Employment During High School:
Consequences for Students' Grades in Academic Courses

John Robert Warren and Paul C. LePore
Department of Sociology
Center for Statistics and Social Sciences
Center for Studies in Demography and Ecology
University of Washington

Robert D. Mare
Department of Sociology
University of California--Los Angeles

Working Paper no. 2
Center for Statistics and the Social Sciences
University of Washington

February 2000

We are grateful for the helpful comments and other assistance from Duncan Chaplin, Eric Grodsky, Robert Hauser, Carolyn Liebler, Adrian Raftery, Thomas Richardson, Jeffrey Owings, and several anonymous reviewers. The opinions expressed herein, however, are those of the authors. Direct correspondence to John Robert Warren, Department of Sociology, University of Washington, Box 353340, Seattle, Washington, 98195-3340 or jrwarren@u.washington.edu.

Abstract

High school students who work intensively at paid jobs tend to have lower grades in academic courses. Prior research has not properly tested theories about the source of the relationship between student employment and grades (or other outcomes), and has not explicitly modeled the potentially reciprocal nature of this relationship. We focus on both the short- and long-term effects of adolescent employment on grades in academic courses and simultaneously consider the extent to which grades may influence employment behaviors. We find no evidence that high school employment has either short- or long-term effects on grades in academic courses or that grades in these courses influence employment activities. Preexisting differences between more and less intensively employed students fully accounts for the association between employment intensity and grades in academic courses.

Employment During High School:

Consequences for Students' Grades in Academic Courses

Introduction

The movement from adolescence to early adulthood represents a meaningful passage from the relative security and certainty of childhood to the autonomy and independence of adulthood (Santrock, 1987). For Erikson (1963, 1968), adolescence is conceived as the pivotal stage in the process of identity formation--an important stage in which teenagers struggle with newly found freedoms and choices and formulate their own religious, political, sexual, and work role attitudes. The family, the school, and the peer group are well recognized as central contexts for the socialization of adolescents (Corsaro & Eder, 1995; Gecas, 1981; Santrock, 1987; Simmons & Blyth, 1987). However, despite the prevalence of employment among adolescents, job holding is often seen as a peripheral or secondary activity for young people--a context relevant mainly for the socialization of adults (Marsh, 1991; Gecas, 1981).

Studies of the life course typically assume that individuals' work careers begins only when their formal schooling ends. In other words, educational careers and occupational careers are usually treated as temporally non-overlapping (Hogan, 1978; Hogan, 1980; Feldstein & Ellwood, 1982; Mare & Winship, 1984; Mare, Kubitschek & Winship, 1984; Michael & Tuma, 1984; Marini, 1984; Coleman, 1984; Ahituv, Tienda, Xu, & Hotz, 1994). As a result, until quite recently we have known relatively little about the relationships between high school students' work lives, school achievements, and later life outcomes.

Despite the limited amount of empirical interest in adolescent employment, a visitor to any grocery store, movie theater, or fast food restaurant will quickly see that a significant number of American high school students are employed. While the extent to which this employment activity represents the beginning of formal occupational careers is unclear, the pervasiveness of high school student employment is unmistakable. Results from the 1980 High School and Beyond Survey (HS&B), for example, found that about 44% of enrolled sophomores and 64% of enrolled seniors were employed during the 1980 school year (Lewin-Epstein, 1981). Similarly, using data from the 1987 National Assessment of Economic Education Survey, Lillydahl (1990) reported that 68% of 12th-graders acknowledged holding a job at some time during the school year.

From a policy perspective, the prevailing wisdom is that the "world of school" and the "world of work" should be more fully integrated in order to properly educate and train young people for their adult roles in the work force (President's Science Advisory Committee, 1974; National Panel on High School and Adolescent Education, 1976; Carnegie Council on Policy Studies in Higher Education, 1979; Byrne, Constant, & Moore, 1992; Congressional Research Service, 1994). As Byrne, Constant, and Moore (1992) have argued, "we need to move beyond our makeshift, do-it-yourself system. Employers and educators need to work together to change the way we prepare young people for the world of work" (p. 26). The Federal School-to-Work Transition Act of 1994, for example, that provided $100 million for support of state initiatives is one example of how these sentiments have translated into public policy.

Advocates of student employment reason that working during high school promotes responsibility, punctuality, and reliability, develops valuable work skills, and builds character and self-confidence (D'Amico, 1984; Greenberger & Steinberg, 1986; Mortimer & Finch, 1986). In contrast,

critics have suggested that employment, as it occurs now (in fast-food restaurants, grocery stores, retail stores, and so forth), does not educate or properly prepare students for adult occupational roles (Behn, Carnoy, Carter, Crain, & Levin, 1974; Greenberger & Steinberg, 1981; Steinberg, 1982), fails to foster the psychological maturity or development necessary for adult employment (Behn, et al., 1974; Greenberger, Steinberg, Vaux, & McAuliffe, 1980; Greenberger & Steinberg, 1981; Steinberg, 1982), and under some circumstances hinders academic achievement (Steinberg, 1982; Steinberg, Greenberger, Garduque, & McAuliffe, 1982; D'Amico, 1984; Schill, McCartin & Meyer, 1985; Mortimer & Finch, 1986; Greenberger & Steinberg, 1986; Wirtz, Rohrbeck, Charner, & Fraser, 1987; Marsh, 1991; Chaplin & Hannaway, 1996). In this paper, we are concerned with the latter criticism of high school students' employment. Specifically, we ask whether employment during high school has consequences for students' grades in academic courses.

We begin by reviewing previous efforts to assess the impact of students' employment during high school on their grades and other educational outcomes. Next, we argue that these efforts are lacking in crucial respects. In particular, no prior research has modeled the relationship between employment and schooling outcomes in such a way that allows for short-term as well as long-term effects of employment or that recognizes the potentially reciprocal nature of this relationship. Subsequently, we present analyses of data from the National Educational Longitudinal Study of 1988 (NELS:88) that are designed to overcome these problems and to provide an improved assessment of how working during high school and students' grades in academic courses are related to one another.

Prior Evidence

Previous assessments of the educational consequences of high school students' employment can be divided roughly into two groups based on the manner in which "employment" is defined. The first group explores the effects of being employed (or employment status) on grades or other outcomes, while the second group explores the effects of the number of hours worked per week (or employment intensity) by high school students on these outcomes. Unfortunately, few studies have examined the impact of the character or nature of the work in which students are engaged on their educational outcomes (Mortimer & Yamoor, 1987; Mortimer, Finch, Shanahan, & Ryu, 1992). An hour working in a movie theater or baby-sitting is generally seen as equivalent to an hour working in a meat packing plant. The works of Stone, Stern, and colleagues (Stone, Stern, Hopkins, & McMillion, 1990; Stern, Stone, Hopkins, & McMillion, 1990) and more recently McNeal (1997) are exceptions to this generalization.

Early models of the association between high school students' employment status and their academic success compared workers' and non-workers' schooling outcomes, usually as measured through grade point averages. Most researchers have noted unfavorable consequences of employment during high school. Steinberg and colleagues (Steinberg, et al., 1982), reacting to the President's Science Advisory Committee's recommendations of earlier integration of adolescents into the workplace (President's Science Advisory Committee, 1974), demonstrated that workers have slightly lower grade point averages than non-workers. Bachman (1983) and McNeil (1984) each suggested that working detracts from school involvement, and by implication, school success. Similarly, using data from the Youth in Transition Study, Mortimer and Finch (1986) found that compared to students who work, students with no high school work experience have significantly higher academic self-concept scores in 11th-grade and higher grade point averages and educational and occupational aspirations in

12th-grade. Recent work by McNeal (1997) also makes clear that the association between employment and school success--as indicated by high school dropout--varies by the type of job that students hold and by gender.

Many researchers have examined the connection between employment status and academic outcomes after controlling for factors that might simultaneously influence those outcomes and the decision to work. Mortimer and Finch (1986), for example, reported that the negative consequences of employment for a number of academic outcomes remain robust even after controlling for ability, family socioeconomic status, student grade point average in the 9th-grade, and academic self-concept at the beginning of high school. In contrast, Steinberg and colleagues (Steinberg, et al., 1982), who found only a slight association between work status and grade point average among their sample of high school students, found no association at all when demographic and socioeconomic background factors were held constant.

