Center for Demography and Ecology

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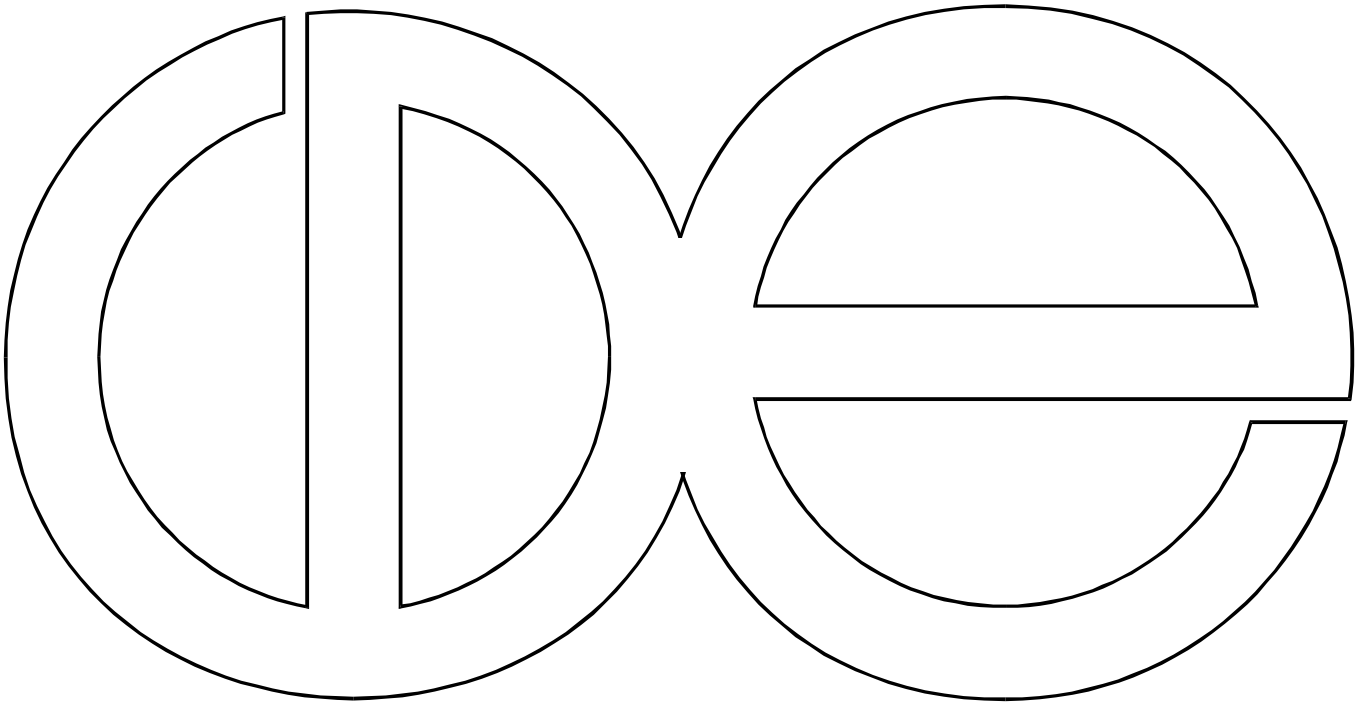

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Revised: May 1997

Paper presented at the annual meetings of the Population Association of America, Washington, D.C., March, 1997. Support for this research was provided by the Wisconsin Alumni Research Foundation, the National Institute on Aging (Grant # AG12731), and the Department of Sociology and the Center for Demography and Ecology of the University of Wisconsin - Madison. We are grateful for the helpful comments on earlier versions of this paper from Robert M. Hauser, Carolyn A. Liebler, Eric Grodsky, and participants in various seminars at the University of Wisconsin. The opinions expressed herein, however, are those of the authors. Direct correspondence to John Robert Warren, Department of Sociology, University of Wisconsin - Madison, 1180 Observatory Drive, Madison, Wisconsin 53706; or E-Mail: WARREN@SSC.WISC.EDU.

ABSTRACT

In this paper we ask how employment during high school affects students' grades in mathematics and reading courses. We argue that prior research has been inadequate in three important respects. First, too little attention has been paid to the operationalization of employment in empirical analyses. Second, researchers' theoretical models of how employment during high school might affect grades have not corresponded to their empirical models of those effects. Third, no prior research has explicitly modeled the potentially reciprocal relationship between employment during high school and students' grades.

We find that the relationship between employment during high school and students' grades is vastly more complicated than previous research has acknowledged. There are both short- and long-term effects of employment on grades, and these effects may work in opposite directions. Furthermore, grades affect how much employed students work at the same time that employment affects grades. In addition, although the relationship between employment and grades is consistent across demographic groups, reading and mathematics grades are differentially affected by employment.

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 the pivotal stage in the process of identity formation 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 recognized as central contexts for the socialization of adolescents (Corsaro and Eder, 1995; Gecas, 1981; Santrock, 1987; Simmons and 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 an individual's work career 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 and Ellwood, 1982; Mare and Winship, 1984; Mare, Kubitschek and Winship, 1984; Marini, 1984; Coleman, 1984 Volume 3; Ahituv, et al., 1994). As a result, until quite recently, we have known very little about the relationships between high school students' work lives, their school achievements, and their later life outcomes.

A trip to a grocery store, a movie theater, or a fast food restaurant quickly shows that significant numbers of American high school students are working at full-time or part-time jobs. 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 percent of enrolled sophomores and 64 percent 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 percent of twelfth graders acknowledged holding a job at some time during the school year.

The pervasiveness of high school students' employment is not a new phenomenon. Figure 1 depicts the percentage of enrolled 16 to 19 year old boys and girls who were employed at several points in time since 1940 (U.S. Bureau of the Census, 1943; U.S. Bureau of the Census, 1953; U.S. Bureau of the Census, 1957; U.S. Bureau of the Census, 1973; U.S. Bureau of Labor Statistics, 1983; U.S. Bureau of the Census, 1992; U.S. Bureau of the Census, 1994). In 1940, only about 6 percent of enrolled boys and 3 percent of enrolled girls were employed, but by 1956 these figures had grown to 35 percent for enrolled boys and 25 percent for enrolled girls. Since the 1950's the percentage of enrolled boys holding jobs has remained stable, while the percentage of enrolled girls holding jobs has gradually gone up. By 1980, 16 to 19 year old enrolled girls were about as likely as 16 to 19 year old enrolled boys to be employed. The increasing prevalence of student employment between 1940 and 1956 may be attributed to any number of factors: suburbanization, general economic prosperity, development of "youth culture" (Coleman, 1961), or perhaps even the increased availability of used cars. The narrowing of the employment gap between boys and girls since 1956 probably has more to do with overall advances in women's labor force participation.

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 (Coleman, 1974; National Panel on High School and Adolescent Education, 1976; Carnegie Council on Policy Studies in Higher Education, 1979; Byrne, Constant and Moore, 1992; Congressional Research Service, 1994). As Byrne, Constant, and Moore (1992:24) 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." 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. The state of Wisconsin's implementation of this program was characteristic of most states: "In an intensive two-year program, juniors and seniors in high school combine class work with work-based learning in a Wisconsin business or industry," giving students

"the chance to gain employment and industry skills in class and apply them on-the-job" (State of Wisconsin, 1993).

Advocates of student employment argue that working during high school promotes responsibility, punctuality, and reliability, develops valuable work skills, and builds character and self-confidence (D'Amico, 1984; Greenberger and Steinberg, 1986; Mortimer and Finch, 1986). In contrast, critics have argued 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, et al., 1974; Greenberger and Steinberg, 1981; Steinberg, 1982), fails to foster the psychological maturity or development necessary for adult employment (Behn, et al., 1974; Greenberger, et al., 1980; Greenberger and Steinberg, 1981; Steinberg, 1982), and under some circumstances hinders academic achievement (Steinberg, 1982; Steinberg, et al., 1982; D'Amico, 1984; Schill, McCartin and Meyer, 1985; Mortimer and Finch, 1986; Greenberger and Steinberg, 1986; Wirtz, et al., 1987; Marsh, 1991; Chaplin and 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 mathematics and reading 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 three crucial respects. First, prior researchers have often done an inadequate job of specifying "employment" in their analyses, and this has had pernicious consequences for their substantive conclusions. Second, most previous researchers have either implicitly or explicitly used the "zero sum" model to explain why employment during high school might affect students' grades or other outcomes, but their empirical analyses have almost never corresponded to this theoretical perspective. Third, no prior research has modeled the relationship between employment and schooling outcomes in such a way 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 affects students' grades.

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 and Yamoor, 1987; Mortimer, et al., 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 et al. (1990) and Stern et al. (1990) are exceptions to this generalization.

Employment Status and Academic Success

Early models of the association between high school students' employment status and their academic success compared workers and non-workers' schooling outcomes, usually their grade point averages. For example, in the first part of their analyses, Straus and Holmberg (1968) found that the association between grades and students' employment status is weak. Similarly, using the HS&B data, Lewin-Epstein (1981) reported that the grade point averages of employed, unemployed, and out-of-the-labor force students differ only trivially.

On the other hand, some researchers have noted unfavorable consequences of employment during high school. Steinberg, et al. (1982), reacting to the President's Science Advisory Committee's

recommendations of earlier integration of adolescents into the workplace (Coleman, 1974), demonstrated that workers have slightly lower grade point averages than non-workers. Bachman (1983) and McNeil (1983) 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.

Many researchers have examined the connection between employment status and academic outcomes after controlling for factors which 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. Straus and Holmberg (1968), in their comparison of working and non-working boys, found that employment status is associated with grade point average among working-class boys but not among middle-class boys. In contrast, 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.

Employment Intensity and Academic Success

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 argue 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.

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 and Steinberg, 1986; Mortimer and Finch, 1986; Wirtz, et al., 1987; Lillydahl, 1990; Marsh, 1991; Kablaoui and Paulter, 1991; Worley, 1995; Chaplin and Hannaway, 1996). 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 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 et al. (1996) and Chaplin and Hannaway (1996) demonstrated that employment intensity during high school is negatively related to the odds of attending college and to the odds of completing four or more years of college.

Marsh (1991) 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, 1991:184-185).

