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# When Work Matters: The Varying Impact of Work Intensity on High School Dropout

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While the association between teenagers' work and academic performance continues to be debated in studies of adolescent employment, many researchers have found that "intensive" involvement in paid work increases the risk of high school dropout. It is still unclear, however, whether this relationship is spurious owing to preexisting differences in socioeconomic background, school performance, aspirations, and orientations toward work and school. Using propensity-score matching techniques, the authors address this issue and assess variation in the effects of work hours on the probability of dropping out of high school. The results suggest that long hours on the job do not encourage high school dropout among all students.

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**A**lthough most young people in the United States graduate from high school (approximately 90 percent of 16–24 year olds), the risk of dropping out of high school is especially high for racial minorities and youths from families of low socioeconomic status (U.S. Department of Education 2005). Twenty-four percent of Hispanic youths do not complete high school, compared to 12 percent of African American and 7 percent of white youths. Furthermore, the high school dropout rate is approximately five times higher for students who reside in families with incomes in the bottom quartile than for those who reside in families with incomes in the top quartile.

While research on high school dropout has typically focused on risk factors, such as the influence of the family, peers, and school, the effect of teenage employment on educational attainment is currently receiving attention. Research has suggested that (1) most teenagers in the United States work in paid jobs at some point during high school

(approximately 90 percent; see U.S. Department of Labor 2000); (2) many of these youths work "intensively" (defined as more than 20 hours per week) during the school year; (3) ascribed characteristics, such as socioeconomic background and race, increase the risk of both high school dropout and early engagement in intensive work; and (4) the relationship between intensive work and school dropout is robust even after prior success in school and background characteristics are controlled (D'Amico 1984; Warren and Cataldi 2003; Warren and Lee 2003).

Nevertheless, it is uncertain whether paid work in adolescence affects high school completion or whether these results reflect preexisting differences among students. Using data from the National Education Longitudinal Study of 1988 (NELS:88), our study extended prior research on the role of teenage employment as an influencing factor on high school dropout. First, we considered a variety of observed background characteristics, such as gender, race, socioeconomic status, aspira-

tions, and prior school and work experiences, that research has shown to affect the likelihood of "intensive" (more than 20 hours per week) versus "moderate" work (20 hours or less per week) in adolescence (National Research Council 1998). Using propensity-score matching techniques, we paired intensive workers and moderate workers whose preexisting demographic and social psychological characteristics were as similar as possible and then estimated the effects of actual work hours on high school completion. Finally, we considered whether a student's propensity to work long hours conditions the impact of intensive work on the probability of high school dropout. This strategy allowed us to uncover the disparate effects of high school dropout that are based on this process of self-selection.

## PRIOR RESEARCH

The debate on the relationship between paid work and schooling in adolescence has centered on whether teenage employment detracts, promotes, or fails to affect academic performance and school completion. We offer three general perspectives on this debate.

The first view suggests that teenage employment directly affects both academic performance and the likelihood of high school completion. Early engagement in paid work may interfere with homework and other extracurricular activities, as well as promote problem behaviors and attitudes that disrupt school performance and high school completion (Greenberger and Steinberg 1986). Because many teenagers work in service and retail jobs with their peers (U.S. Department of Labor 2000), this view suggests that early work experiences provide few opportunities for adult mentorship and the development of skills and instead foster negative attitudes toward work; workplace deviance (e.g., tardiness, giving away goods and services for less than their value, and purposely damaging workplace property); and more adultlike leisure activities, such as drinking and substance use. Paid work, especially when it is considered intensive, reduces grade point

averages, time spent on homework, educational aspirations, and the likelihood of completing high school (Marsh and Kleitman 2005; Steinberg and Dornbusch 1991; Steinberg, Fegley, and Dornbusch 1993). These findings suggest that employment has the potential to pull students away from school, regardless of the students' prior school performances, socioeconomic backgrounds, and other demographic characteristics (Warren and Lee 2003).

Consistent with the view that paid work affects achievement, moderate employment appears to benefit students' academic performance and reduce the risk of high school dropout (D'Amico 1984; Marsh 1991). Studies have challenged the "zero-sum" assumption that limited hours of work during the school year reduce involvement in extracurricular activities and time for studying (Schoenhals, Tienda, and Schneider 1998; Shanahan and Flaherty 2001), arguing that moderate employment increases involvement in school activities (Mihalic and Elliott 1997) and improves school performance (Mortimer and Johnson 1998), especially when work encourages time-management skills and young people are using their earnings to save for college (Marsh 1991; Mortimer 2003).