Researchers have also examined the effects of student employment on grades and other outcomes by taking into consideration the number of hours per week that students have worked. After all, as we discuss below, the common-sense argument against working while attending school is that the time students devote to work detracts from the time available for studying or doing homework or becoming involved in other school related activities. Several observers have found strong negative correlations between number of hours worked per week and academic success (Steinberg, et al., 1982; D'Amico, 1984; Greenberger & Steinberg, 1986; Mortimer & Finch, 1986; Wirtz, et al., 1987; Lillydahl, 1990; Marsh, 1991; Kablaoui & Paulter, 1991; Worley, 1995; Chaplin & Hannaway, 1996; McNeal 1997; Schoenhals, Tienda, & Schneider 1998). Steinberg and colleagues (Steinberg, et al., 1982), for example, found that the number of hours that students work per week, but not their

employment status, has a significant (and negative) impact on their grade point averages even after gender and social class background are held constant. Likewise, Worley (1995) concluded that grades decline as hours worked during the school year increase; Mortimer and Finch (1986) found a negative association between time spent at work and boys' grades, self-assessments of ability, and educational aspirations; and D'Amico (1984) observed that intensive work involvement (more than 20 hours per week) leads to lower levels of study time, less free time, and higher rates of dropping out.

Furthermore, the negative consequences of employment during high school, when expressed as hours worked per week, have been shown to last beyond the schooling years. For example, Carr, Wright, and Brody (1996) and Chaplin and Hannaway (1996) have each demonstrated that employment intensity during high school is negatively related to the probability of attending college and to the likelihood of completing four or more years of college.

Marsh (1991) has offered one of the most ambitious and comprehensive empirical analyses of the impact of high school employment on students' schooling success. Using longitudinal HS&B data, Marsh (1991) measured the effects of hours worked per week during high school on a variety of senior year and post-high school outcomes. He found that for students who did not drop out between grades 10 and 12, total hours worked during high school is negatively related to 17 of 22 senior year and post-secondary measures including academic achievement, grade point average, academic track, amount of time devoted to homework, social and academic self-concept, educational aspirations, post-high school employment, and college attendance. Moreover, these effects remain significant even after controlling for background measures and sophomore outcomes. As Marsh concluded, "the negative effects of working during high school on a variety of senior and post secondary outcomes ... [are] predominantly a

linear function of the number of hours worked and [are] reasonably consistent across ethnicity, sex, ability levels, and level of SES" (Marsh, 1991, pp. 184-185).

Some researchers have questioned whether the negative correlates of extensive employment during high school are actually caused by students' labor force participation, or are simply a reflection of unmeasured, pre-existing differences in family background, attitudes, ability, values, and other characteristics which foster academic success between students who work different amounts (Steinberg, Fegley, & Dornbusch 1993; Bachman & Schulenberg 1993; Schoenhals, et al., 1998). As Steinberg, Fegley, and Dornbusch (1993) have argued, high school students who work long hours (either by choice or necessity) may in fact be less interested in and committed to school even before they enter the labor force. Therefore, any apparent differences between students who work varying amounts of hours per week may be attributable to these pre-employment differences. Illustrating this point, Steinberg, Fegley, and Dornbusch (1993), in a study of 1,800 high school sophomores and juniors from Wisconsin and California, found that adolescents who eventually worked more than 20 hours per week were initially less engaged in school and were granted more autonomy by their parents than other adolescents. Likewise, Schoenhals, Tienda, and Schneider (1998) concluded that much of the adverse impact of youth employment noted in prior research can be attributed "to preexisting differences among youth who elect to work at various intensities" (p. 723).

Even if working long hours negatively affects students' grades or other schooling outcomes, there is also some evidence that working fewer hours (as opposed to not working or to working intensively) actually has positive effects on school performance (D'Amico, 1984; Schill, et al., 1985; Steel, 1991; Garasky, 1996). Schill, McCartin, and Meyer (1985), for example, showed that grades are highest among students who work, but who do not work a lot. Similarly, D'Amico (1984), Steel

(1991), and Garasky (1996) each found that working (but not intensively) decreases students' chances of dropping out of high school.

Problems with Prior Research

Clearly students' employment is associated with a variety of educational outcomes. Why might these associations exist? We argue that a zero-sum model of students' time allocation quite reasonably (but usually implicitly) undergirds most research on this issue. In short, there are only so many hours in a day. Each hour spent at work, in social engagements, or in other extracurricular activities is an hour not spent studying or doing homework.

Since the 1960s, many observers have claimed that American high schools are oriented toward a "youth culture" in which social, romantic, and employment considerations interfere with students' optimal intellectual development (Coleman, 1961; Goodlad, 1984). Coleman (1961) offered a zero-sum analysis of the world of adolescents in which the costs and benefits accrued in one context of adolescent life, such as employment, are seen to have consequences for other aspects of social and intellectual development. From this perspective, working during high school impedes academic success because the amount of time spent on activities outside of narrowly defined academic pursuits (such as work, community service, and social commitments) leads to less time spent on academically-focused classroom related work (Marsh, 1991). In other words, employment during high school constrains the amount of time that can be devoted to homework, studying, and participation in school-related activities, and thus has negative implications for academic achievement and attainment (D'Amico, 1984; Kablaoui & Paulter, 1991; Marsh, 1991).

It would be wrong, however, to suggest that the time spent at work is the only factor affecting school success in this zero-sum framework. As Marsh (1991) notes, zero-sum models can also be applied to the social psychological consequences of high school employment. Besides the reductions in the actual number of hours spent on schoolwork, sustaining high levels of commitment to the workplace may be antithetical to maintaining high levels of dedication to or investment in school, academic self-concept, or academic aspirations (Marsh, 1991). In addition, participation in extra-curricular and school-related activities that retard delinquency, improve psychological adjustment and commitment to high school, and promote a variety of desirable educational outcomes may be hampered by part-time work, particularly at intense levels of employment (Marsh, 1991; D'Amico, 1984; Kablaoui & Paulter, 1991; Lewin-Epstein, 1981).

We think that the zero-sum model offers a plausible theoretical explanation for why employment during high school might have a negative affect on students' educational outcomes. We also believe that--for methodological reasons--most research has only offered limited insights into this framework. One problem encountered by previous researchers involves the difficulties faced in determining the causal ordering of the variables included in empirical models--especially when those variables are measured at the same point in time and when no prior information has been obtained. If we measure "hours worked per week" and "grades" in a cross-sectional survey of students and find that those variables are associated, we cannot say which one causes the other or whether their relationship is spurious.

In an effort to get around this problem, researchers typically use longitudinal data in which schooling outcomes at time T_2 are regressed on employment and other variables at time T_1, where T_2 and T_1 are usually separated by a year or two. Since it is implausible to suggest that future achievement affects past work habits, researchers using this approach are then better able to argue that any observed

association between employment at time T_1 and an outcome at time T_2, after controlling for other factors as measured at time T_1, is causal in nature.

While we agree that there may be sustained and long-term (lagged) effects of employment at one point in time on schooling outcomes in subsequent years, the zero-sum model implies that the impact of employment should be felt in the short-term as well. Consider a hypothetical example. According to the zero-sum model, if two students take a test this Friday, the student who worked more hours in the preceding school week should get a lower grade on that test than the other student, all else constant. The student who worked more hours may have had less time to study for the test, may have slept less, may be less committed to the educational process, or may not have been as prepared for the test in other ways. It is less clear--at least to us--how working this week might directly affect performance on a test two years later. Employment in one week should affect schooling outcomes in subsequent weeks more so than in subsequent years. Any apparent long-term effects should be seen as the product of cumulative short-term effects. Unfortunately--and again for methodological reasons--most prior analyses have only observed the effects of employment on educational outcomes in subsequent years. We maintain that working probably has immediate impacts on schooling outcomes--impacts that may grow in cumulative importance over time--making it vital to measure the short-term (as well as the long-term) effects of work on school success.

It is clear that students' school performance may be affected by whether and how much they work at paid jobs. However, the opposite may be true as well. That is, students' school performance may well influence whether and how much they work. Intuitively, this makes good sense. The decision to get a job or to adjust hours worked per week is surely based on (among other things) school performance. Students who are doing poorly in school may turn to employment as an alternative avenue

of achievement or fulfillment; students who are doing well might limit how much they work in the hopes of maintaining their success. While grades are hardly a perfect or objective measure of what students have learned, they do provide a yardstick for students and parents to measure school performance. Moreover, the information provided through grades undoubtedly influences the decisions families make regarding a students' academic, extracurricular, social, and work lives. To our knowledge, no prior research has estimated a reciprocal model of the effects of employment and grades on one another, although Lillydahl (1990) and Bachman and Schulenberg (1993) speculate that causality may go both ways in the relationship between employment and schooling outcomes.

Consider another hypothetical example. If a student increases the number of hours per week that he or she works at a job, grades may suffer. If the student's grades begin to slip or if other things begin to go wrong in school, the adolescent (along with his or her parents) may decide to cut back on the hours spent at work or to quit the job altogether. Conversely, poor grades might reinforce the student's lack of commitment to school, in which case he or she may decide to increase the number of hours worked per week. Either way, if we wish to understand the relationship between employment during high school and schooling outcomes, then we need to appreciate the fact that the relationship between these variables may be more complicated than has been considered in prior research.