Some researchers, such as Steinberg, Fegley, and Dornbusch (1993) and Bachman and Schulenberg (1993), 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. As Steinberg, Fegley, and Dornbusch (1993) 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. For example, 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.

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, McCartin and Meyer, 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

Specifying "Employment"

How one operationalizes "employment" in empirical analyses will have consequences for conclusions about the relationships between employment and schooling outcomes. We would forgo this discussion were it not the case that many disparate conclusions about the consequences of working during high school have likely been the result of such methodological issues.

Using the NELS:88 data, which we describe in greater detail below, we express students' grades in senior year reading and mathematics courses on a scale from 1 to 13, where 13 is good. As we show in Figure 2, students' grades in their senior year are negatively and linearly associated with hours worked per week in grade 10, except that students who did not work in their sophomore year had grades which were slightly *below* those of students who worked between 1 and 10 hours per week. That is, the relationship between hours worked per week in 10^{th} grade and mathematics and reading grades two years later is not linear, because students who worked zero hours per week have exceptionally low grades.

This non-linearity is not limited to the relationship between hours worked per week and grades, nor is it peculiar to our data. Other researchers have also observed that non-workers have lower grades than workers, even though grades decline as hours worked per week increase (Schill, McCartin and Meyer, 1985; Steinberg and Dornbusch, 1991; Barone, 1993). Similarly, Steinberg and Dornbusch (1991) found such a relationship between hours of homework and hours worked per week, while Bachman and Schulenberg (1993) found non-linearities in the associations between hours worked per week and number of cigarettes smoked, amount of exercise, and whether students eat breakfast.

Given these non-linearities, how should the relationships between hours worked per week and academic success be expressed in empirical models? A common way to examine the impact of employment on schooling outcomes is to regress those outcomes on a dichotomous variable that expresses whether students were employed. If we regress senior year grades in reading on employment status in grade 10 using the NELS:88 data, for example, we find that working is associated with a considerable (0.24 points on a 13 point scale) and statistically significant reduction in senior year grades in reading. Another

common approach is to simply regress schooling outcomes on number of hours worked per week, regardless of employment status. Using this approach with the NELS:88 data, we find that each additional hour worked per week in grade 10 is associated with a 0.036 point decline in reading GPA two years later; again, this association is statistically significant.

These approaches are unacceptable, of course, because they ignore the non-linearity in the relationship between hours worked per week and grades. One way of getting around this problem is to omit cases in which students did not work. After all, those cases are the source of the non-linearity in the relationship. As Finch and Mortimer (1985:178) argued, "if the intent is to study the effects of work hours, we do not consider it justifiable to include students who are not employed in the analysis." In our sample, if we omit cases in which students were not working in grade 10 and then regress senior year reading grades on the number of hours worked per week in grade 10, we find (as expected) that each additional hour of work per week is associated with a considerable (0.075 points on a 13 point scale) and statistically significant reduction in grades two years later.

However, throwing out cases in which students were not employed is hardly satisfactory. This procedure excludes a large minority of cases and does not allow us to assess whether working affects schooling outcomes, except in a very indirect way. If only half of all students are employed, then we only know how employment effects schooling success for a decidedly unrepresentative half of the student population. To more appropriately model the relationship between employment and grades or other outcomes, researchers must take a more complicated approach. The "right" way to specify employment may depend on the outcome of interest and on the type of empirical analysis performed, but it must account for the non-linear nature of the relationships between student employment and many educational outcomes.

In our models we use two variables to express employment. One indicates whether students were employed at a particular point in time, and the second indicates how many hours per week students worked in that year (where the modal value is zero hours). Returning to our example with the NELS:88 data, when we follow this procedure we see that the effect of being employed in grade 10 on senior year reading grades

is positive (0.933, or more than one-third of a standard deviation) and statistically significant, while the effect of hours worked per week is negative (as expected from the prior model, the coefficient equals 0.075) and statistically significant. In other words, our specification of "employment" reflects the fact that students who work, but who do not work very many hours, do better in school than students who do not work, and that academic outcomes decline as the number of hours worked per week increases.

Empirical Models Versus How the World Really Works

Clearly students' employment, however operationalized, 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. This model is discussed in more detail below. However, as we also discuss below, we contend that empirical analyses of the effects of employment on students' educational outcomes are nearly always specified in such a way that the zero-sum model is effectively abandoned.

There are only so many hours in the 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 1960's, 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 "time spent on activities outside narrowly defined academic pursuits leads to less time spent on academic pursuits" (Marsh, 1991:172). 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 and Paulter, 1991).

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 amount of time 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 to high school, and promote a variety of desirable educational outcomes may be hampered by part-time work, particularly at intense levels of employment (D'Amico, 1984; Kablaoui and Paulter, 1991; Lewin-Epstein, 1981).

While we think that the zero-sum model offers a plausible explanation for why employment during high school might affect students' educational outcomes, we also believe that most prior research has operationalized this model poorly. The problem begins with the fact that it is difficult to determine the causal ordering of two variables 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. 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. They 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.

The problem with this empirical specification is that it is inconsistent with the zero-sum model described above. The zero-sum model implies that if two students take a test on a 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 certain that if two students take a test on a Friday during their senior year, then the student who worked more hours during the corresponding week in their sophomore year should score lower on that test than the other student, all else constant. Our point is that most of the educational consequences of working are probably immediate, not long term. A whole constellation of intervening factors may (and are likely to) modify any lagged effects of employment on academic success years later. Unfortunately, most analyses only consider the effect of employment in one year on educational outcomes in subsequent years.

Reciprocal Effects

Students' school performance may be affected by whether and how much they work at paid jobs. However, the opposite is likely true as well. That is, students' school performance may well influence whether and how much they work. To our knowledge, no prior research has explicitly and simultaneously modeled both possibilities, although Lillydahl (1990) and Bachman and Schulenberg (1993) speculate that causality may go both ways in the relationship between employment and schooling outcomes.

For example, if Sally increases the number of hours per week that she works at her job, her grades may suffer. If Sally's grades begin to slip or if other things begin to go wrong in school, she (along with her parents) may decide to cut back on her hours at work or to quit her job altogether. Conversely, poor grades might reinforce Sally's lack of commitment to school, in which case she may decide to increase the number of hours she works 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, we find three problems with the extant literature in this area. First, too many researchers have operationalized "employment" in such a way that the relationship between employment and academic success is misspecified. Second, methodological considerations have led researchers to estimate models of the effects of employment on academic success that diverge from common-sense notions of how employment might actually affect schooling outcomes. Finally, none of the work in this area explicitly examines the ways in which employment and school performance 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 that we advocate the use of cross-sectional data for this purpose. As we show in our analyses, longitudinal data is necessary to model the reciprocal relationship between employment and grades. While it is interesting to note the relationship between employment in the sophomore year and grades in the senior year, that association may not be as large as the association between work and grades when both are measured in the same year.

THE NATIONAL LONGITUDINAL STUDY OF 1988

To explore the relationships between employment during high school and students' grades in mathematics and reading, we analyze data from NELS:88, a longitudinal survey of the eighth 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.

Achievement tests were administered to students in eighth 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' employment activities in their sophomore and senior years, 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 recency of the interviews and the completeness of the information collected.

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 employed at the time of each survey. 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 assigning the midpoint of categories.

SAMPLE SELECTION CRITERIA AND WEIGHTING

We make use of data from the 1990 and 1992 sophomore and senior year follow-ups (21,382 cases), and initially restrict our analyses to cases in which students were in-school and in-grade in 1990 (18,176 cases), their sophomore years, and did not drop out by their senior years (17,247 cases). In addition, we omit cases in which students failed to identify their gender (0 cases), listed their race as something other than Black, White, or Hispanic (1,505 cases), or did not report how many hours they worked per week in grades 10 or 12 (2,870 cases). For all other variables (except students' senior year grades) we assigned the mean to missing cases and included a dummy variable in our regression models to indicate that such an imputation had taken place. After these exclusions, our unweighted sample size is 12,872.

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 National Center for Education Statistics in the NELS:88 data file (U.S. Department of Education, 1990). In our analyses, we used F2F1PNWT, which is to be used for producing weighted student panel statistics when data from the 1990 and 1992 survey waves are included 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 mean of F2F1PNWT 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 3.729, the mean design effect across variables (U.S. Department of Education, 1990). After weighting, our sample is equivalent to a random sample of 3,757 cases.

DESCRIPTIVE STATISTICS

In Table 1 we describe students' employment activities in grades 10 and 12, separately by several demographic characteristics. The first row indicates that 26.8 percent of students were employed at the time of their 10th grade interview and 50.7 percent were employed at the time of their 12th grade interview. 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 10th grade, 17.7 percent of students worked more than 15 hours per week, while in 12th grade that figure had grown to almost 30 percent. Among students employed in grade 10, the average number of hours worked per week in that year was 15.7, and among students employed in grade 12, the average number of hours worked per week was 17.8.

The next section of Table 1 compares the employment activities of boys and girls. 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 and Steinberg, 1983; Lillydahl, 1990; Yamoor and Mortimer, 1990; Mortimer, et al., 1990; Barone, 1993; Light, 1994). In contrast, our data show that boys were slightly more likely than girls to be employed in grade 10, but that the opposite was true in grade 12. In both years, boys were somewhat more likely than girls to work more than 15 hours per week, and among employed students boys worked considerably more hours per week. We believe that the discrepancy between our findings and those of prior observers has to do with the recency of our data; as shown in Figure 1, since about 1980 girls have been about as likely to be employed as boys.

The third section of Table 1 reveals strong racial differences in employment activity. In both years, and consistent with prior research (D'Amico, 1984; Coleman, 1984 Volume 3; Gottfredson, 1985; Lewin-Epstein, 1981; Kablaoui and Paulter, 1991; Light, 1994; Ahituv, et al., 1994), Blacks and Hispanics were substantially less likely than Whites to be employed. For example, whereas 55.2 percent of White students were employed in grade 12, only 32.2 percent of Black students and 40.5 percent of

Hispanic students were employed at that time. However, among employed students, Blacks worked substantially more hours per week than Whites in grade 10 and Blacks and Hispanics each worked more than Whites in grade 12. The general picture, then, is that White students were more likely to employed, but tended to work fewer hours per week when they were employed.