The second view is that the observed benefits of moderate work, as well as the detriments of intensive work, are due to individual differences in socioeconomic background, school performance, aspirations, and orientations toward work and school. It suggests that work hours will have no effect on high school dropout once self-selection processes are accounted for. For example, youths from the lowest socioeconomic origins tend to work the greatest number of hours in high school and have the highest risk of high school dropout (National Research Council 1998; U.S. Department of Education 2005). Likewise, nonwhite youths average more hours of paid work in adolescence than do white youths and have twice the rate of school dropout (Entwisle, Alexander, and Olson 2000). Prior grades and educational aspirations also influence the decision to work intensively during high school, which renders the association between the intensity of work and school performance statistically non-

significant (Schoenhals et al. 1998; Warren, LePore, and Mare 2000).

The third view is that the effects of teenage work hours on academic performance and high school completion are conditional on an individual's preexisting characteristics. Thus, working long hours may not have deleterious effects for all students. For instance, D'Amico (1984) found that intensive work in the 10th grade increased the probability of dropping out only for white boys, whereas in the 11th grade, the association between work hours and dropout was statistically significant only for girls. Marsh (1991) found that the intensity of work did not have an effect on school performance among students who were working to save money for college. In addition, long work hours may not be as harmful for youths from more disadvantaged backgrounds (who are also probably more likely to need to work more hours). For example, Entwisle et al. (2005) concluded that for young, economically disadvantaged boys, paid work actually increased their chances of completing high school. They suggested that for these non-college-bound youths who see early entry into the labor market as having a greater payoff than school, work may improve their life chances by building human capital. These differential effects of work hours extend beyond just academic outcomes. Johnson (2004) found differences by race and ethnicity in the effects of intensive work on substance use.

Furthermore, most studies have found that intensive workers are different from moderate workers. Youths with less interest and success in school may invest in paid work as a possible alternative to school. Poor school performance predicts greater investment not only in paid work, but in jobs with more opportunities to learn and develop skills (Mortimer 2003), especially in low-income areas (Entwisle et al. 2000). Prior orientations toward work also influence the motivation to work, as well as the decision to work intensively, during the high school period, and the effects of work intensity may vary by these orientations (Warren 2002). These findings suggest that students with a strong orientation toward work may not have had higher grades, spent more time doing homework or

participating in extracurricular activities, or finished school, even if they had worked less intensively.

In sum, if the first perspective is correct, we would expect intensive work hours to have a direct effect on high school dropout, net of self-selection processes. If the second perspective is correct, the direct effect of work hours on high school dropout may simply reflect individual differences between intensively employed students and those who work fewer hours. We used propensity-score matching techniques to account for these potential differences and to provide a less biased estimate of the impact of intensive work on high school dropout. Finally, if the third perspective is correct, the impact of intensive work hours may vary according to students' propensity to work more than 20 hours per week. By using propensity-score methods, we could also address the potential variation in these effects that may have been masked in prior research.

## **ANALYTIC STRATEGY**

Many studies of the effects of work intensity on school performance and adolescents' adjustment have used a single population regression model with covariate adjustment to account for individual differences and differences in family background (see, e.g., Gottfredson 1985; Ploeger 1997; Schoenhals et al. 1998). These studies have focused on an average causal effect, thus assuming a single effect of work hours for all students. For example, they have interpreted the estimate of intensive work as the expected increase in the probability of dropout if a randomly selected student from the high school population was to work more than 20 hours per week. In other words, they have assumed that the benefit that a moderate worker receives from working 20 hours per week or less is the same as the benefit that an intensive worker would receive from working fewer hours. However, a variety of factors, such as prior engagement in school and work, family background, and early academic achievement, influence decisions about whether to work and how much to work in adolescence. The

availability, as well as the desirability, of jobs also affects the probability of work in adolescence. In less prosperous areas, for example, teenagers often have to compete with adults for less prestigious jobs that are typically held by teenagers in more prosperous areas (Newman 1999).