To summarize, methodological considerations have led researchers to estimate models of the relationship between employment and academic success that diverge from common-sense notions of how employment might actually affect schooling outcomes. These models ignore the fact that employment may have both short-term and long-term effects on schooling outcomes, and none of the work in this area explicitly examines the ways in which employment and school performance might simultaneously influence one another. We contend that in order to adequately describe the relationships

between employment and grades or other outcomes, researchers need contemporaneous measures of those variables. That is not to say, however, that we advocate the use of cross-sectional data for this purpose. As we will show in our analyses, longitudinal data is necessary to model the reciprocal relationship between employment and grades.

The National Longitudinal Study of 1988 (NELS:88)

We analyze data from NELS:88, a longitudinal survey of the 8th-grade student cohort of 1988. In the base year, the sample included approximately 25,000 randomly selected students in 1,000 public and private schools across the United States. In addition to the data collected from student interviews, NELS:88 contains information from parents, school administrators, teachers, and student transcripts. The initial student cohort has been followed-up on three occasions, in 1990, 1992, and 1994. Students who dropped out of school between survey waves were also interviewed, and for each follow-up the sample was "freshened" with new sample members in order to make the first and second follow-ups cross-sectionally representative of 1990 sophomores and 1992 seniors, respectively.

Our primary outcome variable of interest, students' senior year grades in academic courses, is derived from transcript data that was compiled after the 1992 NELS:88 follow-up. We have only included students' courses that were graded in such a way that 4.0 represents an "A" and 0.0 represents an "F" (only a small percentage of courses were graded using alternate systems, such as "pass/fail"). Using this 0 to 4 scale, we averaged across students' courses in grade 9 and separately in grade 12 to arrive at students' grade point average (GPA) in those two years. Based on descriptions of courses in the NELS:88 second follow-up transcript data codebook (U.S. Department of Education, 1995), we labeled courses as either "academic" or "non-academic." [1] In grade 10, we include

separate measures of students' 9th grade GPA in academic courses and non-academic courses, while in grade 12 we are only concerned with students' GPA in academic courses.

In the sophomore and senior year surveys, students were asked about their employment status and about how many hours they worked per week. Specifically, in grade 10, students were asked, "Are you currently employed or have you ever been employed?" In grade 12, students were asked, "Have you ever worked for pay, not counting work around the house?" Despite differences in question wording and response options, we are able to determine whether students were currently employed at the time of each survey. That is, unlike prior researchers, we consider whether students were employed at the time of their interview instead of whether they were ever employed during the school year.

In grade 10, students were subsequently asked, "How many hours do/did you usually work a week on your current or most recent job?" Likewise, in grade 12 students were asked, "How many hours do/did you usually work each week on your current or most recent job during this school year?" Again, despite differences in the phrasing of the questions and in the available response options, we are able to determine how many hours per week students usually worked per week if they were employed. Since the NELS:88 variables which represent hours worked per week are categorical, we constructed continuous "hours worked per week" variables by recoding these variables through assigning of the midpoint values for each categorical range.

Achievement tests were administered to students in 8th-grade and then again in their sophomore and senior years of high school. The achievement test scores administered in NELS:88 were scaled using Item Response Theory (IRT) techniques, and were constructed in such a way that scores are comparable across survey waves (National Center for Education Statistics, 1994). In addition, information regarding students' track placements, family and social backgrounds, school social contexts,

and educational aspirations is available, often from multiple survey waves. The NELS:88 data are better suited to this type of analysis than HS&B or other comparable surveys because of the more recent collection of the interviews and the completeness of the information gathered.

Sample Selection Criteria and Weighting

We make use of data from the 1990 and 1992 sophomore and senior year follow-ups, and initially restrict our analyses to cases in which students were in-school and in-grade in 1990, their sophomore years, and did not drop out by their senior years.[2] In addition, we omit cases in which students listed their race/ethnicity as something other than Black, White, or Hispanic or did not report how many hours they worked per week in grades 10 or 12. We refer to this group of 13,965 cases as the "full" sample.

To approximate population characteristics and to account for panel attrition over time, users of the NELS:88 data must weight their sample by one of the many weights provided by the National Center for Education Statistics in the NELS:88 data file (U.S. Department of Education, 1990). In our analyses, we used F2TRP1WT, which is to be used for producing weighted student panel statistics when data from the 1990 and 1992 survey waves are combined with transcript data in the analyses. In order to adjust our weights in such a way as to have standard errors reflect the actual sample size (as opposed to the size of the reference population), we divided the weight for each case by the sample mean of F2TRP1WT before weighting. Also, because NELS:88 employed a cluster sampling design, and because commonly available statistical software packages assume that data were collected through simple random sampling, we also adjusted each weight in such a way as to correct for design effects. Specifically, after dividing each weight by its mean, we further divided them by 2.67, the mean design

effect across variables (U.S. Department of Education, 1995). After weighting, our full sample of 13,965 cases is equivalent to a simple random sample of 4,612 cases and our tests of statistical significance reflect a sample of this size.

Descriptive Statistics

In Table 1, we describe students' employment activities in grades 10 and 12, separately by several demographic characteristics. About one in four students were employed at the time of their survey in grade 10 and roughly half were employed at the time of their survey in grade 12. These estimates are low compared to those of Lewin-Epstein (1981) or Lillydahl (1990). This is because we report the percentage of students who were employed at the time of their interview, whereas others report the percentage of students who worked during a given school year. In 10^{th} grade, about 17% of students worked more than 15 hours per week, while in 12^{th} grade that figure had grown to almost 30%.

The next sections of Table 1 compare the employment activities of boys and girls; Blacks, Hispanics, and non-Hispanic Whites; city dwellers and non-city dwellers; and students in different curriculum tracks. Most prior research has shown that boys are more likely than girls to be employed and that employed boys tend to work more hours per week than employed girls (Lewin-Epstein, 1981; Greenberger & Steinberg, 1983; Lillydahl, 1990; Yamoor & Mortimer, 1990; Mortimer, Finch, Owens, & Shanahan, 1990; Barone, 1993; Light, 1994). In contrast, our data show few differences between the employment activities of boys and girls. We believe that the discrepancy between our findings and those of prior observers has to do with the recency of our data; after about 1980 girls have been about as likely to be employed as boys.

Table 1 reveals racial differences in employment activity. In both years, and consistent with prior research (D'Amico, 1984; Coleman, 1984; Michael & Tuma, 1984; Gottfredson, 1985; Lewin-Epstein, 1981; Kablaoui & Paulter, 1991; Light, 1994; Ahituv, et al., 1994), Blacks and Hispanics were less likely than non-Hispanic whites to be employed. However, among employed students, Blacks appear to have worked more hours per week than non-Hispanic Whites in grade 10 and Blacks and Hispanics each appear to have worked more than Whites in grade 12. This is an intriguing finding and an important issue worthy of further study.

In addition to these demographic differences in employment, students who lived in cities (defined as communities of more than 50,000 people) in grade 10 differ little from other students in their employment activities. However, employment intensity does appear to vary with students' 12^{th}-grade curriculum track. Students in the vocational track in 12^{th} grade were more likely than students in the college preparatory or general tracks to work more than 15 hours per week in grade 10, and the same was true in grade 12. Likewise, among employed students, those in the vocational track worked more hours per week. In grade 12, for example, employed vocational track students worked an average of about five more hours per week than employed college preparatory track students.

Finally, Table 1 suggests a curvilinear relationship between employment intensity and the chances that students dropped out between grades 10 and 12 (solely for this line of this table we have temporarily reintroduced dropouts into our sample). That is, students who did not work in grade 10 were more likely to drop out of school before grade 12 than students who worked between 1 and 15 hours per week, while students who worked more than 15 hours per week were most likely to have dropped out. Although we exclude students who dropped out before the senior-year interview from the rest of our analyses, we see this as an important finding. It is true, as some have feared, that students

who work many hours per week are more likely to drop out of high school. However, the more interesting finding is that students who worked between 1 and 15 hours per week were especially unlikely to drop out.

In our analyses of the relationship between employment and senior year grades, we control for students' family socioeconomic status, numbers of siblings, family structure, sophomore year grades, achievement test scores, educational aspirations, reading and mathematics coursework, race/ethnicity, sex, urban residence, and curriculum track, all as measured prior to grade 12. In addition, we control for zip-code-level employment rates for 16- to 19-year-old high school students and for 16- to 19-year-old high school graduates. These rates are derived from the 1990 Census and were matched to the records in the private-release version of the NELS data. For the remainder of our analyses, we only include cases with no missing data on any of the measures that we use in our analyses. In Table 2, we compare the full sample to our "analysis sample." There is a remarkable degree of similarity when comparing the means and standard deviations of the variables of the cases in the full sample to the cases included in the analysis sample, suggesting few obvious problems with the sample selection procedures employed.