The next section of Table 1 suggests that students who lived in cities (defined as communities of more than 50,000 people) in grade 10 differed little from other students in their employment activities. However, employment intensity varies substantially with students' 12th grade curriculum track. Students in the vocational track in 12th 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 5 more hours per week than employed college preparatory track students. Interestingly, students who did not know their curriculum track were consistently least likely to be employed.

Finally, Table 1 shows a strong 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 substantially 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; both contrasts are statistically significant. Although we exclude drop-outs 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.

Student Characteristics And Employment In Grades 10 And 12

For the rest of our analyses, we restrict the sample to cases with no missing data on measures of students' senior year reading and mathematics grades. This excludes about 13 percent of the initial sample, leaving us with a weighted sample of 3,267 cases. In Table 2 we compare the initial sample to the analysis sample and 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 our analyses of the effects of employment on senior year grades in reading and mathematics, we control for students' family socioeconomic status, sibship size, family structure, grades, achievement test scores, educational aspirations, reading and mathematics coursework, race, sex, urban residence, and curriculum track, all as measured in grade 10. In addition, we control for senior year state-level earnings and unemployment rates for 16 to 19 year olds using data from the 1989 and 1990 March Current Population Surveys (CPS).

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 substantially more advantageous family backgrounds, as expressed by the standardized 10th grade SES composite variable (which consists of parents' educations, parents' occupations, and family income) than students who either did not work or who worked more than 15 hours per week. Table 2 also shows that these students were also most likely to live in two-parent households and tended to have smaller sibships.

Reading and mathematics grades and achievement test scores are also consistently highest among children who worked but who worked 15 or fewer hours per week. Students who worked between 1 and 15 hours per week in grade 10 had higher grade point averages and 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 work fewer than 15 hours per week.

To assess educational aspirations, we made use of an item that indicates how confident students were in grade 10 that they would attend college. Whether we consider employment in grade 10 or grade 12, 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. Table 2 reveals little connection between coursework in English or mathematics and employment, except that students who worked more than 5 hours per week in grade 10 had taken fewer math courses between grades 8 and 10 than students who were not employed in their sophomore year.

Turning to students' demographic characteristics, Table 2 reflects the findings from Table 1. Employed students are disproportionately non-Hispanic White and male, college preparatory track students are underrepresented in the group of students who work more than 15 hours per week, and there appears to be little connection between urban residence and employment intensity. Finally, Table 2 shows that state-level earnings for 16 to 20 year olds are higher for employed students than for students who are not employed, suggesting that labor market conditions play a role in influencing students' decision to work.

The results in Table 2 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, these data would not disagree. In short, 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 models that have been featured in nearly all prior research. In these traditional models, senior year grades are a function of employment in grade 10,

sophomore year grades, a vector of other control variables (SES, family structure, sibship size, reading and mathematics achievement test scores, aspirations, coursework in reading and mathematics, race, sex, curriculum track, urban residence, and state-level earnings and unemployment rates for 16 to 20 year olds), and a random disturbance. As described above, these models also include measures that indicate whether values were imputed for cases in which data was missing on exogenous variables. 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.

We estimate our model using the full sample, and then separately using data for men, for women, for non-Hispanic whites, and for Blacks and Hispanics. The results of these models are presented in Table 3 (for reading grades) and Table 4 (for mathematics grades), and are not surprising. Being employed in grade 10 has a positive and statistically significant effect on reading grades two years later for the full sample, for women, and for non-Hispanic whites, but no significant effect on mathematics grades. On the other hand, the effect of hours worked per week in grade 10 on senior year reading and mathematics grades is both negative and statistically significant in most cases. Were we to stop here, as most research does, we would conclude the following: being employed in 10th grade may have some positive effects on grades, but grades decline as hours worked per week increase. We might then recommend that as a matter of policy students should not be allowed to work very many hours per week. However, a proponent of student employment might respond that although the effect of the hours worked per week variable is negative and statistically significant, it is not very large. After all, according to the model students would have to work 100 hours or so per week in grade 10 in order to reduce their senior year reading or mathematics grades by one full standard deviation.

A SIMULTANEOUS EQUATIONS MODEL

To examine the potentially reciprocal causal relationship between employment during high schooling and senior year grades, we estimate a different series of regression models. Figure 3 displays the basic design of our model, the key feature of which is that grade point average (GPA) in the senior year has a reciprocal causal relationship with both employment status in the senior year and hours worked per week in that year. More specifically, senior year GPA is a function of senior and sophomore year employment, sophomore year grades, a vector of other control variables (the same variables that were used in the traditional model), and a random disturbance. Both employment status and hours worked per week during the senior year are functions of senior year GPA, a vector of control variables, and random disturbances. In these equations we do not include indicators of whether values were imputed for cases with missing data on exogenous variables, since the coefficients for these indicators were generally not statistically significant in the traditional models.

To identify the effects of senior year GPA on employment status and hours worked per week in that year it is necessary to find 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 necessary to find 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 coursework or grades as measured in the sophomore year to affect employment or hours worked per week in the senior year. These restrictions are reasonable, we believe, because the effects of these variables on senior year employment are likely indirect, operating through senior year grades. That is, controlling for senior year grades, we assume that the effects of sophomore year grades and coursework are minimal. In the second case, we do not permit state-level unemployment rates and earnings for 16 to 19 year olds, as measured when students were sophomores, to affect grades in the senior year. These variables might reasonably affect students' employment activities in their senior year, but we can not imagine how they might affect students' grades.

Because of the measurement properties of employment status and hours worked per week, the model illustrated in Figure 3 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 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 and 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).

The model can be written as follows. For the *i*th student, let G_i denote senior year grade point average (in either reading or mathematics, depending on the model), 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:

$$E_i = 1 \text{ if } E_i^* > 0$$

$$= 0 \text{ if } E_i^* \leq 0.$$

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

$$Hi = H_i^* \text{ if } E_i = 1$$

$$= 0 \text{ if } E_i = 0.$$

Then the equations of the model are:

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

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

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

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; (2) is a probit equation with a continuous endogenous variable G and exogenous variables X_k and W_l; and (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 instrumental variables that enable us to identify the effects of senior year GPA 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 and Hotz, 1983; Avery and Hotz, 1985). This method of estimation yields unique, consistent estimates that incorporate all of the overidentifying 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 overidentifying restrictions implied by the model; and solving for the structural parameters and standard errors from the reduced form parameter estimates and standard errors, respectively.)

In Table 5 we present the results of our model of the relationship between employment during high school and senior year reading grades; in Table 6 we present these results for mathematics grades. Each table consists of three sections, representing equations 1 through 3. 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.

From the results for equation 1 in Tables 5 and 6 we see that, all else constant, being employed in grade 12 has little effect on students' reading grades in that year; in most cases, these effects are not statistically significant. In contrast, being employed in grade 12 *lowers* students' mathematics grades in that year, in some cases by a full standard deviation or more. Furthermore, among employed students there is a *positive* effect of hours worked per week in the senior year on mathematics grades (but few effects on reading grades). While it is surprising to find that hours worked per week has a positive effect on mathematics grades among employed students, we should note that these effects are relatively small in magnitude. In general, working an additional 10 hours per week raises students' mathematics grades by only about one-fifth of a standard deviation. By way of comparison, an increase of a single point on the sophomore year mathematics achievement test has an effect of similar size. In general, then, we find minimal effects of senior year employment on senior year reading grades, but we find that having a job in the senior year harms students' mathematics grades. Overall, this pattern is consistent across demographic groups.

Equation 1 also contains terms for the effects of *sophomore* year employment on senior year grades. These effects are quite similar to what they were in the traditional model. That is, employment in grade 10 has positive effects on grades in the senior year, while hours worked per week has negative effects on senior year grades. Contrary to our earlier discussion, sophomore year employment *does* have direct effects on grades in subsequent years, even after considering senior year employment and an array of control variables. We are unable to directly consider the mechanisms that might produce such effects, but we suspect that they are related to the cumulative acquisition of knowledge and skills and to unmeasured characteristics of the minority of students who were employed in grade 10. Students who work long hours in the sophomore year may fall behind their peers who work less, and may not be able to catch up in ensuing years. This interpretation still emphasizes the *immediate* effects of employment on educational outcomes, rather than the long-term effects. Long work hours in the sophomore year immediately affect students' academic orientation and/or how well they do in school in that year, and the penalty associated

with long work hours in grade 10 may be difficult to counteract later on. On the other hand, the positive effects of having in a job in the sophomore year on grades in the senior year may have to do with such unmeasured characteristics as responsibility, motivation, or work habits. The minority of students who work, but not intensively, in grade 10 may (all else constant) get better grades two years later because they are especially motivated to work hard, to be responsible, or to achieve in multiple realms of their lives.

Equations 2 and 3 reflect the impact of senior year grades on employment status and hours worked per week, respectively. From equation 2 we see that grades have no effect on students' chances of being employed, but from equation 3 we see that (with one exception) grades have negative effects on hours worked per week among employed students. The exception is that among employed boys, senior year reading grades have no effect on hours worked per week. Not surprisingly, employment status and hours worked per week in grade 10 have large and statistically significant effects on employment status and hours worked per week in grade 12. To summarize briefly, senior year grades have no effect on *whether* students work, but they do negatively affect *how much* employed students work. This negative effect may be thought of in one of two ways. First, we might say that as students' grades go up, they tend to work fewer hours per week. Alternatively, and we think more realistically, we might say that as students' grades go down, they tend to work more hours per week. That is, we suspect that students become more involved in the world of work as their academic success declines.

It is instructive to compare the results of the traditional models in Tables 3 and 4 with those of the models in Tables 5 and 6. In Tables 3 and 4 we saw that there is a negative association between hours worked per week in grade 10 and senior year grades even after controlling for other variables in the model. Coming to similar conclusions, prior researchers have taken such findings as evidence that as students work more hours per week their grades begin to suffer. However, the results from Tables 5 and 6 suggest that the overall relationship between employment and grades is far more complicated. We find that there is a *negative* effect of being employed in the senior year on mathematics grades in that year (but no effect on reading grades), and that there is little effect of hours worked per week in the senior year. At the same

time, lower grades cause students to work more hours per week (or higher grades cause students to work fewer hours per week). In the long run (over two years), working is a net plus but working too much can have a cumulatively negative impact on grades. In the short run, having a job appears to harm students' mathematics grades, but students alter their work intensity in response to changes in their grades. The often observed negative association between hours worked per week and grades as measured at one point in time (the senior year) does turn out to be causal in nature, but the direction of causality seems to be the opposite of what has been presumed in the past.