This nonrandom process of selection into intensive work roles is a problem for estimating the direct effects of working more than 20 hours per week on high school dropout. The estimation of a treatment effect is dependent on a counterfactual—*inferences must be made about outcomes that would have been observed for intensive workers had they worked 20 hours or less per week.* The problem, then, is one of missing data, since it is impossible to observe both outcomes on the same individuals. A simple comparison of two individuals, one who works more than 20 hours per week and one who does not, may be misleading because students who would work intensively may be systematically different from those who would not. Paid work may have still have a conditional effect on achievement because the average effect of intensive work on high school dropout is likely to differ between students who would choose to work more than 20 hours per week and those who would not. Estimating the average effect of long work hours on high school dropout does not tell us how intensive workers would have fared had they worked less than 20 hours per week during the school year.

One technique that attempts to address this issue matches treated and untreated individuals on a set of observed characteristics. However, finding a matched pair grows exponentially more difficult with each increase in the number of preexisting background variables. Propensity-score matching techniques address this issue by assuming that individuals have an underlying propensity to select into treatment (Rosenbaum and Rubin 1983) or, in our analysis, to work more than 20 hours per week during the early high school period. Using a generated score that measures the propensity to work more than 20 hours per week, we matched intensive workers with moderate workers whose preexisting background characteristics were similar.

Doing so effectively balanced the distribution of observable covariates between the two groups (Morgan 2001; Rubin and Thomas 1996).

More specifically, using the conditional probability of treatment (in our case, intensive employment), a propensity score ( $P(X)$ ) is estimated, given a set of covariates:

$$P(X) = \Pr(T_i = 1 | X_i), \quad (1)$$

where  $T_i = 1$  if individual  $i$  works more than 20 hours per week,  $X_i$  is a vector of covariates for individual  $i$  that predict intensive work and are potential confounding or disturbing variables of the association between work intensity and the probability of dropping out of high school. Although one can use any parametric or nonparametric estimator of the propensity score, it is often estimated with a logit model:

$$\Pr(T_i = 1 | X_i) = \exp(\beta X_i) / (1 + \exp(\beta X_i)), \quad (2)$$

where  $\beta$  is a vector of parameter estimates for the set of covariates  $X_i$ . On the basis of an individual's propensity score, a matching algorithm pairs the treated group with comparable untreated individuals. Thus, we used matched controls as counterfactuals and did not include unmatched cases in subsequent analyses. We then estimated the effect of working more than 20 hours per week among students who typically choose to do so. When observed pretreatment covariates capture relevant differences between students, the matching produces less biased estimates of the treatment effect. It should be noted that we assumed that unobserved differences are irrelevant in the treatment assignment. This is a potential limitation if unobserved differences also affect the probability of dropping out of high school. For a more in-depth discussion of this method, see Dehejia and Wahba (2002), Joffe and Rosenbaum (1999), Morgan (2001), Rosenbaum and Rubin (1983), and Rubin and Thomas (1996).

Using estimated propensity scores, we then performed one-to-one caliper matching without replacement to pair treated and untreated individuals on their propensities to

work more than 20 hours per week. This algorithm matches a student who worked intensively in the 9th or 10th grade with the nearest student within a specified range (.10 in our case) who worked 20 hours or less per week. We used a common-support match, meaning that treated students who do not have a match within the specified interval on the propensity score are not paired with a student from the nontreated group. These cases are considered to be "off-support." In addition, moderate workers whose propensity scores fall below those of the lowest-scoring intensive worker were not included in the analysis sample.

As we mentioned earlier, one view of teenage employment is that the effects of paid work may vary by gender, race and ethnicity, socioeconomic background, reasons for working, and orientations toward work or school. Our propensity score encapsulates these measured characteristics. Therefore, we stratified the sample on the basis of the propensity score into three groups (low, middle, and high) and estimated the effect of intensive work hours on high school dropout for each group. By estimating the impact of paid work separately for individuals with high, middle, and low propensities toward long work hours, we could examine the conditions under which work intensity affects high school dropout. That is, we explicitly considered the extent to which the effects of teenage work hours on high school dropout is conditional on preexisting characteristics of the individual.

