual Earnings</u>			
Grasso (1975)	12 Yrs. Exactly	1969	(+) comm. (none) rest voc	(none) rest voc	--	--

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TABLL F-2
(cont.)

Summary of Findings of Regression Studies Based on LME Data Sets by Gainful Employment Outcomes Examined.

Study	Educ. Level Represented	Follow-up Yr Represented	M-W	M-B	F-W	F-B
<u>C. Annual Earnings (cont.)</u>						
Grasso & Shea (1979b)	12 Yrs. Exactly	1969, 1971/72 ^a	(none) comm. (none) rest voc	(none) comm. (none) rest voc	(+) comm. (none) rest voc	(none) comm. (none) rest voc ^b
	10-11 Yrs. 12 Yrs. 13-15 Yrs.	1969, 1971 ^a	<u>Males - race pooled</u> (none) comm. or rest voc		NR	NR
<u>D. Annual # Hours Worked</u>						
Hofferth (1980)	12 Yrs. <u>or Less</u>	3 Yrs. out h.s.	(none) comm. (none) rest voc	(none) comm. (none) rest voc	(-) comm. (none) rest voc	(none) comm. (none) rest voc ⁷¹
		5 Yrs. out h.s.	(none) comm. (none) rest voc	(none) comm. (none) rest voc	(none) comm. (none) rest voc	(none) comm. (none) rest voc
		10 Yrs. out h.s.	(none) comm. (none) rest voc	(none) comm. (+) rest voc	(none) comm. (none) rest voc	(+) comm. (none) rest voc
<u>E. # Weeks Worked in Previous Year</u>						
Custman & Steinmeier (1981)	12 Yrs. Exactly	4 Yrs. out h.s.	(none) comm. (none) rest voc	NR - comm. (none) rest voc	(none) comm. (none) rest voc	(none) comm. NR - rest voc
<u>F. # Weeks Unemployed in Previous Year</u>						
Grasso (1975)	12 Yrs. Exactly	1969	c	c	--	--

TABLE P-2 Summary of Findings of Regression Studies Based on LME Data Sets by Gainful Employment Outcomes Examined.

Study	Educ. Level Represented	Follow-up Yr Represented	M-W	M-B	F-W	F-B
<u>F. # Weeks Unemployed in Previous Year (cont.)</u>						
Hofferth (1980)	12 Yrs or Less	3 Yrs. out h.s.	(none) comm. (none) rest voc	(none) comm. (none) rest voc	(none) comm. (none) rest voc	(none) comm. (none) rest voc
		5 Yrs. out h.s.				
		10 Yrs. out h.s.				
<u>G. Occupational Status^f</u>						
Grasso (1975)	12 Yrs. Exactly	1969	(+) comm. (none) rest voc	(none) rest voc NR - comm.	--	--
Grasso & Shea (1979) ^b	12 Yrs. Exactly	M, 1971	(none) comm. ^d (none) rest voc	(none) comm. (none) rest voc	(+) comm. (-) rest voc	(none) comm. (none) rest voc
		F, 1972				
			<u>Males - race pooled</u>			
	10-11 Yrs.	1971	(none) comm. ^e		NR	NR
	12 Yrs.		(none) rest voc			
	13-15 Yrs.					

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- a. Males: 1969 earnings in current job in 1971 and annual earnings in past year, 1971.
Females: 1969 earnings in current job in 1972 and annual earnings in past year, 1972.
- b. Not significant at 95% level; however, was significant at 90% level for comm. curr. when no restriction was placed on # weeks employed in 1972.
- c. Grasso noted, "basic results indicated model was inadequate for testing curricular differences" (p. 78).
- d. W-M, commercial contrast on Duncan SEI consistently significant at 90% level but not at 95% level.
- e. Males, race pooled, 12 Yrs. exactly, commercial contrast on Duncan SEI significant at 90% level.
- f. Duncan SEI for males and BOSE for females.