Within the analysis sample, we compare students who did not work to those who worked 15 or fewer hours per week and those who worked more than 15 hours per week. In Table 2, asterisks indicate whether differences between groups were significant at the 0.05 and 0.01 levels. The first row of Table 2 shows that students who worked between 1 and 15 hours per week (in either grade 10 or grade 12) came from more advantaged family backgrounds, as expressed by the standardized 10th-grade SES composite variable (consisting of parents' educational levels, parents' occupations, and family income) than students who either did not work or who worked more than 15 hours per week.

However, Table 2 also shows that these students were not more likely to live in two-parent households or to have fewer siblings.

Students who worked between 1 and 15 hours per week in grade 10 also had higher grade point averages in academic and non-academic courses in grade 9 and higher test scores in reading and mathematics in both grade 10 and grade 12 than students who either did not work in grade 10 or who worked more than 15 hours per week in that year. At the same time, students who worked between 1 and 15 hours per week in grade 12 had the highest grade point averages and test scores in both grades 10 and 12. On the other hand, students who worked more than 15 hours per week (in either year) had the lowest grade point averages and test scores in both years. In general, students' grades and test scores are highest when they are employed, but only when they work fewer than 15 hours per week.

To assess educational aspirations, we make use of an item that indicates how confident students were in grade 10 that they would attend college. In both years, students who worked more than 15 hours per week had the lowest levels of confidence, while students who worked between 1 and 15 hours per week had the highest levels of confidence that they would attend college. Interestingly, Table 2 reveals little connection between coursework in English or mathematics and employment. Finally, Table 2 shows that students' employment intensity is positively related to local (zip-code-level measures) employment rates for 16- to 19-year-old high school students and graduates, suggesting that labor market conditions may influence students' decisions about whether and how much to work.

The results in Table 2 largely support the hypothesis that intense work involvement is associated with lower grades. However, although the table does not present estimates of the effects of grades on work, the results are also consistent with the view that students who do well in school are more likely to work, but less likely to work many hours per week. That is, if we were to contend that doing well in

school causes students to work (but not too much), these data would not disagree. While the results in Table 2 demonstrate that there is a non-linear relationship between employment intensity and grades, they do not tell us anything about the direction of causality in this relationship.

The Traditional Regression Model

To begin, we estimate the traditional sort of model that has been featured in nearly all prior research. In this model, senior-year grades in academic courses are a function of employment in grade 10, sophomore year grades in academic and non-academic courses, a vector of other control variables (SES, family structure, number of siblings, reading and mathematics achievement test scores, aspirations, coursework in reading and mathematics, race, sex, curriculum track, and urban residence), and a random disturbance. This analysis serves two purposes. First, we are able to compare the results of our traditional analyses with those of prior research. Second, in the end we will be able to contrast the substantive findings from the traditional models with those from our preferred models (described below).

We estimate the "traditional" model using data from the full analysis sample,[3] and present the results in Table 3. There are no direct effects of employment status or hours worked per week in the sophomore year on grades in senior-year academic courses. The association between employment in grade 10 and grades two years later can be fully accounted for by controlling for family background, sophomore-year grades, and so forth.[4] Were we to stop here, as most research does, we would conclude that parents and educators need not be concerned with the long-term effects of employment on grades in academic courses. We have said nothing about the short-term impact of adolescent employment on those grades, however.

A Simultaneous Equations Model

To examine the long-term and short-term effects of work on academic achievement and the potentially reciprocal relationship between employment during high schooling and senior-year grades in academic courses, we estimate a different series of regression models. Figure 1 displays the basic design of our model, the key feature of which is that grade point average (GPA) in senior-year academic courses has a reciprocal relationship with both employment status and hours worked per week in the senior year. More specifically, senior-year GPA in academic courses is a function of senior- and sophomore-year employment, sophomore-year grades and test scores, a vector of other control variables, and a random disturbance. Both employment status and hours worked per week during the senior year are functions of senior-year GPA in academic courses, sophomore-year employment, state-level unemployment rates and earnings, a vector of other control variables, and random disturbances.

To identify the effects of senior-year GPA in academic courses on employment status and hours worked per week in that year, it is necessary to find instrumental variables that affect senior-year GPA but do not affect employment status and hours worked per week. Conversely, to identify the senior-year GPA equation, it is also necessary to find instrumental variables that affect employment status and hours worked per week but do not affect GPA.

In the first case, we do not permit reading or mathematics test scores or coursework as measured in the sophomore year to directly affect employment or hours worked per week in the senior year. These restrictions are reasonable, we believe, because any effects of these variables on senior year employment are likely indirect, operating through senior-year grades. Furthermore, the associations

between these variables and senior-year employment are slight, while the associations between these variables and senior-year grades are both positive and significant.

In the second case, we do not permit zip-code-level employment rates and earnings for 16- to 19-year-olds, as measured when students were sophomores, to affect grades in the senior year. Again, the empirical associations between these variables and senior-year grades in academic courses are extremely low, while their associations with the employment variables are very high. These variables might reasonably affect students' employment activities in their senior year, but we cannot imagine how they might directly affect students' grades.

Because of the measurement properties of employment status and hours worked per week, the model illustrated in Figure 1 is not a simple linear structural equation model. Senior-year employment status is a dichotomous variable and hours worked per week in the senior year is a continuous variable censored at zero. The censoring of the hours worked per week variable, moreover, is determined by employment status because hours worked per week equals zero if and only if a student did not work. Taken together, the employment and hours worked per week equations make up a sample selection or "Type 2 Tobit" model (Berk, 1983; Amemiya, 1985; Winship, & Mare, 1992). When combined with a linear equation for senior year GPA, the model is a complex structural equation model with limited-dependent variables and dummy endogenous variables (Heckman, 1978; Maddala, 1983). See the Appendix section for details about the specification and estimation of this model.

In Table 4, we present the results of our model of the relationship between employment during high school and senior-year grades in academic courses.[5] The table consists of three sections. In Equation 1, the dependent variable is GPA in academic courses in grade 12. In Equations 2 and 3, the dependent variables are the odds of being employed in grade 12 and number of hours worked per

week in grade 12 (if employed), respectively. The coefficients for the first and third equations are linear regression coefficients, and indicate the effect of a one-unit change in the independent variables. Since Equation 2, which predicts the probability of employment, is a probit model, the coefficients express the effect of a one-unit change in the independent variable on the predicted value of a latent standard normal variable underlying the observed dichotomous dependent variable.

As reported at the top of the column for Equation 1, we find no short-term effects of senior-year employment on senior-year grades in academic courses. Consistent with the results described in Table 3, employment status and hours worked per week in grade 10 also have no significant effects on senior-year grades in academic courses. That is, when holding all else constant, employment status and hours worked per week have no significant short-term or long-term effects on students' grades in academic courses in their senior year. As in the model described in Table 3, senior-year grades are primarily a function of earlier grades, gender, race/ethnicity, achievement test scores, and curriculum track.

Equations 2 and 3 reflect the impact of senior-year grades in academic courses (and other variables) on employment status and hours worked per week, respectively. From Equation 2 we see that senior-year grades in academic courses have no significant effect on students' chances of being employed, and from Equation 3 we see that senior-year grades in academic courses have no significant effect on hours worked per week among employed students. Whether students work in their senior year appears to depend on whether they worked in their sophomore year, their gender and race/ethnicity, and the local availability of jobs for high school students. How intensively students work as high school seniors (given that they are employed) depends on prior work activities,[6] gender, SES, curriculum track,

and urban residence. Senior-year grades in academic courses appear to have no effect of students' decisions about whether and how much to work.

Conclusions

In the course of our research, we have frequently listened to high school teachers who are concerned about the school performance of their students--students that are often characterized as working too much at paid jobs. It is their perception that students who work intensively are more frequently tired and are less prepared to handle the demands that their schoolwork places on them. While teachers' perceptions may well be accurate, our evidence suggests that intense employment does not translate into lower grades in academic courses. In accord with some prior evidence, our results indicate no long-term penalty for intensive employment (Steinberg, et al., 1993; Bachman & Schulenberg, 1993; Schoenhals, et al., 1998). Perhaps more surprisingly, our results show no short-term consequences, either.

We have argued that prior research on the relationship between students' employment and their academic outcomes has often been inadequate in important ways, and we have attempted to overcome these inadequacies in our own analyses. First, we argued that the immediate, short-term effects of employment on schooling outcomes are at least as important as the long-term effects. That is, we have maintained that the repercussions of working many hours in a week will be felt in subsequent weeks at least as much as in subsequent years. Unfortunately, and primarily for methodological reasons, prior research on this topic has only examined the effects of employment at one point in time on schooling outcomes much later, often years later. In our analyses, we overcame these methodological difficulties

by estimating a multiple-equations model from which we observed the effects of employment in both grades 10 and 12 on grades in the senior year.