## DATA

We analyzed data from NELS:88, a nationally representative longitudinal survey of students who were enrolled in the eighth grade in spring 1988. Students completed a baseline survey in 1988 and were administered follow-up surveys every two years until 1994 and then again in 2000. The baseline sample consisted of 24,599 eighth-grade students who were randomly selected from more than 1,000 public and private schools. Our sample consisted of the 15,855 students who responded to the baseline (1988) and the first

two follow-up surveys (1990 and 1992)<sup>1</sup> and did not permanently drop out of high school between 1988 and 1990.<sup>2</sup> We further restricted our analysis sample to respondents who provided full information on average work hours in 1990 and key variables that are included in the propensity-score equation. The resulting sample was comprised of 13,203 students.

We compared students who averaged more than 20 hours of paid work per week during the school year to students who worked fewer hours. For these analyses, we were interested in the effects of intensive work among students who are employed; therefore, we selected only those who held a job during the 9th or 10th grade. We coded students who worked only during the summer months as nonworkers in our analyses because they did not have to balance work and school simultaneously; this practice is consistent with that of prior studies (Entwisle et al. 2005; Schoenhals et al. 1998). Of the 13,203 students in our analysis sample, 4,985 held a job during the 9th or 10th grade.

## Variables

### Outcome Variable: High School Dropout

We measured high school dropout on the basis of the variable (F2DOSTAT), created by the National Center for Education Statistics (NCES; U.S. Department of Education 1995). We considered students as dropouts if they left high school between the 10th and 12th grades and did not return (coded 1). Students who did not leave high school between the 10th and 12th grades or who were enrolled in an alternative school were not dropouts (coded 0).<sup>3</sup>

### Treatment Variable: Intensive Work Hours

Our key "treatment" variable in the analyses is a dichotomous measure of intensive employment during the freshman and sophomore school years. The 1990 survey asked the respondents to report the number of hours per week they typically worked in their current or most recent job. Given the relatively young age of the students, we considered the employment intensive if the students averaged more than 20 hours of work per week in

their current or most recent job, which is consistent with prior research on adolescent employment (Mortimer 2003; National Research Council 1998).<sup>4</sup> The treated respondents in our sample averaged more than 20 hours per week of paid labor during the school year, while the untreated respondents moderated their hours of employment (averaging 20 hours or less) during the freshman and sophomore school years. Among students who held a job during the first two years of high school, 26 percent worked more than 20 hours per week during the school year.

**Variables for Our Propensity Equation** We included covariates that prior research has identified as potential confounders of the association between work intensity and high school dropout. As Rubin and Thomas (1996) and Morgan (2001) discussed, an important factor in determining whether to include variables and higher-order terms in the model is not their statistical significance, but their power in balancing the means and variances of the covariates between treated and untreated groups. Variables should be excluded only if, in prior research, there is a consensus that they are unrelated to the outcomes or if they are highly correlated with other covariates that are already in the equation.<sup>5</sup>

We considered several demographic, socioeconomic, and family characteristics measured in the 8th grade that may influence the propensity to work intensively during the 9th and 10th grades. Because federal and state legislation restricts the amount of hours and type of employment by age, our propensity-score equation included the age of the respondent. We also included measures of gender (male = 1, female = 0) and dummy variables indicating racial status (African American, Hispanic, Asian, Native American, and white). To measure socioeconomic status, we included dummy variables indicating family composition (two biological parents, one biological parent and one stepparent, or one parent only), number of siblings (including stepbrothers and stepsisters), and total family size (measured by how many people resided in the household). We measured parents' education with dummy variables indi-

cating the highest level of educational attainment in the household (high school dropout, high school graduate, some college, a bachelor's degree, a master's degree, or a Ph.D. or professional degree). We also included indicators of mother's employment status in the eighth grade (employed = 1, not employed = 0), family income in 1988 (in thousands of dollars), mother's aspirations for her child (less than high school, high school, vocational school, some college, a bachelor's degree, or a master's degree or higher), and the respondent's autonomy from parents. Autonomy from parents is an index of four items measuring how often the respondents reported that their parents limited their time with friends, checked on their homework, required them to do chores, and restricted their time spent watching television.