DISCUSSION

In this paper we argued that prior research on the relationship between students' employment and their academic outcomes has often been inadequate in three important ways, and we attempted to overcome these inadequacies in our own analyses. First, we showed that the manner in which "employment" is specified has serious consequences for conclusions about the relationships between employment and schooling outcomes. We chose a specification of employment that we believe adequately captures the non-linear relationship between employment and grades (as well as many other schooling outcomes). Second, we suggested that the immediate effects of employment on schooling outcomes are probably at least as important as the long term effects. That is, we believe that the repercussions of working many hours in a week will be felt in subsequent weeks more so than in subsequent years. Unfortunately, and primarily for methodological reasons, prior research on this topic has 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-equation model from which we observed the effects of employment in both grades 10 and 12 on grades in the senior year. As it turns out, we found that there are important long-term *and* short-term effects of employment on grades. Third, 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 these reciprocal effects, and we did find important effects of grades on employment intensity.

One of our most noteworthy findings arose from our descriptive analyses. Students who worked between 1 and 15 hours per week in grade 10 were significantly less likely than students who did not work to drop out of school before grade 12, while students who worked more than 15 hours per week in grade 10 were significantly more likely to have dropped out. While we omitted dropouts from the bulk of our analyses, we urge other researchers to focus on the ways in which these intriguing findings arise. In particular, we hope that future work will ask why students who work fewer than 15 hours per week are so unlikely to drop out.

In our traditional model, we found what most other researchers have found. Having a job in the sophomore year has positive effects on grades two years later, but hours worked per week in the sophomore year has negative effects on those grades. The results from our revised model, which considered the short-term effects of senior year employment on senior year grades as well as the reciprocal effects of senior year grades on employment, complicated the story considerably. First, the short-term effects of holding a job in the senior year appear to be negative, especially for mathematics grades. Second, there appear to be no effects of hours worked per week in the senior year on grades in that year. Third, grades have a negative effect on hours worked per week. Finally, none of our results suggest that the relationship between employment and grades vary by race or sex.

How do we interpret this collection of findings? Students who work a moderate amount in their sophomore year get better grades two years later; students who work a great deal in that year get lower grades two years later. The positive effect on senior year grades of having a job in the sophomore year probably has to do with unmeasured attributes of students, such as achievement motivation, responsibility, maturity, and so forth. Intensive employment in the sophomore year may put students at an academic disadvantage from which they are unable to recover, and this disadvantage can be seen in their grades two years later. Turning to the short-term effects of employment, students who hold jobs in their senior year get

lower mathematics grades, but not lower reading grades; students' senior year grades are not affected by how many hours they work per week in that year. Simply holding a job detracts from students' performance in their mathematics classes, but not in their reading classes; we are unable to say why employment may differentially affect mathematics and reading grades. In general, students who are employed may be less academically oriented, may not care about their grades as much, or may identify more with their roles as workers than as students. For whatever reason, this effect manifests itself in mathematics classes more so than in reading classes. Finally, how much (but not whether) students work is affected by their grades. As we have argued, we believe that as students' academic performance declines, many turn to work as an alternative to school. Employment affects grades in complex ways, both direct and indirect, short-term and long-term, and grades affect employment at the same time. Readers who disagree with our interpretation of our empirical findings will surely agree that the relationship between employment and grades is far more complicated that has been recognized in previous research.

Should students be encouraged to become more involved in the labor force while they are still attending high school? How should we answer parents when they ask whether to grant their 16 year old sons or daughters permission to get jobs? In this paper we have said nothing about how employment during high school affects students' psychological characteristics, preparedness for their careers, attitudes toward work, levels of responsibility, and so forth. We can say, however, that working has consequences for how well students do in school, as measured by grades in reading and mathematics. The nature of these effects are complicated, so students and their parents should carefully monitor the intensity of students' employment and changes in students' academic performance, and should be prepared to modify students' employment status and work schedules as circumstances warrant.

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Table 1.
Employment Status and Hours Worked Per Week

		Employment in Grade 10					Employment in Grade 12				
	Full Sample	Not Employed	1 to 15 Hrs/Wk	>15 Hrs/Wk	Mean Hrs./wk	(sd)	Not Employed	1 to 15 Hrs/Wk	>15 Hrs/Wk	Mean Hrs./wk	(sd)
Weighted N	3,757	2,752	342	663			1,851	785	1,121		
Full Sample	100.0%	73.2%	91.0%	17.7%	15.7	(10.2)	49.3%	20.9%	29.8%	17.8	(9.0)
Sex											
Boys	1,840	72.0%	8.1%	20.0%	17.2	(10.7)	51.8%	17.3%	30.9%	19.3	(9.6)
Girls	1,917	74.5%	10.1%	15.4%	14.1	(9.3)	46.9%	24.3%	28.8%	16.6	(8.4)
Race											
Whites	2,802	70.9%	10.0%	19.1%	15.5	(10.0)	44.8%	23.2%	32.0%	17.7	(8.9)
Blacks	408	80.9%	5.9%	13.2%	17.7	(11.4)	67.8%	12.0%	20.2%	18.3	(9.5)
Hispanics	351	81.2%	6.3%	12.4%	15.9	(10.7)	59.5%	14.2%	26.3%	19.4	(9.2)
Community Size											
Urban Dweller	977	74.2%	9.1%	16.7%	15.6	(10.0)	51.2%	20.3%	28.5%	17.7	(9.3)
Not Urban	2,780	72.9%	9.1%	18.0%	15.8	(10.2)	48.6%	21.1%	30.3%	17.9	(9.0)
Curriculum Track, Grade 12											
College Prep.	1,661	73.7%	10.5%	15.9%	14.0	(9.3)	49.7%	25.5%	24.8%	15.9	(8.3)
General	1,334	72.9%	8.7%	18.4%	16.5	(10.5)	48.4%	18.6%	33.1%	18.9	(9.3)
Vocational	420	70.1%	6.8%	23.1%	18.4	(10.5)	42.6%	14.1%	43.2%	20.8	(8.9)
Don't Know	154	73.6%	8.3%	18.2%	16.6	(10.7)	57.5%	18.0%	24.5%	18.1	(8.9)
High School Drop Out											
% Who Dropped Out Before Grade 12	3,976	5.8%	2.1%	7.8%	-	-	-	-	-	-	-

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 sample size and adjust for design effects. Specifically, we initially adjusted the weight F2F1PNWT such that NEWWEIGHT = ((F2F1PNWT/165.080)/3.729).

Table 2.
Means and Standard Deviations of Variables in the Full Sample by Employment Status in Grades 10 and 12

	Entire	Analysis Sample											
			Employment in Grade 10					Employment in Grade 12					
Maximum Weighted Sample Size:		Full Sample (N = 3,267)	Not Empl. (N = 2,411)		>15 Hrs/wk (N = 563)			Not Empl. (N = 1,581)		>15 Hrs/wk (N = 992)			
	Mean	Mean	S.D.		S.D.		Mean		S.D.		Mean		S.D.
Exogenous Variables													
Family SES in Grade 10 (F1SES)	0.07 (0.74)	0.07	(0.74)	0.08	(0.76)	0.19	(0.74)*	-0.02	(0.66)**	0.07	(0.80)	0.22	(0.70)***	-0.02	(0.65)**
Sibship Size (F1S90A, F1S90B, F1S91A, F1S91B)	2.56 (2.14)	2.50	(2.10)	2.50	(2.11)	2.41	(1.92)	2.58	(2.17)	2.57	(2.23)	2.21	(1.81)***	2.60	(2.08)
Father in Household in Grade 10? (F1S92A, F1S92B, F1S92C)	0.85 (0.36)	0.86	(0.35)	0.86	(0.35)	0.86	(0.35)	0.84	(0.37)	0.84	(0.37)	0.88	(0.32)**	0.87	(0.34)
GPA in Math Classes, Grade 10 Scale: 0 to 4 (F1S39A)	2.83 (0.91)	2.84	(0.91)	2.85	(0.91)	2.97	(0.93)	2.74	(0.89)*	2.84	(0.93)	2.98	(0.88)***	2.75	(0.90)*
GPA in Reading Classes, Grade 10 Scale: 0 to 4 (F1S39B)	2.97 (0.84)	2.99	(0.83)	3.00	(0.83)	3.11	(0.80)*	2.85	(0.85)***	2.96	(0.85)	3.17	(0.78)***	2.91	(0.81)
Reading Achievement Test, IRT (F12XRIRR)	31.54 (9.44)	31.75	(9.37)	31.69	(9.48)	34.33	(8.85)***	30.67	(8.92)*	31.46	(9.64)	34.20	(8.83)***	30.49	(8.99)*
Math Achievement Test, IRT (F12XMIRR)	44.96 (12.96)	45.48	(12.88)	45.26	(12.97)	49.26	(12.40)***	44.46	(12.42)	44.95	(13.22)	49.04	(12.23)***	43.84	(12.31)
Prop. Who Think They Are Very Likely to go to College (F1S64B)	0.54 (0.50)	0.55	(0.50)	0.56	(0.50)	0.63	(0.48)*	0.49	(0.50)**	0.55	(0.50)	0.66	(0.47)***	0.49	(0.50)**
Coursework in English, Gr. 8 to 10 (F1S24A)	2.24 (1.27)	2.28	(1.21)	2.29	(1.18)	2.38	(1.46)	2.21	(1.22)	2.28	(1.24)	2.29	(1.12)	2.29	(1.24)
Coursework in Math, Gr. 8 to 10 (F1S22A-J)	1.69 (0.58)	1.73	(0.54)	1.74	(0.52)	1.77	(0.52)	1.67	(0.61)**	1.72	(0.55)	1.77	(0.49)*	1.73	(0.54)
Proportion White (F1RACE)	0.75 (0.44)	0.77	(0.42)	0.75	(0.44)	0.84	(0.37)***	0.81	(0.39)***	0.71	(0.46)	0.84	(0.36)***	0.81	(0.39)***
Proportion Male (F1SEX)	0.49 (0.50)	0.49	(0.50)	0.49	(0.50)	0.44	(0.50)	0.55	(0.50)**	0.52	(0.50)	0.41	(0.49)***	0.51	(0.50)
Proportion in the College Prep. Track in Grade 12 (F2HSPROG)	0.44 (0.50)	0.46	(0.50)	0.46	(0.50)	0.51	(0.50)	0.40	(0.49)**	0.47	(0.50)	0.54	(0.50)***	0.38	(0.49)***
Prop. in Communities with More Than 50,000 People (F1C5A)	0.26 (0.44)	0.25	(0.43)	0.25	(0.43)	0.23	(0.42)	0.24	(0.43)	0.26	(0.44)	0.24	(0.43)	0.24	(0.43)
State-Level Earnings for 16 to 20 Year Old Employed People in $Ln (1989 and 1990 CPS)	6.67 (0.28)	6.67	(0.28)	6.65	(0.28)	6.73	(0.27)***	6.73	(0.27)***	6.64	(0.28)	6.72	(0.28)***	6.69	(0.26)***
State-Level Unemployment Rate for 16 to 20 Year Old People (1989 and 1990 CPS)	14.01 (3.22)	13.96	(3.24)	14.03	(3.26)	13.76	(3.34)	13.76	(3.08)	13.95	(3.18)	13.74	(3.34)	14.12	(3.25)
Endogenous Variables													
GPA in Math Classes, Grade 12 Scale: 1 to 13 (F2RHMAG2)	7.37 (2.49)	7.39	(2.48)	7.45	(2.47)	8.03	(2.40)***	6.78	(2.42)***	7.28	(2.57)	8.21	(2.30)***	6.99	(2.31)**
GPA in Reading Classes, Grade 12 Scale: 1 to 13 (F2RHENG2)	6.73 (2.58)	6.74	(2.58)	6.81	(2.59)	7.22	(2.59)**	6.22	(2.45)***	6.70	(2.65)	7.37	(2.55)***	6.37	(2.40)**