Second, we asserted that employment and grades may affect each other simultaneously. To put it another way, we argued that while employment may affect grades, grades may also affect employment. To demonstrate this, we specified a model in which we could identify reciprocal effects. As it turns out, we found no important long-term or short-term effects of employment on grades; nor did we find effects of grades on employment activities in the senior year.

Our descriptive analyses--presented in Tables 1 and 2--show quite clearly that students who work intensively are different from other students in important ways. They have lower grades, lower SES backgrounds, and lower achievement test scores; they are also least optimistic about their chances of going to college and are underrepresented in the college track. The fact that high school seniors who work intensively tend to do less well in school has been taken as prima facie evidence that intense employment causes poorer school performance. The obvious policy implication is to enact more stringent teenage employment regulations and to enforce more effectively existing regulations.

Our results do not support this traditional interpretation of the association between employment intensity and school performance. There are pre-existing differences between intensively employed seniors and other seniors that account for this association. Students who are from higher SES backgrounds, who have better grades and test scores as sophomores, who have higher educational aspirations, and who are placed in the college track are more likely to do well in school as seniors, and are also less likely to work intensively.

How can we interpret these results? It may be that students who do not perceive that they will be academically successful and who are not confident about their chances of going on to college turn to

employment as a more fruitful way to spend their time and energy. These students may perceive that paid employment is more promising as an avenue of success, in both the short- and long-term. For them, working a lot now may seem like the best way to prepare for life after high school. Given the importance of SES, sex, and race/ethnicity in our results, this process of self-selection may not be entirely meritocratic. In any case, our results suggest that policymakers who share teachers' concerns about intensively employment students should focus more on the mechanisms through which some students come to see work--and not their education--as the most fruitful way to spend time and energy.

The present findings can only be generalized to the population of students who remain in school until grade 12. This is a weakness, of course, and the obvious next step is to estimate a model in which the impact of employment on dropping out is considered as well. Another obvious weakness in our analyses is our inattention to the ways in which our findings might differ by race/ethnicity, sex, and type of employment. We would like to pursue issues raised by McNeal (1997) in his recent article, but data and space limitations prevent us from going that direction for now. Although we estimate separate models (the results of which are available from the authors) for boys and girls and for non-Hispanic whites and Blacks and Hispanics, these models do a less than comprehensive job of addressing the role of race/ethnicity or sex in the relationship between student employment and schooling outcomes. Furthermore, and due primarily to data limitations,[7] our results say nothing about how the type of work that students do might be related to schooling outcomes. Clearly, there is a great deal of research to be done. Although we believe that our work will serve to point others in more useful directions, we do not claim that ours is the final word.

We find no compelling evidence that employment affects grades in academic courses--at least among those students who do not drop out. However, we have said nothing about how employment

during high school might affect students' achievement test scores, psychological characteristics, preparedness for their careers, attitudes toward work, levels of responsibility, longer-term occupational or educational attainment, and other outcomes. We find little evidence to support many people's concern that students are working too much and that this is hurting their grades. This does not mean that working too much has no effect on how much students learn or on other educational outcomes.

Appendix

Our simultaneous equations model can be written as follows. For the *i*th student, let G_i denote senior-year GPA in academic courses, H_i denote hours worked per week during the senior year, E_i denote a dichotomous variable that equals one if a student was employed in the senior year and zero otherwise; X_{ki} denote the *k*th exogenous variable that affects employment status, hours worked per week, and GPA; W_{li} denote the *l*th exogenous variable that affects employment status and hours worked per week but not GPA; and V_{mi} denote the *m*th exogenous variable that affects GPA but not employment status or hours worked per week. In addition, let E_i^* denote a latent continuous variable for employment status that is linked to observed employment status E_i as follows:

$E_i = 1$ if $E_i^* > 0$

$= 0$ if $E_i^* \leq 0$.

Let H_i^* be a latent continuous variable for hours worked per week that is linked to observed hours worked per week as follows:

$Hi = H_i^*$ if $E_i = 1$

$= 0$ if $E_i = 0$.

Then the equations of the model are:

$$G_i = \beta_0^G + \beta_1^G E_i + \beta_2^G H_i + \sum_k \gamma_k^G X_{ki} + \sum_m \mu_m^G V_{mi} + \eta_i^G \quad \text{(Equation 1)}$$

$$E_i^* = \beta_0^E + \beta_1^E G_i + \sum_k \gamma_k^E X_{ki} + \sum_l \lambda_l^E W_{li} + \eta_i^E \quad \text{(Equation 2)}$$

$$H_i^* = \beta_0^H + \beta_1^H G_i + \sum_k \lambda_k^H X_{ki} + \sum_l \lambda_l^H W_{li} + \eta_i^H \quad \text{(Equation 3)}$$

where the β's, γ's, μ's, and λ's are parameters and η_i^G, η_i^E, and η_i^H are disturbances that are assumed to follow a trivariate normal distribution. Given this specification, Equation 1 is a linear model

with a dummy endogenous variable E, a censored endogenous variable H, and exogenous variables X_k and V_m; Equation 2 is a probit equation with a continuous endogenous variable G and exogenous variables X_k and W_l; and Equation 3 is a tobit equation with a continuous endogenous variable G and exogenous variables X_k and W_l. The exogenous variables V_m, which are included in Equation 1, but omitted from Equations 2 and 3, are the instrumental variables that enable us to identify the effects of senior-year GPA in academic courses on employment status and hours worked per week (β_1^E and β_1^H). Similarly, the exogenous variables W_l, which are included in Equations 2 and 3, but are omitted from Equation 1, are instrumental variables that enable us to identify the effects of senior-year employment status and hours worked per week on senior-year GPA (β_1^G and β_2^G).

We estimate the model using a nonlinear instrumental variables procedure implemented in the program HotzTran (Avery, Hansen, & Hotz, 1983; Avery & Hotz, 1985). This method of estimation yields unique, consistent estimates that incorporate all of the over-identifying restrictions that are contained in the structural model. In practice, we estimate the structural parameters of Equations 1, 2, and 3 by solving these equations for their reduced forms--that is, by expressing each dependent variable as a function of the exogenous variables only; estimating the reduced form equations using HotzTran subject to the over-identifying restrictions implied by the model; and solving for the structural parameters and standard errors from the reduced form parameter estimates and standard errors, respectively.[8]

References

Ahituv, A. Tienda, M., Xu, L., & Hotz, V. J. (1994). Initial labor market experiences of black, Hispanic and white men. Population Research Center Discussion Paper Series, Working Paper 94-5. Chicago, IL: Population Research Center and The University of Chicago.

Amemiya, T. (1985). Advanced Econometrics. Cambridge, MA: Harvard University Press.

Avery, R. B. and Hotz, V. J. (1985). HotzTran User's Manual. Old Greenwich, CT: CERA Economic Consultants, Inc.

Avery, R. B., Hansen, P., and Hotz, V. J. (1983). Multiperiod probit models and orthagonality condition estimation. International Economic Review, 24, 21-35.

Bachman, J. G. (1983). Premature affluence: Do high school students earn too much? Economic Outlook USA, 10, 64-67.

Bachman, J. G. and Schulenberg, J. (1993). How part-time work intensity relates to drug use, problem behavior, time use, and satisfaction among high school seniors: Are these consequences or merely correlates? Developmental Psychology, 29, 220-235.

Barone, F. J. (1993). The effects of part-time employment on academic performance. NASSP Bulletin, 77, 67-73.

Behn, W., Carnoy, M., Carter, M., Crain, J., and Levin, H. (1974). School is bad; work is worse. School Review, 83, 49-68.

Berk, R. A. (1983). An introduction to sample selection bias in sociological data. American Sociological Review, 48, 386-398.

Byrne, S. M., Constant, A., and Moore, G. (1992). Making transitions from school to work. Educational Leadership, 49, 23-26.

Carnegie Council on Policy Studies in Higher Education. (1979). Giving Youth a Better Chance. San Francisco, CA: Jossey-Bass.

Carr, R. V., Wright, J. D., and Brody, C. J. (1996). Effects of high school work experience a decade later: Evidence from the National Longitudinal Survey. Sociology of Education, 69, 66-81.

Chaplin, D. D. and Hannaway, J. (1996, April). High school employment: Meaningful connections for at-risk youth. Paper presented at the meeting of the American Educational Research Association, New York, NY.

Coleman, J. S. (1961). The Adolescent Society. Glencoe, IL: Free Press.

Coleman, J. S. (1984). The transition from school to work. In D. J. Treiman and R. V. Robinson (Eds.), Research in Social Stratification and Mobility, Volume 3 (pp. 27-59). Greenwich, CT: JAI Press.

Congressional Research Service. (1994). School-to-Work Transition: Issues and Legislation in the 2d Session of the 103d Congress. CRS Report for Congress 94-216 EPW. Washington, DC: The Library of Congress.