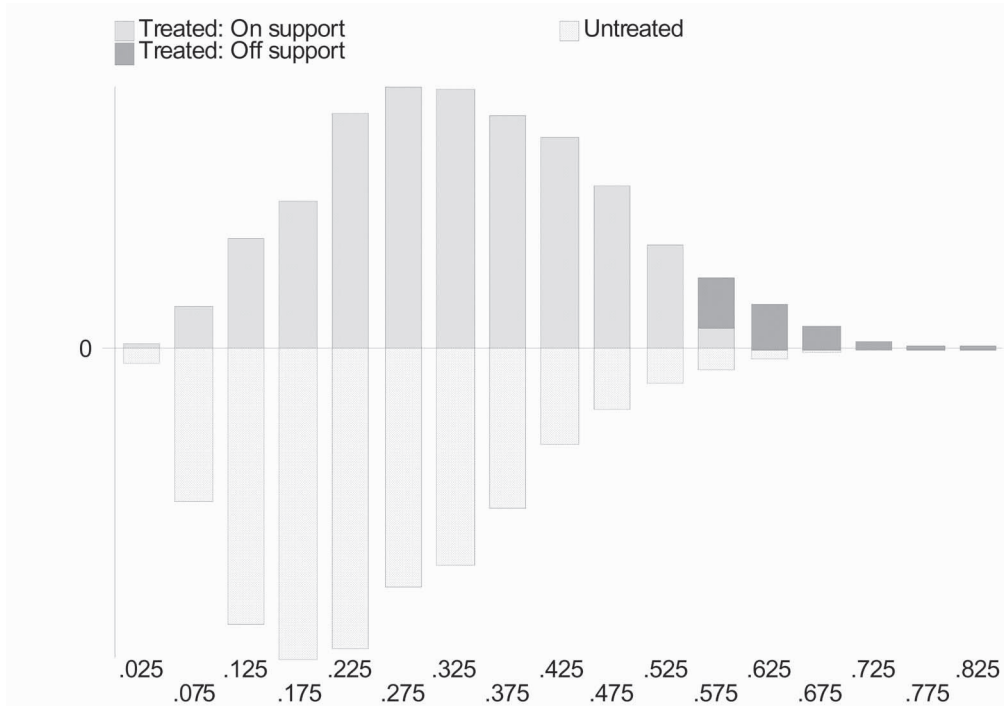
We also included measures of the students' grade point average in the eighth grade, their reading and math IRT scores (based on item-response theory; see U.S. Department of Education 1992), and whether the respondents were held back a grade in school. To measure school engagement, we included dummy variables for educational aspirations (measured in the same manner as mother's aspirations for her child), an index of "dropout risk" created by the NCES, the average number of hours per week the respondent spent doing homework, the average number of hours per week the respondent watched television, and the frequency of school absences. In addition, we constructed an additive measure of school detachment, which references the number of occasions the respondents were sent to the school office for misbehaving, got into a fight at school, skipped class, or were late for school and how often they came to class without paper or pencils, without their homework completed, or without their books. In addition, since students' perceptions of teachers' support may influence their orientations toward school, we included an index of teacher support that we constructed from items that measured how strongly the students agreed that the teachers were good, were interested in students, praised their efforts, put them down (reverse coded), and listened to what they had to say. We also included a measure of the number of

extracurricular activities and dummy variables indicating school sector (public school; Catholic school; private religious school; or a private, nonreligious school) in our propensity-score equation.

To account for the effects of early work experiences on school performance, we included measures of hours worked in the eighth grade. We coded students who did not work in the eighth grade as working zero hours). We also included dummy variables for the type of job (ranging from informal jobs, such as lawn work, baby-sitting, and odd jobs, to waiter, manual laborer, clerk, and office worker). Our propensity-score equation included measures of urbanicity (urban area = 1, rural or suburban area = 0) and dummy variables indicating the region of the United States (Northeast, North Central, West, or South) to capture variation in local labor market conditions.