Initial sample restricted to cases in which students were in-school and in-grade in grade 10, did not drop out before grade 12, were either Black, White or Hispanic, reported their gender, and reported how many hours they worked per week in grades 10 and 12. The analysis sample is further restricted to cases in which information was available about students' senior year grades in reading and mathematics. 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 F2F1PNWT such that NEWWEIGHT = ((F2F1PNWT/151.754)/3.729).
Significance Levels: * = p < .10 ; ** = p < .05 ; *** = p < .01. Tests compare employed students to not employed students.

Table 3.
Regressions of Senior Year Reading Grades on Sophomore Year Employment and Other Variables

	Full Sample (N = 12,183)		Men (N = 5,892)		Women (N = 6,291)		Whites (N = 8,997)		Bks, Hisp. (N = 3,186)	
(N = 3,267)	β	t-stat.	β	t-stat.	β	t-stat.	β	t-stat.	β	t-stat.
Employed in Grade 10	0.115	(2.094)	0.006	(0.068)	0.257	(3.444)	0.132	(2.195)	-0.021	(-0.165)
Hours Worked per Week in Grade 10	-0.019	(-6.628)	-0.011	(-2.968)	-0.029	(-6.971)	-0.017	(-5.601)	-0.020	(-3.238)
Family SES in Grade 10	0.128	(5.808)	0.162	(4.923)	0.102	(3.436)	0.158	(6.126)	0.027	(0.636)
Sibship Size	-0.013	(-1.861)	-0.015	(-1.475)	-0.011	(-1.144)	-0.004	(-0.506)	-0.026	(-2.265)
Father in Household in Grade 10?	0.350	(8.599)	0.403	(6.568)	0.279	(5.160)	0.287	(5.730)	0.459	(6.677)
GPA in Math Classes, Grade 10, Scale: 0 to 4	0.347	(19.018)	0.350	(12.966)	0.341	(13.836)	0.358	(17.292)	0.295	(7.884)
GPA in Reading Classes, Grade 10, Scale: 0 to 4	1.212	(59.106)	1.279	(43.390)	1.138	(39.742)	1.283	(53.492)	1.038	(26.603)
Reading Achievement Test, IRT	0.027	(11.951)	0.019	(5.881)	0.037	(11.447)	0.025	(9.735)	0.036	(7.373)
Math Achievement Test, IRT	0.038	(21.252)	0.040	(15.575)	0.036	(14.475)	0.035	(17.476)	0.045	(12.210)
Prop. Who Think They Are Very Likely to go to Col.	0.243	(7.334)	0.168	(3.422)	0.303	(6.788)	0.272	(7.104)	0.163	(2.488)
Coursework in English, Gr. 8 to 10	-0.015	(-0.341)	-0.041	(-0.661)	-0.001	(-0.018)	-0.054	(-0.982)	0.135	(1.671)
Coursework in Math, Gr. 8 to 10	0.025	(0.794)	-0.026	(-0.586)	0.098	(2.073)	-0.033	(-0.885)	0.148	(2.446)
Proportion White	0.180	(4.922)	0.143	(2.639)	0.194	(3.941)	-	-	-	-
Proportion Male	-0.673	(-22.905)	-	-	-	-	-0.678	(-20.229)	-0.670	(-11.161)
Proportion in the College Prep. Track in Grade 12	0.320	(9.973)	0.306	(6.426)	0.334	(7.728)	0.281	(7.693)	0.420	(6.291)
Prop. in Communities with More Than 50,000 People	-0.074	(-2.213)	-0.050	(-0.997)	-0.088	(-1.956)	-0.053	(-1.308)	-0.114	(-1.936)
State-Level Earn. for 16 to 20 Year Old Empl People, $Ln	0.303	(5.746)	0.302	(3.847)	0.320	(4.533)	0.358	(6.071)	0.065	(0.564)
State-Level Unemp. Rate for 16 to 20 Year Old People	0.014	(3.073)	0.007	(1.023)	0.022	(3.653)	0.029	(5.846)	-0.053	(-5.153)
Constant	-2.272	(-6.009)	-2.699	(-4.811)	-2.642	(-5.210)	-2.534	(-5.870)	-0.156	(-0.190)
R-Squared	0.608		0.586		0.593		0.621		0.555	

Note: See Table 2 for description of sample selection and weighting procedures. Models include dummy variables to indicate whether mean substitution occurred for particular exogenous variables.

Table 4.
Regressions of Senior Year Mathematics Grades on Sophomore Year Employment and Other Variables

	Full Sample (N = 12,183)		Men (N = 5,892)		Women (N = 6,291)		Whites (N = 8,997)		Bks, Hisp. (N = 3,186)	
(N = 3,267)	β	t-stat.	β	t-stat.	β	t-stat.	β	t-stat.	β	t-stat.
Employed in Grade 10	-0.005	(-0.089)	0.110	(1.232)	-0.117	(-1.408)	0.041	(0.614)	-0.274	(-1.932)
Hours Worked per Week in Grade 10	-0.015	(-4.823)	-0.021	(-4.822)	-0.008	(-1.717)	-0.017	(-4.890)	-0.004	(-0.545)
Family SES in Grade 10	0.014	(0.590)	0.022	(0.615)	0.010	(0.290)	0.028	(0.969)	-0.035	(-0.748)
Sibship Size	-0.004	(-0.544)	-0.008	(-0.684)	0.001	(0.086)	0.004	(0.368)	-0.016	(-1.286)
Father in Household in Grade 10?	0.320	(7.083)	0.394	(5.806)	0.240	(3.980)	0.331	(5.917)	0.269	(3.559)
GPA in Math Classes, Grade 10, Scale: 0 to 4	1.281	(63.292)	1.231	(41.341)	1.335	(48.492)	1.341	(57.943)	1.071	(26.032)
GPA in Reading Classes, Grade 10, Scale: 0 to 4	0.311	(13.662)	0.393	(12.056)	0.228	(7.124)	0.335	(12.520)	0.271	(6.333)
Reading Achievement Test, IRT	-0.003	(-1.197)	-0.012	(-3.413)	0.007	(1.962)	-0.002	(-0.796)	-0.006	(-1.164)
Math Achievement Test, IRT	0.062	(31.272)	0.066	(23.496)	0.057	(20.532)	0.059	(26.213)	0.069	(17.189)
Prop. Who Think They Are Very Likely to go to Col.	0.040	(1.094)	-0.006	(-0.108)	0.072	(1.447)	0.041	(0.965)	0.033	(0.459)
Coursework in English, Gr. 8 to 10	-0.047	(-0.930)	-0.117	(-1.696)	0.031	(0.416)	-0.045	(-0.746)	-0.015	(-0.169)
Coursework in Math, Gr. 8 to 10	0.107	(3.011)	0.093	(1.914)	0.117	(2.220)	0.040	(0.967)	0.250	(3.754)
Proportion White	0.273	(6.716)	0.170	(2.831)	0.365	(6.621)	-	-	-	-
Proportion Male	-0.321	(-9.835)	-	-	-	-	-0.356	(-9.515)	-0.198	(-3.002)
Proportion in the College Prep. Track in Grade 12	0.214	(6.003)	0.190	(3.612)	0.242	(5.017)	0.139	(3.400)	0.484	(6.599)
Prop. in Communities with More Than 50,000 People	-0.032	(-0.864)	-0.039	(-0.701)	-0.027	(-0.544)	0.006	(0.143)	-0.100	(-1.545)
State-Level Earn. for 16 to 20 Year Old Empl People, $Ln	0.190	(3.243)	0.280	(3.228)	0.108	(1.372)	0.244	(3.696)	-0.111	(-0.876)
State-Level Unemp. Rate for 16 to 20 Year Old People	0.007	(1.329)	0.001	(0.139)	0.013	(1.924)	0.016	(2.918)	-0.039	(-3.431)
Constant	-2.325	(-5.537)	-2.963	(-4.779)	-2.092	(-3.689)	-2.561	(-5.311)	0.399	(0.442)
R-Squared	0.555		0.540		0.569		0.568		0.491	

Note: See Table 2 for description of sample selection and weighting procedures. Models include dummy variables to indicate whether mean substitution occurred for particular exogenous variables.