Corsaro, W. A. and Eder, D. (1995). Development and socialization of children and adolescents. In G. A. Fine, K. S. Cook, and J. H. House (Eds.), Sociological Perspectives on Social Psychology (pp. 421-451). Boston: Allyn and Bacon.

D'Amico, R. (1984). Does employment during high school impair academic progress? Sociology of Education, 57, 152-164.

Erikson, E. H. (1963). Childhood and Society. New York, NY: Norton.

Erikson, E. H. (1968). Identity: Youth and Crisis. New York, NY: Norton.

Feldstein, M. and Ellwood, D. T. (1982). Teenage underemployment: What is the problem? In R. Freeman and D. Wise (Eds.), The Youth Labor Market: It's Nature, Causes, and Consequences (pp. 17-33). Chicago, IL: University of Chicago Press.

Garasky, S. (1996). Exploring the effects of childhood family structure on teenage and young adult labor force participation. IRP Discussion Papers, Volume 1111-96. Madison, WI: Institute for Research on Poverty.

Gecas, V. (1981). The contexts of socialization." In M. Rosenberg and R. H. Turner (Eds.), Social Psychology: Sociological Perspectives, (pp. 165-199). New York, NY: Basic Books.

Goodlad, J. I. (1984). A Place Called School. New York, NY: McGraw-Hill.

Gottfredson, D. C. (1985). Youth employment, crime, and schooling: A longitudinal study of a national sample. Developmental Psychology, 21, 419-432.

Greenberger, E. and Steinberg, L. D. (1981). The workplace as a context for the socialization of youth. Journal of Youth and Adolescence, 10, 185-210.

Greenberger, E. and Steinberg, L. D. (1983). Sex differences in early labor force experience: Harbinger of things to come? Social Forces, 62, 467-486.

Greenberger, E. and Steinberg, L. D. (1986). When Teenagers Work: The Psychological and Social Costs of Adolescent Employment. New York, NY: Basic Books.

Greenberger, E., Steinberg, L. D., Vaux, A., and McAuliffe, S. (1980). Adolescence who work: Effects of part-time employment on peer relations. Journal of Youth and Adolescence, 9, 189-202.

Heckman, J. J. (1978). Dummy endogenous variables in a simultaneous equation system. Econometrica, 46, 931-960.

Hogan, D. P. (1978). The effects of demographic factors, family background, and early job achievement on age at marriage. Demography, 15, 161-175.

Hogan, D. P. (1980, August). Social class differentials in transition to adulthood. Paper presented at annual meetings of the American Sociological Association, New York, NY.

Kablaoui, B. N. and Paulter, A. J. (1991). The effects of part-time work experience on high school students. Journal of Career Development, 17, 195-211.

Lewin-Epstein, N. (1981). Youth Employment During High School. Chicago, IL: National Center for Education Statistics.

Light, A. (1994). Transitions from school to work: A survey of research using the National Longitudinal Surveys. National Longitudinal Surveys Discussion Paper, Number NLS 94-18. Washington, DC: U.S. Department of Labor, Bureau of Labor Statistics.

Lillydahl, J. H. (1990). Academic achievement and part-time employment of high school students. Journal of Economic Education, 21, 307-316.

Maddala, G. S. (1983). Limited-Dependent and Qualitative Variables in Econometrics. Cambridge, England: Cambridge University Press.

Mare, R. D. and Winship, C. (1984). The paradox of lessening racial inequality and joblessness among black youth: Enrollment, enlistment, and employment, 1964-1981. American Sociological Review, 49, 39-55.

Mare, R. D., Kubitschek, W. N., and Winship, C. (1984). The transition from youth to adult: Understanding the age pattern of employment. American Journal of Sociology, 90, 326-358.

Marini, M. M. (1984). Age and sequencing norms in the transition to adulthood. Social Forces, 63, 229-244.

Marsh, H. W. (1991). Employment during high school: Character building or a subversion of academic goals? Sociology of Education, 64, 172-189.

McNeal, Jr., R. B. (1997). Are students being pulled out of high school? The effect of adolescent employment on dropping out. Sociology of Education, 70, 206-220.

McNeil, L. M. (1984). Lowering Expectations: The Impact of Student Employment on Classroom Knowledge. Program Report 84-1. Madison, WI: Wisconsin Center for Education Research.

Michael, R. T. and Tuma, N. B. (1984). Youth employment: Does life begin at 16? Journal of Labor Economics, 2, 464-476.

Mortimer, J. T. and Finch, M. D. (1986). The effects of part-time work on adolescent self-concept and achievement. In K. M. Borman and J. Reisman (Eds.), Becoming a Worker, (pp. 66-89). Norwood, NJ: Ablex Publishing Corporation.

Mortimer, J. T. and Yamoor, C. (1987). interrelations and parallels of school and work as sources of psychological development. Research in the Sociology of Education and Socialization, 7, 221-246.

Mortimer, J. T., Finch, D. D., Owens, T. J., and Shanahan, M. (1990). Gender and work in adolescence. Youth & Society, 22, 201-224.

Mortimer, J. T., Finch, M. D., Shanahan, M., and Ryu, S. (1992). Work experience, mental health, and behavioral adjustment in adolescence. Journal of Research on Adolescence, 2, 25-57.

National Center for Education Statistics. (1994). The Condition of Education 1994. Washington, DC: United States Government Printing Office.

National Panel on High School and Adolescent Education. (1976). The Education of Adolescents. Washington, DC: United States Government Printing Office.

President's Science Advisory Committee. (1974). Youth, Transition to Adulthood: A Report of the President's Science Advisory Committee, Panel on Youth. Chicago, IL: University of Chicago Press.

Santrock, J. W. (1987). Adolescence: An Introduction, Third Edition. Dubuque, IA: Wm. C. Brown Publishers.

Schill, W. J, McCartin, R., and Meyer, K. A. (1985). Youth employment: Its relationships to academic and family variables. Journal of Vocational Behavior, 26, 155-163.

Schoenhals, M., Tienda, M., and Schneider, B. (1998). The educational and personal consequences of adolescent employment. Social Forces, 77, 723-762.

Simmons, R. G. and Blyth, D. A. (1987). Moving Into Adolescence: The Impact of Pubertal Change and School Context. New York, NY: Aldine de Gruyter.

Steel, L. 1991. Early work experience among white and non-white youths: Implications for subsequent enrollment and employment. Youth and Society, 22, 419-447.

Steinberg, L. D. (1982). Jumping off the work experience bandwagon. Journal of Youth and Adolescence, 11, 183-205.

Steinberg, L. D., Fegley, S., and Dornbusch, S. M. (1993). Negative impact of part-time work on adolescent adjustment: Evidence from a longitudinal study. Developmental Psychology, 29, 171-180.

Steinberg, L. D., Greenberger, E., Garduque, L., and McAuliffe, S. (1982). High school students in the labor force: Some costs and benefits to schooling and learning. Educational Evaluation and Policy Analysis, 4, 363-372.

Stern, D., Stone, III, J. R., Hopkins, C., and McMillion, M. (1990). Quality of students' work experience and orientation toward work. Youth and Society, 22, 263-282.

Stone, III, J. R., Stern, D., Hopkins, C., and McMillion, M. (1990). Adolescents' perceptions of their work: School supervised and non-school supervised. Journal of Vocational Education Research, 15, 31-53.

U.S. Department of Education, National Center for Educational Statistics. (1990). National Educational Longitudinal Study, 1988 [Computer File]. Chicago, IL: National Opinion Research Center [producer]. Ann Arbor, MI: Inter-University Consortium for Political and Social Research [distributor].

U.S. Department of Education, National Center for Educational Statistics. (1995). National Educational Longitudinal Study of 1988 Second Follow Up: Transcript Component Data File User's Manual. Washington, DC: United States Department of Education, National Center for Educational Statistics.

Winship, C. and Mare, R. D. (1992). Models for sample selection bias. Annual Review of Sociology, 18, 327-350.

Wirtz, P. W., Rohrbeck, C. A., Charner, I., and Fraser, B. S. (1987). Intense employment while in high school: Are teachers, guidance couselors, and parents misleading academically-oriented adolescents? Graduate Institute for Policy Education and Research Working Paper. Washington, DC: George Washington University.

Worley, L. P. (1995). Working adolescents: Implications for counselors. The School Counselor, 42, 218-223.

Yamoor, C. M. and Mortimer, J. T. (1990). Age and gender differences in the effects of employment on adolescent achievement and well-being. Youth & Society, 22, 225-240.