We included these “pretreatment” measures in a logit model to generate propensity scores for each respondent. Table A1 reports estimates from our equation modeling inten-

sive employment. We included not only main effects of the variables just discussed, but higher-order terms and interactions. Figure 1 shows the distribution of propensity scores for treated and nontreated individuals. It highlights the overlap of each distribution. As expected, the distribution of propensity scores is shifted to the right for students who work more than 20 hours per week. For nontreated individuals, the propensity scores range from .01 to .87, with a mean of .24. Among treated individuals, propensity scores range from .03 to .91, with a mean of .36. We did not include in our sample the treated cases at the upper end of the distribution that did not have a matched comparison (these cases were considered to be off-support). Using a caliper of .10, we matched all but 134 students who worked more than 20 hours per week with a nontreated counterpart. Our sample included 2,458 students, 50 percent of whom worked more than 20 hours per week.<sup>6</sup>



**Figure 1. Distribution of Propensity to Work Intensively, by Treatment Status, “Intensive” and “Moderate” Workers**

## RESULTS

Table 1 presents descriptive statistics for measures of family background, prior school performance and engagement, and prior work for the sample both before and after we matched on the propensity score. A primary advantage of matching on a propensity score is that it minimizes differences on all the covariates included in the equation, which can help address selection issues regarding the relationship between paid work and achievement. Prior to matching, there are significant differences in socioeconomic background and prior school performance and engagement between the moderate and intensive workers. Not only do moderate workers tend to have more advantaged family backgrounds, they have higher educational aspirations, test scores, and school engagement than do intensive workers. Matching reduces the differences between intensive and moderate workers in all the pretreatment measures to statistical nonsignificance.<sup>7</sup> However, a significant difference ( $p < .05$ ) still remains in the proportion of students who dropped out of high school between the 10th and 12th grades. Five percent of the moderate workers versus 8 percent of the intensive workers dropped out of high school. This finding suggests that there is still an effect of work hours on high school dropout after preexisting differences in family background, prior school performance, and orientations toward work between intensive and moderate workers are eliminated.<sup>8</sup>

To address whether intensive work has a conditional effect on school dropout based on preexisting differences between students, we next investigated whether the effect of intensive work on high school dropout is the same for all students or whether it varies by the propensity to work more than 20 hours per week. We pooled our matched sample and divided the sample into low-, middle-, and high-propensity groups, sorting approximately one-third of the sample into each propensity stratum.<sup>9</sup> Table 2 presents the descriptive statistics on family background and prior school performance variables within each propensity stratum.

As Table 2 shows, there are significant dif-

ferences in family background and prior school performance between each propensity stratum. Students with the lowest propensities toward intensive work had the highest grades, test scores, and aspirations; the lowest levels of school detachment; the fewest number of school absences; the highest number of hours spent on homework; and the greatest number of extracurricular activities. They were less likely than the other propensity groups to repeat a grade and had the lowest risk of dropout (based on the composite variable created by NCES). In addition, students from the lowest-propensity stratum tended to come from intact families with higher household incomes. Both mother's aspirations for her child and parents' education were higher for students in this category. In terms of their work histories prior to high school, these students worked the fewest hours and were the least likely to work in a formal job in the eighth grade.

Alternatively, the respondents with the highest propensities for intensive work in the 9th or 10th grade tended to be more disadvantaged than students with lower propensities for intensive work. African American and Hispanic students were overrepresented in this group. In addition, students in this propensity stratum tended to come from families with lower household incomes and a higher number of siblings, and few reported that one of their parents had achieved a bachelor's degree or higher. Students in the highest-propensity category were, on average, the most detached from school; had the lowest grades, test scores, and educational aspirations in the eighth grade; spent the least time on homework; were much more likely to have repeated a grade; and had the highest score on the dropout risk index. They also worked a greater number of hours in the eighth grade. These findings demonstrate the impact that work has on school, but, as some researchers have suggested, they also demonstrate the influence of prior school performance on subsequent work patterns. Consequently, the association between work and school has a reciprocal nature.

Does the impact of intensive employment on high school dropout vary by students' propensities to work more than 20 hours per