Table 5.
Structural Equation Model of the Relationship Between Reading Grades and Employment in Grade 12

	Full Sample		Boys		Girls		Non-Hisp. Whites		Blacks & Hispanics	
	Coef.	Coef./S.E.	Coef.	Coef./S.E.	Coef.	Coef./S.E.	Coef.	Coef./S.E.	Coef.	Coef./S.E.
Equation 1: Dependent Variable: Senior Year Reading Grades										
Employed in Grade 12	0.548	(1.244)	0.936	(1.888)	0.264	(0.681)	-0.041	(-0.090)	3.213	(4.349)
Hrs./Wk in Gr. 12 (Given Employed)	0.006	(0.398)	-0.012	(-1.258)	0.027	(2.803)	0.024	(1.510)	-0.068	(-2.382)
Employed in Grade 10	0.166	(4.981)	0.042	(0.842)	0.332	(7.074)	0.204	(5.486)	-0.063	(-0.790)
Hrs./Wk in Gr. 10	-0.022	(-11.706)	-0.013	(-5.334)	-0.036	(-11.728)	-0.024	(-11.211)	-0.012	(-2.833)
Non-Hispanic White	0.215	(10.120)	0.200	(6.313)	0.227	(7.930)	-	-	-	-
Male	-0.680	(-36.785)	-	-	-	-	-0.694	(-32.517)	-0.627	(-16.539)
SES Composite	0.128	(9.704)	0.141	(7.157)	0.121	(6.739)	0.166	(10.508)	0.027	(1.077)
Number of Siblings	-0.013	(-3.264)	-0.016	(-2.576)	-0.011	(-1.925)	-0.006	(-1.095)	-0.025	(-3.541)
Father in Household in Grade 10	0.351	(14.785)	0.432	(12.040)	0.281	(8.892)	0.287	(9.749)	0.442	(10.809)
Sophomore Year Math Grades	0.350	(23.334)	0.386	(18.150)	0.294	(13.800)	0.350	(19.725)	0.335	(12.241)
Sophomore Year English Grades	1.237	(72.360)	1.268	(52.818)	1.208	(49.503)	1.319	(63.026)	1.074	(37.069)
Reading Ach. Test Score, Grade 10	0.027	(20.122)	0.018	(9.154)	0.037	(19.628)	0.026	(16.793)	0.031	(10.921)
Math. Ach. Test Score, Grade 10	0.039	(37.447)	0.041	(27.662)	0.037	(25.405)	0.037	(30.784)	0.045	(21.069)
Very Sure to Attend College in Gr. 10	0.243	(12.270)	0.183	(6.281)	0.299	(11.090)	0.294	(12.824)	0.056	(1.405)
Coursework in Math., Grade 10	0.175	(5.206)	0.169	(3.648)	0.161	(3.269)	0.158	(3.740)	0.219	(4.021)
Coursework in English, Grade 10	0.170	(6.442)	0.113	(3.199)	0.250	(6.265)	0.061	(1.865)	0.363	(8.248)
College Preparatory Track	0.336	(17.434)	0.307	(10.501)	0.353	(13.609)	0.289	(13.054)	0.447	(11.095)
Urban Resident	-0.079	(-4.056)	-0.079	(-2.689)	-0.065	(-2.470)	-0.070	(-2.925)	-0.108	(-3.092)
Equation 2: Dependent Variable: Senior Year Employment Status (1 = Employed, 0 =Not Employed)										
Senior Year Reading Grades	-0.010	(-1.515)	-0.012	(-1.281)	-0.006	(-0.683)	-0.006	(-0.821)	-0.003	(-0.224)
Employed in Grade 10	0.607	(22.700)	0.635	(16.700)	0.599	(15.649)	0.638	(21.027)	0.486	(8.330)
Hrs./Wk in Gr. 10	0.001	(0.527)	0.001	(0.727)	-0.001	(-0.534)	-0.002	(-0.974)	0.009	(3.084)
Non-Hispanic White	0.328	(18.861)	0.307	(12.238)	0.339	(14.009)	-	-	-	-
Male	-0.167	(-12.078)	-	-	-	-	-0.194	(-12.100)	-0.065	(-2.346)
SES Composite	-0.036	(-3.463)	-0.100	(-6.560)	0.023	(1.552)	-0.054	(-4.324)	0.008	(0.428)
Number of Siblings	-0.013	(-3.836)	-0.005	(-1.047)	-0.020	(-4.176)	-0.004	(-0.836)	-0.028	(-5.033)
Father in Household in Grade 10	0.157	(8.063)	0.192	(6.738)	0.110	(4.093)	0.168	(6.894)	0.128	(4.030)
Reading Ach. Test Score, Grade 10	-0.002	(-1.808)	0.000	(0.059)	-0.004	(-2.720)	-0.003	(-2.366)	0.002	(0.856)
Math. Ach. Test Score, Grade 10	0.003	(4.086)	0.001	(0.887)	0.006	(4.936)	0.004	(4.115)	0.001	(0.749)
Very Sure to Attend College in Gr. 10	0.018	(1.145)	-0.053	(-2.401)	0.094	(4.355)	-0.011	(-0.586)	0.117	(3.996)
College Preparatory Track	-0.095	(-6.254)	-0.002	(-0.106)	-0.185	(-8.657)	-0.086	(-4.872)	-0.106	(-3.489)
Urban Resident	0.045	(2.831)	0.053	(2.297)	0.036	(1.634)	0.032	(1.611)	0.086	(3.204)
ln(State-Level Youth Earnings)	0.388	(15.375)	0.289	(7.909)	0.494	(14.015)	0.386	(13.335)	0.362	(6.861)
State-Level Youth Unemployment	0.008	(3.830)	0.015	(4.829)	0.001	(0.402)	0.008	(3.352)	0.006	(1.323)
Equation 3: Dependent Variable: Senior Year Hours Worked Per Week (Given Employed)										
Senior Year Reading Grades	-0.775	(-1.945)	-0.350	(-0.771)	-1.227	(-3.293)	-1.275	(-2.974)	1.367	(2.028)
Employed in Grade 10	-1.782	(-7.228)	-1.658	(-4.671)	-2.055	(-6.091)	-1.675	(-6.387)	-2.518	(-4.370)
Hrs./Wk in Gr. 10	0.180	(13.177)	0.156	(9.490)	0.218	(11.190)	0.173	(11.688)	0.238	(7.895)
Non-Hispanic White	0.352	(1.360)	0.223	(0.680)	0.500	(1.654)	-	-	-	-
Male	1.301	(6.371)	-	-	-	-	0.912	(3.901)	3.281	(8.076)
SES Composite	-1.039	(-8.247)	-1.232	(-7.430)	-0.900	(-5.733)	-1.112	(-8.561)	-1.001	(-4.345)
Number of Siblings	0.219	(5.357)	0.240	(4.842)	0.221	(4.158)	0.194	(4.281)	0.352	(4.632)
Father in Household in Grade 10	0.171	(0.594)	0.277	(0.673)	0.168	(0.517)	-0.108	(-0.374)	0.130	(0.229)
Reading Ach. Test Score, Grade 10	-0.049	(-3.485)	-0.088	(-5.629)	0.003	(0.153)	-0.042	(-2.696)	-0.063	(-2.025)
Math. Ach. Test Score, Grade 10	-0.005	(-0.319)	-0.010	(-0.440)	-0.003	(-0.216)	0.005	(0.263)	-0.075	(-2.257)
Very Sure to Attend College in Gr. 10	-1.095	(-6.271)	-1.209	(-4.864)	-0.924	(-3.817)	-0.812	(-4.119)	-2.077	(-6.247)
College Preparatory Track	-1.210	(-6.793)	-1.692	(-6.531)	-0.756	(-3.189)	-1.065	(-5.618)	-2.882	(-6.667)
Urban Resident	-0.285	(-1.672)	0.510	(2.102)	-0.960	(-4.013)	-0.153	(-0.793)	-0.303	(-0.953)
ln(State-Level Youth Earnings)	-1.799	(-6.299)	-2.061	(-5.401)	-1.520	(-4.049)	-1.714	(-5.665)	-2.788	(-4.671)
State-Level Youth Unemployment	0.131	(5.464)	0.161	(5.067)	0.105	(3.403)	0.126	(4.834)	0.185	(3.156)
Error Variances and Covariances										
Error Variance, Equation 1 (Employed)	2.348	(13.653)	2.490	(19.976)	2.240	(13.933)	2.363	(14.127)	2.572	(12.445)
Error Variance, Equation 1 (Not Empl.)	2.561	(93.868)	2.688	(66.950)	2.394	(65.619)	2.426	(77.441)	2.782	(53.776)
Error Variance, Equation 3	71.873	(19.437)	80.786	(35.593)	64.935	(16.157)	71.399	(18.552)	91.468	(24.640)
Error Covariance, Equations 2 and 3	0.001	(0.019)	-0.008	(-0.115)	-0.014	(-0.164)	0.002	(0.033)	0.004	(0.042)