Endnotes

[1] The variable F2RCSSC classifies students' courses in to one of 54 major categories. We have defined the following categories of courses as academic in nature (the first two digits of the code for F2RCSSC is in parentheses): Area and Ethnic Studies (05); Education (13); Engineering (14); Foreign Languages (16); Allied Health (17); Health Sciences (18); Law (22); Letters (23); Liberal/General Studies (24); Library and Archival Sciences (25); Life Sciences (26); Mathematics (27); Multi/Interdisciplinary Studies (30); Philosophy and Religion (38); Theology (39); Physical Sciences (40); Science Technologies (41); Psychology (42); and Social Sciences (45). All other courses are labeled "non-academic."

[2] We are unable to say how our findings are affected by the omission of students who dropped out before grade 12, though we do readily acknowledge the important interplay between employment opportunities and the decision to end formal schooling faced by many youngsters (McNeal, 1997). As we describe below, the model we estimate is already quite complex, such that adding a sample selection equation to our model would be difficult. In the end, our findings are generalizable only to the population of students who do not drop out.

[3] We also estimated separate models using data for men, for women, for non-Hispanic whites, and for Blacks and Hispanics. The results of these models are available from the authors.

[4] We also estimated these models using a less restrictive sampling scheme; the results of those models are not presented here. In those models, we did not drop cases with missing data on independent variables. Instead, we imputed variable means and included dummy variables to indicate

that such imputations had taken place. The results of those models are also substantially the same as the data presented here.

[5] Again, we also estimate separate models for boys, for girls, for non-Hispanic whites, and for Blacks and Hispanics. These results are available from the authors.

[6] The large and statistically significant negative effect of 10th-grade employment status on hours worked per week in grade 12 may seem paradoxical. The coefficient seems to imply that among employed seniors, those who also worked in grade 10 typically work 2.8 fewer hours per week. However, this negative coefficient must be offset by the positive effect of hours worked per week in grade 10. Among employed seniors, Equation 3 suggests that those who worked and who worked an average number of hours per week in grade 10 will work an average number of hours per week in grade 12.

[7] We agree with McNeal (1997) that the kind of work that students do may significantly alter the impact of work intensity on schooling outcomes. However, the quality and reliability of the "kind of job" survey items in NELS:88 and High School and Beyond, for that matter, make us appropriately nervous about exploring this issue using these data.

[8] Details of the procedures used to solve for the structural parameters are available from the authors.

Table 1.
Employment Status and Hours Worked Per Week in Grades 10 and 12, by Sociodemographic Characteristics

		Employment in Grade 10					Employment in Grade 12				
	Full Sample	Not Employed	1 to 15 Hrs/Wk	>15 Hrs/Wk	Hrs./Wk if Empl. Mean	(sd)	Not Employed	1 to 15 Hrs/Wk	>15 Hrs/Wk	Hrs./Wk if Empl. Mean	(sd)
Nominal N	13,965	10,423	1,273	2,269			7,126	2,846	3,993		
Design Effect-Adjusted N	4,612	3,424	394	794			2,264	981	1,367		
Full Sample	100.0%	74.2%	8.6%	17.2%	15.9	(10.3)	49.1%	21.3%	29.6%	17.6	(8.9)
Sex											
Boys	2,262	73.2%	7.6%	19.1%	17.5	(11.1)	52.4%	17.0%	30.7%	19.0	(9.4)
Girls	2,351	75.2%	9.4%	15.4%	14.3	(9.2)	46.0%	25.4%	28.6%	16.3	(8.3)
Race											
Whites	3,485	72.0%	9.4%	18.6%	15.8	(10.3)	45.0%	23.8%	31.3%	17.3	(8.7)
Blacks	517	83.5%	4.2%	12.3%	19.0	(11.6)	68.3%	10.8%	20.9%	19.5	(10.4)
Hispanics	393	81.1%	5.7%	13.1%	15.8	(9.7)	56.6%	14.1%	29.3%	19.3	(8.7)
Community Size											
Urban Dweller	1,159	75.6%	8.2%	16.2%	15.5	(9.9)	50.4%	20.1%	29.5%	17.7	(9.2)
Not Urban	3,418	73.6%	8.7%	17.6%	16.1	(10.4)	48.6%	21.6%	29.7%	17.5	(8.8)
Curriculum Track, Grade 12											
College Prep.	2,133	75.1%	9.3%	15.5%	14.7	(9.9)	50.3%	25.7%	24.0%	15.5	(8.1)
General	1,572	73.9%	9.0%	17.1%	15.9	(10.5)	47.3%	19.5%	33.2%	18.8	(9.3)
Vocational	517	69.6%	5.7%	24.7%	19.1	(10.2)	41.0%	15.0%	44.0%	20.2	(8.7)
Don't Know	174	76.5%	6.4%	17.0%	15.9	(9.1)	60.9%	13.4%	25.7%	19.6	(8.4)
High School Drop Out											
% Who Dropped Out Before Grade 12	5,256	5.3%	1.5%	7.5%	-	-	-	-	-	-	-

Sample restricted to cases in which students were in-school and in-grade in grade 10, did not drop out before grade 12 (except for the line above pertaining to dropouts), were either Black, White, or Hispanic, reported their gender, and reported how many hours they worked per week in grades 10 and 12. The data are weighted in such a way that standard errors reflect the actual (unweighted) sample size and adjust for design effects. Specifically, in the full sample we initially adjusted the weight F2TRP1WT such that NEWWEIGHT = ((F2TRP1WT/178.3989)/2.67).

Table 2.
Means and Standard Deviations of Variables by Employment Intensity in Grades 10 and 12

					Employment in Grade 10						Employment in Grade 12					
	Full Sample		Analysis Sample		Not Empl.		1 to 15 Hrs/wk		>15 Hrs/wk		Not Empl.		1 to 15 Hrs/wk		>15 Hrs/wk	
Nominal N	13,965		7,824		5,830		745		1,249		3,804		1,732		2,288	
Design Effect-Adjusted N	4,612		2,930		2,154		274		502		1,362		664		904	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Family SES in Grade 10 (F1SES)	0.07	(0.75)	0.07	(0.73)	0.07	(0.75)	0.23	(0.74) **	0.00	(0.65)	0.07	(0.78)	0.20	(0.71) **	-0.01	(0.66) *
Sibship Size (F1S93A, F1S93B)	1.44	(1.25)	1.41	(1.26)	1.40	(1.28)	1.48	(1.19)	1.43	(1.22)	1.39	(1.28)	1.41	(1.23)	1.44	(1.25)
Father in Household in Grade 10? (F1S92A)	0.70	(0.46)	0.74	(0.44)	0.74	(0.44)	0.77	(0.42)	0.72	(0.45)	0.74	(0.44)	0.76	(0.43)	0.72	(0.45)
GPA in Non-Academic Classes, Grade 9 (Transcript Data)	2.68	(0.77)	2.76	(0.75)	2.77	(0.74)	2.86	(0.67)	2.66	(0.78) **	2.76	(0.76)	2.90	(0.68) **	2.65	(0.75) **
GPA in Academic Classes, Grade 9 (Transcript Data)	2.12	(0.84)	2.18	(0.82)	2.19	(0.83)	2.35	(0.80) **	2.06	(0.77) **	2.17	(0.84)	2.37	(0.79) **	2.07	(0.78) **
Reading Achievement Test, IRT (F12XRIRR)	31.71	(9.77)	32.29	(9.52)	32.14	(9.67)	34.91	(8.65) **	31.51	(9.11)	32.11	(9.82)	34.50	(9.00) **	30.94	(9.16) **
Math Achievement Test, IRT (F12XMIRR)	45.17	(13.32)	45.95	(13.08)	45.54	(13.11)	49.57	(12.46) **	45.72	(13.02)	45.48	(13.42)	49.19	(12.26) **	44.29	(12.76) *
Proportion Very Likely to Go to College (F1S64B)	0.55	(0.50)	0.56	(0.50)	0.56	(0.50)	0.64	(0.48) *	0.51	(0.50) *	0.55	(0.50)	0.64	(0.48) **	0.50	(0.50) *
Coursework in Math, Grades 8 to 10 (F1S22A-J)	1.48	(1.55)	1.53	(1.56)	1.55	(1.59)	1.55	(1.43)	1.47	(1.47)	1.53	(1.55)	1.65	(1.72)	1.45	(1.44)
Coursework in English, Grades 8 to 10 (F1S24A)	1.14	(0.92)	1.12	(0.92)	1.12	(0.92)	1.15	(0.92)	1.11	(0.93)	1.13	(0.93)	1.14	(0.91)	1.10	(0.93)
Proportion White (F1RACE)	0.76	(0.43)	0.77	(0.42)	0.76	(0.43)	0.83	(0.38) **	0.83	(0.38) **	0.71	(0.45)	0.84	(0.37) **	0.82	(0.39) **
Proportion Male (F1SEX)	0.49	(0.50)	0.47	(0.50)	0.46	(0.50)	0.45	(0.50)	0.53	(0.50) **	0.50	(0.50)	0.40	(0.49) **	0.49	(0.50)
Proportion in College Track (F1SEX)	0.49	(0.50)	0.48	(0.50)	0.49	(0.50)	0.51	(0.50)	0.42	(0.50) **	0.51	(0.50)	0.55	(0.50)	0.39	(0.49) **
Prop. in Communities with 50,000+ People (F1C5A)	0.25	(0.44)	0.26	(0.44)	0.26	(0.44)	0.26	(0.44)	0.26	(0.44)	0.27	(0.45)	0.26	(0.44)	0.25	(0.43)
Zip Code Level Unempl. Rate, 16-19 Year Old H.S. Students	38.85	(12.56)	39.49	(12.28)	38.42	(12.45)	41.55	(10.99) **	42.93	(11.41) **	37.35	(12.32)	41.42	(12.32) **	41.30	(11.66) **
Zip Code Level Unempl. Rate, 16-19 Year Old H.S. Grads	71.57	(18.99)	72.01	(18.47)	71.07	(18.90)	74.92	(15.98) **	74.43	(17.57) **	70.68	(19.27)	73.66	(17.60) **	72.79	(17.76) **
GPA in Non-Academic Classes, Grade 12 (Transcript Data)	2.84	(0.77)	2.88	(0.76)	2.88	(0.77)	3.02	(0.69) **	2.79	(0.75) **	2.88	(0.78)	3.02	(0.68) **	2.77	(0.77) **
GPA in Academic Classes, Grade 12 (Transcript Data)	2.20	(0.82)	2.23	(0.82)	2.24	(0.83)	2.38	(0.80) **	2.13	(0.79) **	2.23	(0.84)	2.42	(0.77) **	2.10	(0.80) **