**Table 1. Descriptive Statistics of Matched and Unmatched Samples**

Statistic	Unmatched Sample				Matched Sample			
	"Moderate" Workers (N = 3,622)		"Intensive" Workers (N = 1,363)		"Moderate" Workers (N = 1,229)		"Intensive" Workers (N = 1,229)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Dropout by Grade 12	0.03	(0.17)	0.09	(0.28) <sup>a</sup>	0.05	(0.22)	0.08	(0.26) <sup>a</sup>
Variables in Propensity-Score Equation								
Age	16.07	(0.48)	16.27	(0.55) <sup>a</sup>	16.23	(0.54)	16.21	(0.51)
Male	0.47	(0.50)	0.58	(0.49) <sup>a</sup>	0.57	(0.50)	0.55	(0.50)
Black	0.06	(0.23)	0.08	(0.28) <sup>a</sup>	0.08	(0.27)	0.08	(0.28)
Hispanic	0.08	(0.27)	0.11	(0.31) <sup>a</sup>	0.10	(0.30)	0.10	(0.31)
Asian	0.06	(0.23)	0.04	(0.19) <sup>a</sup>	0.03	(0.18)	0.04	(0.20)
Native American	0.01	(0.08)	0.01	(0.11) <sup>a</sup>	0.01	(0.10)	0.01	(0.09)
White	0.80	(0.40)	0.76	(0.43) <sup>a</sup>	0.77	(0.42)	0.76	(0.42)
Number of siblings	2.15	(1.51)	2.36	(1.54)	2.31	(1.58)	2.33	(1.53)
Family size	4.60	(1.37)	4.65	(1.40)	4.70	(1.48)	4.63	(1.37)
Parents' highest degree: less than high school	0.06	(0.24)	0.11	(0.31) <sup>a</sup>	0.10	(0.29)	0.09	(0.29)
Parents' highest degree: high school	0.18	(0.38)	0.24	(0.43) <sup>a</sup>	0.23	(0.42)	0.23	(0.42)
Parents' highest degree: some college	0.40	(0.49)	0.46	(0.50) <sup>a</sup>	0.47	(0.50)	0.46	(0.50)
Parents' highest degree: BA	0.18	(0.38)	0.11	(0.31) <sup>a</sup>	0.11	(0.31)	0.12	(0.32)
Parents' highest degree: MA	0.12	(0.32)	0.06	(0.24) <sup>a</sup>	0.06	(0.23)	0.06	(0.25)
Parents' highest degree: Ph.D.	0.06	(0.24)	0.03	(0.17) <sup>a</sup>	0.04	(0.19)	0.03	(0.18)
Two-parent household	0.73	(0.44)	0.67	(0.47) <sup>a</sup>	0.69	(0.46)	0.68	(0.47)
Stepparent household	0.10	(0.31)	0.14	(0.35) <sup>a</sup>	0.14	(0.35)	0.13	(0.34)
Single-parent household	0.17	(0.37)	0.19	(0.39)	0.17	(0.38)	0.18	(0.39)
Mother employed	0.78	(0.41)	0.75	(0.44) <sup>a</sup>	0.75	(0.43)	0.75	(0.43)
Income (in \$1,000s)	44.04	(33.12)	37.60	(29.05) <sup>a</sup>	38.52	(28.77)	38.56	(29.63)
Mother's aspirations: less than high school	0.00	(0.05)	0.01	(0.09) <sup>a</sup>	0.00	(0.06)	0.00	(0.06)
Mother's aspirations: high school	0.03	(0.17)	0.04	(0.20) <sup>a</sup>	0.04	(0.19)	0.04	(0.20)
Mother's aspirations: vocational	0.04	(0.21)	0.07	(0.26)	0.08	(0.27)	0.07	(0.26)
Mother's aspirations: some college	0.08	(0.28)	0.10	(0.30) <sup>a</sup>	0.09	(0.29)	0.10	(0.29)
Mother's aspirations: BA	0.48	(0.50)	0.40	(0.49)	0.43	(0.50)	0.41	(0.49)
Mother's aspirations: MA or higher	0.26	(0.44)	0.26	(0.44)	0.25	(0.44)	0.26	(0.44)
Autonomy from parents	2.97	(0.62)	2.94	(0.62)	2.96	(0.63)	2.96	(0.61)
Grades in 8th grade	3.06	(0.69)	2.82	(0.73)	2.88	(0.70)	2.86	(0.72)
Reading IRT score	28.94	(8.29)	26.17	(8.02)	26.52	(8.07)	26.63	(8.01)
Math IRT score	39.22	(11.84)	34.66	(10.97) <sup>a</sup>	35.20	(11.25)	35.34	(11.07)
Held back	0.13	(0.34)	0.25	(0.43) <sup>a</sup>	0.21	(0.41)	0.21	(0.41)