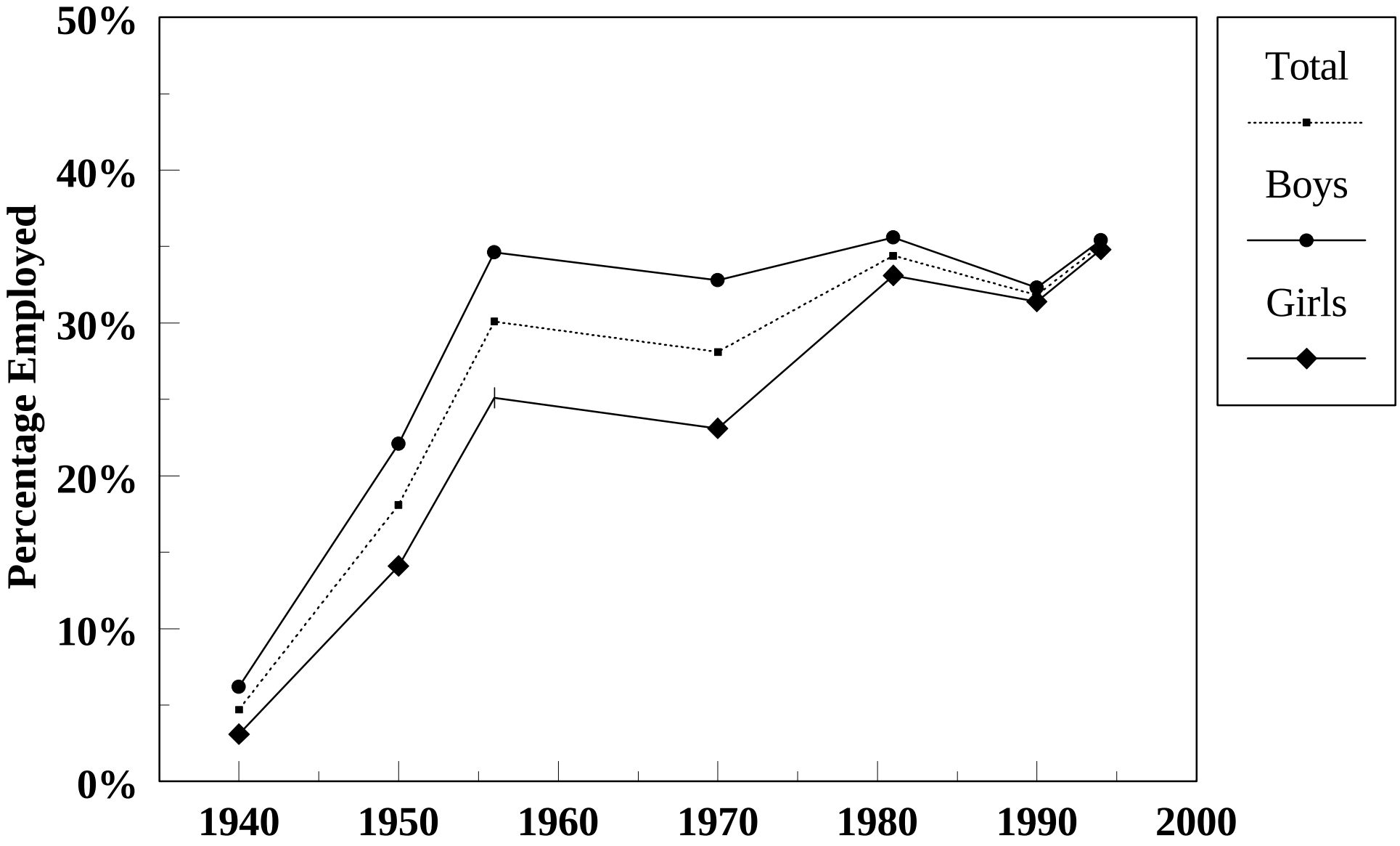
Note: See Table 2 for description of sample selection and weighting procedures.

Table 6.
Structural Equation Model of the Relationship Between Mathematics Grades and Employment in Grade 12

	Full Sample		Boys		Girls		Non-Hisp. Whites		Blacks & Hispanics	
	Coef.	Coef./S.E.	Coef.	Coef./S.E.	Coef.	Coef./S.E.	Coef.	Coef./S.E.	Coef.	Coef./S.E.
Equation 1: Dependent Variable: Senior Year Mathematics Grades										
Employed in Grade 12	-1.880	(-4.022)	-1.441	(-2.624)	-1.977	(-4.743)	-1.244	(-2.504)	-3.843	(-4.166)
Hrs./Wk in Gr. 12 (Given Employed)	0.056	(3.487)	0.040	(3.609)	0.065	(6.009)	0.049	(2.694)	0.073	(2.338)
Employed in Grade 10	0.106	(2.789)	0.195	(3.537)	0.005	(0.088)	0.148	(3.543)	-0.150	(-1.693)
Hrs./Wk in Gr. 10	-0.024	(-11.361)	-0.027	(-9.773)	-0.019	(-5.445)	-0.026	(-10.816)	-0.013	(-2.758)
Non-Hispanic White	0.289	(12.114)	0.191	(5.456)	0.397	(12.218)	-	-	-	-
Male	-0.383	(-18.514)	-	-	-	-	-0.411	(-17.301)	-0.263	(-6.223)
SES Composite	0.046	(3.090)	0.037	(1.689)	0.055	(2.719)	0.051	(2.925)	0.041	(1.463)
Number of Siblings	-0.011	(-2.370)	-0.015	(-2.181)	-0.004	(-0.596)	-0.003	(-0.477)	-0.022	(-2.815)
Father in Household in Grade 10	0.330	(12.340)	0.408	(10.256)	0.258	(7.189)	0.349	(10.577)	0.246	(5.403)
Sophomore Year Math Grades	1.252	(76.407)	1.216	(53.019)	1.291	(54.432)	1.345	(69.815)	1.004	(33.174)
Sophomore Year English Grades	0.270	(14.465)	0.337	(13.061)	0.203	(7.464)	0.324	(14.272)	0.154	(4.799)
Reading Ach. Test Score, Grade 10	-0.001	(-0.376)	-0.010	(-4.692)	0.009	(4.206)	-0.001	(-0.417)	-0.005	(-1.492)
Math. Ach. Test Score, Grade 10	0.063	(54.137)	0.068	(41.275)	0.058	(35.075)	0.062	(45.982)	0.067	(28.577)
Very Sure to Attend College in Gr. 10	0.077	(3.449)	0.026	(0.812)	0.121	(3.932)	0.080	(3.116)	0.056	(1.259)
Coursework in Math., Grade 10	0.021	(0.575)	-0.021	(-0.430)	0.057	(1.036)	0.058	(1.262)	-0.044	(-0.722)
Coursework in English, Grade 10	0.199	(6.892)	0.161	(4.216)	0.249	(5.602)	0.096	(2.713)	0.388	(7.967)
College Preparatory Track	0.259	(11.947)	0.233	(7.221)	0.272	(9.204)	0.169	(6.845)	0.557	(12.441)
Urban Resident	-0.023	(-1.036)	-0.062	(-1.901)	0.019	(0.624)	-0.001	(-0.020)	-0.080	(-2.069)
Equation 2: Dependent Variable: Senior Year Employment Status (1 = Employed, 0 =Not Employed)										
Senior Year Mathematics Grades	-0.003	(-0.655)	-0.005	(-0.724)	-0.004	(-0.580)	-0.004	(-0.534)	0.003	(0.315)
Employed in Grade 10	0.607	(22.673)	0.634	(16.665)	0.599	(15.624)	0.638	(21.019)	0.485	(8.339)
Hrs./Wk in Gr. 10	0.001	(0.565)	0.001	(0.779)	-0.001	(-0.522)	-0.002	(-0.961)	0.009	(3.095)
Non-Hispanic White	0.328	(18.846)	0.307	(12.225)	0.339	(14.008)	-	-	-	-
Male	-0.167	(-12.074)	-	-	-	-	-0.194	(-12.092)	-0.065	(-2.362)
SES Composite	-0.037	(-3.479)	-0.100	(-6.597)	0.023	(1.549)	-0.054	(-4.328)	0.008	(0.418)
Number of Siblings	-0.013	(-3.836)	-0.005	(-1.030)	-0.020	(-4.174)	-0.004	(-0.837)	-0.028	(-5.048)
Father in Household in Grade 10	0.157	(8.070)	0.192	(6.748)	0.110	(4.092)	0.169	(6.901)	0.129	(4.043)
Reading Ach. Test Score, Grade 10	-0.002	(-1.812)	0.000	(0.046)	-0.004	(-2.726)	-0.003	(-2.366)	0.002	(0.874)
Math. Ach. Test Score, Grade 10	0.003	(4.088)	0.001	(0.882)	0.006	(4.936)	0.004	(4.111)	0.001	(0.742)
Very Sure to Attend College in Gr. 10	0.018	(1.138)	-0.053	(-2.423)	0.094	(4.353)	-0.011	(-0.585)	0.117	(3.999)
College Preparatory Track	-0.096	(-6.276)	-0.003	(-0.138)	-0.185	(-8.674)	-0.086	(-4.878)	-0.106	(-3.514)
Urban Resident	0.046	(2.839)	0.054	(2.323)	0.036	(1.635)	0.032	(1.613)	0.086	(3.197)
ln(State-Level Youth Earnings)	0.388	(15.352)	0.288	(7.890)	0.494	(14.008)	0.386	(13.329)	0.362	(6.859)
State-Level Youth Unemployment	0.008	(3.811)	0.015	(4.806)	0.001	(0.395)	0.008	(3.341)	0.006	(1.324)
Equation 3: Dependent Variable: Senior Year Hours Worked Per Week (Given Employed)										
Senior Year Mathematics Grades	-1.675	(-4.551)	-1.407	(-3.558)	-1.734	(-5.143)	-1.460	(-3.824)	-2.344	(-2.906)
Employed in Grade 10	-1.723	(-8.252)	-1.165	(-3.434)	-2.548	(-9.134)	-1.746	(-6.880)	-2.082	(-3.663)
Hrs./Wk in Gr. 10	0.164	(12.473)	0.119	(6.259)	0.241	(14.573)	0.172	(13.129)	0.157	(5.463)
Non-Hispanic White	0.780	(3.605)	0.556	(2.051)	1.011	(3.946)	-	-	-	-
Male	1.377	(8.431)	-	-	-	-	1.306	(7.875)	1.715	(3.544)
SES Composite	-1.136	(-11.526)	-1.348	(-8.456)	-0.950	(-7.004)	-1.299	(-9.929)	-0.506	(-2.302)
Number of Siblings	0.240	(7.739)	0.230	(4.852)	0.269	(5.764)	0.201	(4.963)	0.411	(5.579)
Father in Household in Grade 10	0.269	(1.183)	0.393	(1.160)	0.185	(0.708)	0.056	(0.210)	0.539	(1.322)
Reading Ach. Test Score, Grade 10	-0.076	(-7.954)	-0.114	(-6.169)	-0.034	(-2.496)	-0.075	(-6.348)	-0.099	(-3.981)
Math. Ach. Test Score, Grade 10	0.066	(2.593)	0.067	(2.698)	0.050	(2.040)	0.043	(2.142)	0.161	(3.074)
Very Sure to Attend College in Gr. 10	-1.272	(-9.422)	-1.275	(-5.998)	-1.179	(-6.175)	-1.091	(-6.478)	-2.061	(-6.259)
College Preparatory Track	-1.244	(-8.579)	-1.632	(-7.335)	-0.962	(-4.951)	-1.260	(-7.627)	-0.998	(-1.720)
Urban Resident	-0.131	(-0.908)	0.461	(2.002)	-0.709	(-3.492)	-0.001	(-0.007)	-0.332	(-1.072)
ln(State-Level Youth Earnings)	-2.053	(-8.561)	-2.339	(-6.182)	-1.710	(-5.689)	-1.833	(-6.810)	-3.161	(-5.340)
State-Level Youth Unemployment	0.138	(7.204)	0.163	(5.402)	0.108	(4.044)	0.126	(5.142)	0.218	(4.174)
Error Covariances										
Error Variance, Equation 1 (Employed)	3.252	(34.800)	3.394	(33.909)	3.031	(26.453)	3.157	(22.114)	3.518	(30.113)
Error Variance, Equation 1 (Not Empl.)	3.050	(93.910)	3.121	(67.052)	2.949	(65.546)	2.850	(77.484)	3.401	(53.695)
Error Variance, Equation 3	77.888	(53.224)	84.496	(47.404)	70.253	(30.654)	74.470	(27.807)	91.520	(18.793)
Error Covariance, Equations 2 and 3	0.013	(0.251)	0.023	(0.316)	-0.009	(-0.122)	0.006	(0.089)	-0.010	(-0.107)