Analysis sample restricted to cases in which students were in-school and in-grade in grade 10, did not drop out of school before grade 12, were either Black, White or Hispanic, reported their gender, reported how many hours they worked per week in grades 10 and 12, and had no missing data on variables in this table. The data are weighted in such a way that standard errors reflect the actual unweighted sample size and adjust for design effects. Specifically, for the analysis sample we adjusted the weight F2TRP1WT such that NEWWEIGHT = ((F2TRP1WT/172.4786)/2.67). Separate significance tests compare students who work 1 to 15 hours per week and students who work more than 15 hours per week to students who are not employed. Significance Levels: * = $p < 0.05$, ** = $p < 0.01$.

Table 3.
Regression of Senior Year Grades in Academic Courses
on Sophomore Year Employment and Other Variables

	Coefficient	Standard Error	t-statistic
Employed in Grade 10	0.028	(0.073)	(0.383)
Hours Worked per Week in Grade 10	-0.003	(0.004)	(-0.698)
White	**0.105**	**(0.048)**	**(2.199)**
Male	**-0.198**	**(0.038)**	**(-5.150)**
Family SES in Grade 10	0.020	(0.029)	(0.700)
Sibship Size	0.004	(0.015)	(0.292)
Father in Household in Grade 10?	0.078	(0.043)	(1.808)
GPA in Non-Academic Courses, Grade 9	0.048	(0.033)	(1.436)
GPA in Academic Courses, Grade 9	**0.480**	**(0.034)**	**(14.165)**
Reading Achievement Test, IRT	0.005	(0.003)	(1.713)
Math Achievement Test, IRT	**0.006**	**(0.002)**	**(2.752)**
Believe They Are Very Likely to go to College	0.048	(0.042)	(1.131)
Coursework in Math, Grades 8 to 10	0.009	(0.016)	(0.532)
Coursework in English, Grades 8 to 10	-0.005	(0.028)	(-0.192)
College Preparatory Track in Grade 12	0.039	(0.042)	(0.933)
Lives in Community with More Than 50,000 People	-0.035	(0.043)	(-0.808)
Constant	**0.504**	**(0.106)**	**(4.748)**
R-Squared	0.47		

Note: Design Effect-Adjusted N = 2,930; Nominal N = 7,824. See Table 2 for description of sample sele
weighting procedures. Bolded coefficients are at least twice their standard errors.

Table 4.
Structural Equation Model of the Relationship Between Senior-Year Grades in Academic Courses and Employment in Grade 12

	Equation 1 Dependent Variable: *Senior Year Grades in Academic Courses*			**Equation 2** Dependent Variable: *Senior Year Employment Status (1 = Employed; 0 = Not)*			**Equation 3** Dependent Variable: *Senior Year Hours Worked per Week (Given Employed)*		
	Coef.	S.E.	t-Stat.	Coef.	S.E.	t-Stat.	Coef.	S.E.	t-Stat.
Senior Year Grades in Academic Courses	-	-	-	-0.013	(0.151)	(-0.089)	-0.192	(3.812)	(-0.050)
Employed in Grade 12	0.209	(0.145)	(1.439)	-	-	-	-	-	-
Hrs./Wk in Gr. 12 (Given Employed)	-0.005	(0.020)	(-0.229)	-	-	-	-	-	-
Employed in Grade 10	-0.029	(0.074)	(-0.396)	**0.475**	**(0.061)**	**(7.843)**	**-2.804**	**(0.588)**	**(-4.766)**
Hrs./Wk in Gr. 10	-0.002	(0.004)	(-0.386)	0.006	(0.047)	(0.124)	0.235	(0.420)	(0.560)
Non-Hispanic White	**0.114**	**(0.038)**	**(3.018)**	**0.310**	**(0.052)**	**(5.925)**	0.445	(0.545)	(0.816)
Male	**-0.193**	**(0.033)**	**(-5.919)**	**-0.132**	**(0.054)**	**(-2.431)**	**1.865**	**(0.513)**	**(3.631)**
SES Composite	0.019	(0.024)	(0.785)	-0.036	(0.036)	(-1.021)	**-1.227**	**(0.335)**	**(-3.666)**
Number of Siblings	0.016	(0.013)	(1.257)	0.021	(0.019)	(1.128)	0.072	(0.176)	(0.407)
Father in Household in Grade 10	0.045	(0.037)	(1.227)	-0.026	(0.054)	(-0.485)	-0.523	(0.504)	(-1.038)
Grades in Non-Acad. Courses, Gr. 9	0.049	(0.028)	(1.757)	-0.015	(0.041)	(-0.361)	-0.506	(0.411)	(-1.233)
Grades in Academic Courses, Gr. 9	**0.476**	**(0.028)**	**(16.800)**	0.036	(0.039)	(0.921)	-0.460	(1.851)	(-0.248)
Reading Ach. Test Score, Grade 10	**0.006**	**(0.002)**	**(2.374)**	(Omitted: Instrumental Variable)			(Omitted: Instrumental Variable)		
Math. Ach. Test Score, Grade 10	**0.007**	**(0.002)**	**(3.701)**	(Omitted: Instrumental Variable)			(Omitted: Instrumental Variable)		
Very Sure to Attend College in Gr. 10	0.049	(0.036)	(1.366)	0.030	(0.052)	(0.572)	-0.662	(0.458)	(-1.446)
Coursework in Math., Grade 10	-0.001	(0.014)	(-0.039)	(Omitted: Instrumental Variable)			(Omitted: Instrumental Variable)		
Coursework in English, Grade 10	0.020	(0.023)	(0.860)	(Omitted: Instrumental Variable)			(Omitted: Instrumental Variable)		
College Preparatory Track	**0.078**	**(0.036)**	**(2.209)**	-0.125	(0.094)	(-1.324)	**-1.546**	**(0.720)**	**(-2.146)**
Urban Resident	-0.047	(0.036)	(-1.288)	**0.015**	**(0.005)**	**(2.997)**	**-0.910**	**(0.039)**	**(-23.309)**
Empl. Rate, 16-19 Year Old H.S. Students	(Omitted: Instrumental Variable)			**0.012**	**(0.002)**	**(5.785)**	-0.000	(0.019)	(-0.022)
Empl. Rate, 16-19 Year Old H.S. Grads	(Omitted: Instrumental Variable)			-0.000	(0.001)	(-0.239)	0.004	(0.012)	(0.302)
Error Variances and Covariances									
Error Variance, Eq. 1 (Employed)	**0.353**	**(0.013)**	**(26.557)**						
Error Variance, Eq. 1 (Not Empl.)	**0.355**	**(0.013)**	**(27.111)**						
Error Variance, Eq. 3	**68.222**	**(3.000)**	**(22.741)**						
Error Covariance, Eqs. 2 and 3	0.000	(0.178)	(0.002)						

Note: Design Effect-Adjusted N = 2,930; Nominal N = 7,824. See Table 2 for description of sample selection and weighting procedures.
See text for details concerning the model. Bolded coefficients are at least twice their standard errors.

Figure 1.
12th Grade Employment and Senior-Year Grades in Academic Courses:
A Simultaneous Equations Model