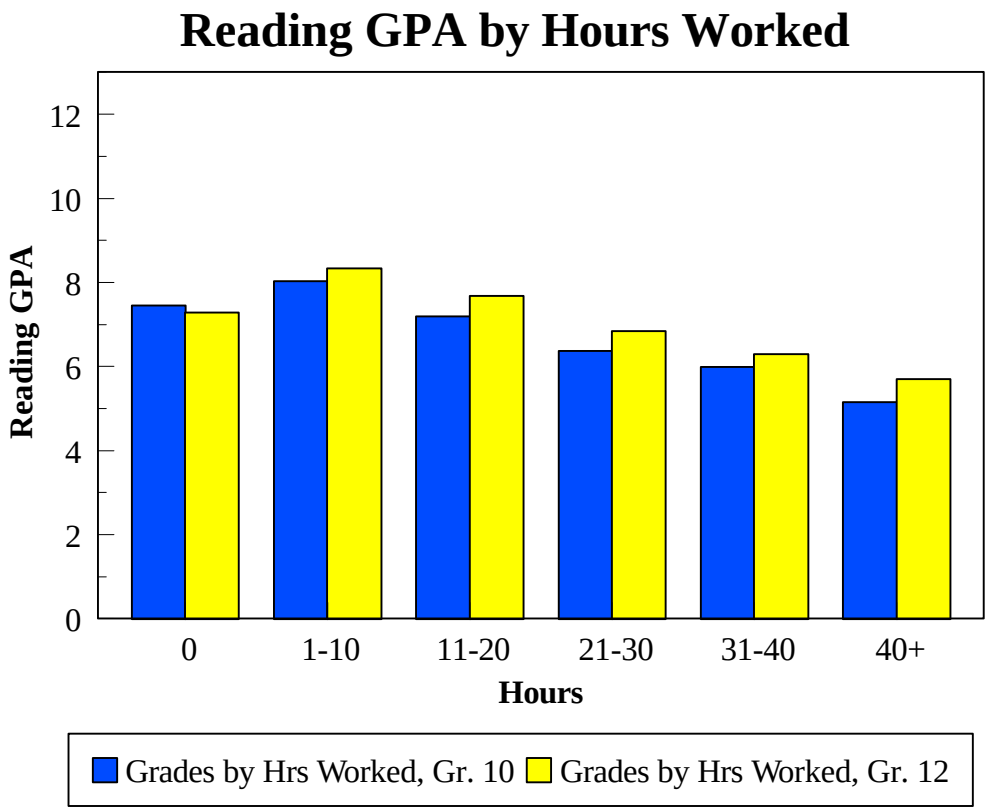
Note: See Table 2 for description of sample selection and weighting procedures.

Figure 1.
Percentage Employed Among 16 to 19 Year Old Students, 1940 to 1994



Sources: U.S. Bureau of the Census 1943, 1953, 1957, 1973, 1992, 1994; U.S. Bureau of Labor Statistics 1983.

Figure 2.
The Curvilinear Relationships Between Schooling Outcomes and Hours Worked per Week in Grades 10 and 12



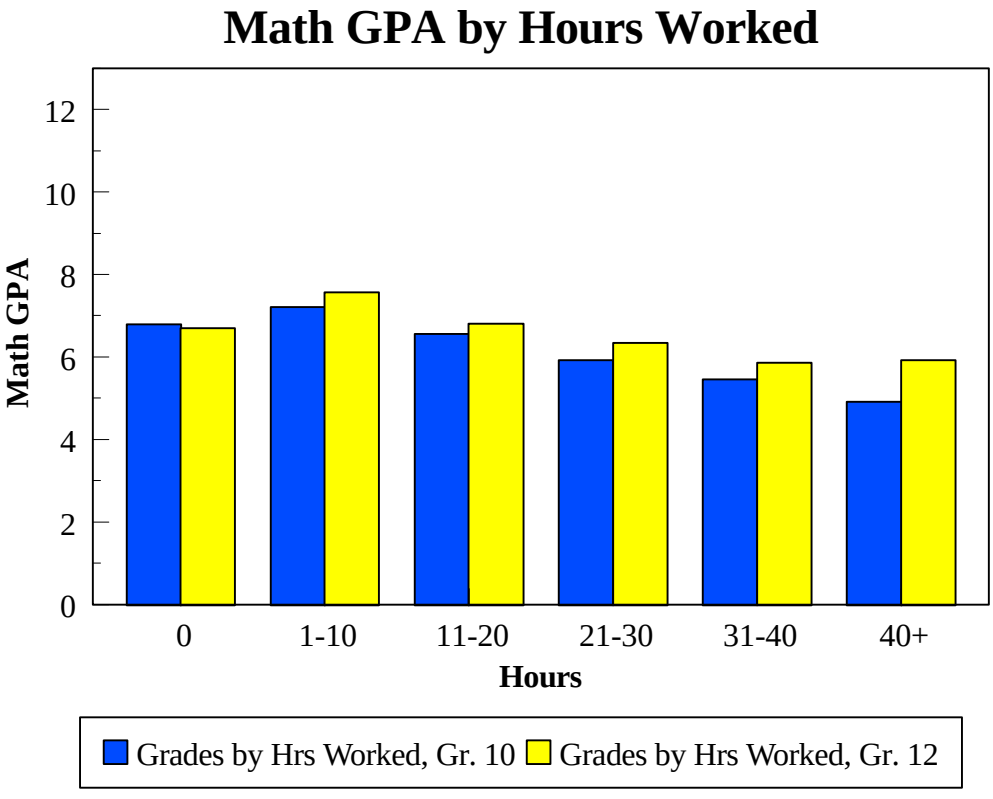
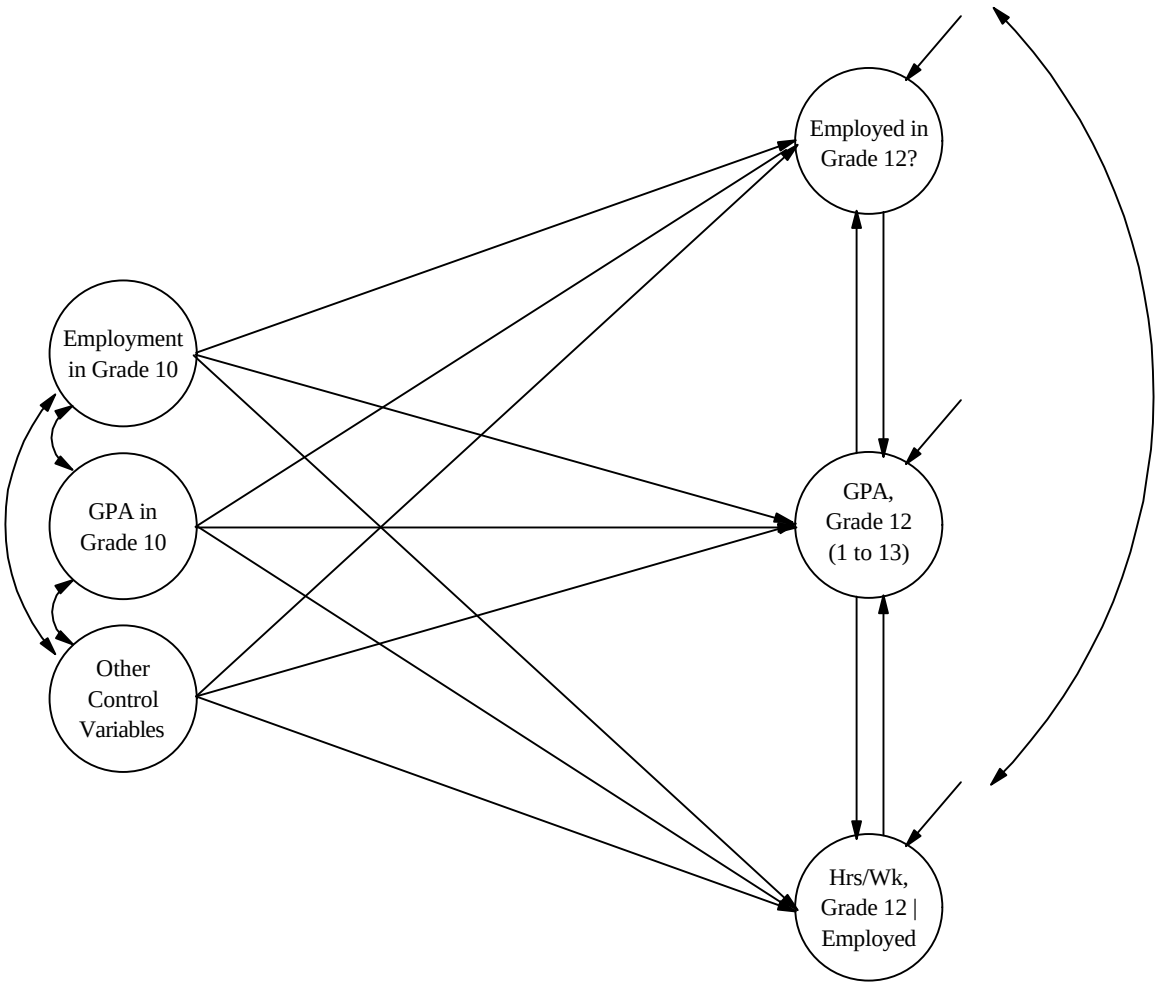


Figure 3.
12th Grade Employment and Senior-Year Grades:
A Simultaneous Equations Model



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