Table 1. Continued

Statistic	Unmatched Sample				Matched Sample			
	"Moderate" Workers (N = 3,622)		"Intensive" Workers (N = 1,363)		"Moderate" Workers (N = 1,229)		"Intensive" Workers (N = 1,229)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Educational aspirations: less than high school	0.00	(0.06)	0.01	(0.11) <sup>a</sup>	0.01	(0.08)	0.00	(0.06)
Educational aspirations: high school	0.06	(0.24)	0.09	(0.28) <sup>a</sup>	0.09	(0.29)	0.08	(0.27)
Educational aspirations: vocational	0.08	(0.27)	0.14	(0.34) <sup>a</sup>	0.13	(0.34)	0.12	(0.32)
Educational aspirations: some college	0.11	(0.31)	0.14	(0.35) <sup>a</sup>	0.14	(0.34)	0.14	(0.35)
Educational aspirations: BA	0.47	(0.50)	0.39	(0.49)	0.42	(0.49)	0.41	(0.49)
Educational aspirations: MA	0.28	(0.45)	0.23	(0.42) <sup>a</sup>	0.22	(0.42)	0.24	(0.43)
Dropout risk	0.53	(0.85)	0.73	(0.95) <sup>a</sup>	0.67	(0.97)	0.68	(0.92)
Homework in 8th grade	6.21	(4.96)	5.57	(4.60)	5.76	(4.79)	5.65	(4.61)
Hours spent watching television	19.65	(8.59)	20.51	(8.81)	19.89	(8.57)	20.40	(8.81)
Absences in 8th grade	1.34	(1.93)	1.53	(2.15) <sup>a</sup>	1.48	(2.02)	1.44	(2.03)
School detachment	3.68	(2.81)	4.32	(3.25) <sup>a</sup>	4.06	(3.10)	4.13	(3.07)
Teacher support	2.84	(0.58)	2.78	(0.62) <sup>a</sup>	2.81	(0.60)	2.80	(0.60)
Extracurricular activities	5.13	(3.44)	4.68	(3.48) <sup>a</sup>	4.78	(3.42)	4.77	(3.46)
Public school	0.80	(0.40)	0.89	(0.31) <sup>a</sup>	0.88	(0.32)	0.88	(0.32)
Private school	0.05	(0.23)	0.03	(0.17) <sup>a</sup>	0.03	(0.18)	0.03	(0.17)
Catholic school	0.11	(0.31)	0.07	(0.25) <sup>a</sup>	0.07	(0.26)	0.07	(0.26)
Private, religious school	0.04	(0.19)	0.01	(0.12) <sup>a</sup>	0.01	(0.09)	0.02	(0.12)
Hours worked in 8th grade	4.64	(5.76)	6.14	(7.29)	5.20	(6.64)	5.27	(6.60)
Lawn work	0.02	(0.13)	0.03	(0.16) <sup>a</sup>	0.02	(0.14)	0.02	(0.13)
Waiter/waitress	0.09	(0.28)	0.06	(0.24)	0.06	(0.23)	0.06	(0.25)
Newspaper delivery	0.35	(0.48)	0.25	(0.44)	0.27	(0.44)	0.28	(0.45)
Baby-sitting	0.03	(0.17)	0.08	(0.27)	0.06	(0.23)	0.06	(0.23)
Manual labor	0.05	(0.21)	0.05	(0.22)	0.05	(0.22)	0.05	(0.22)
Store clerk	0.03	(0.16)	0.03	(0.16)	0.03	(0.16)	0.03	(0.16)
Office job	0.01	(0.12)	0.01	(0.10) <sup>a</sup>	0.01	(0.09)	0.01	(0.09)
Odd jobs	0.05	(0.21)	0.05	(0.22)	0.06	(0.23)	0.06	(0.23)
Other job	0.09	(0.28)	0.11	(0.32)	0.11	(0.31)	0.11	(0.31)
Not employed	0.12	(0.33)	0.16	(0.36) <sup>a</sup>	0.15	(0.36)	0.16	(0.37)
Urban	0.25	(0.43)	0.23	(0.42)	0.22	(0.42)	0.23	(0.42)
South	0.24	(0.43)	0.33	(0.47) <sup>a</sup>	0.32	(0.47)	0.31	(0.46)
Northeast	0.23	(0.42)	0.18	(0.38)	0.19	(0.40)	0.19	(0.39)
North Central	0.33	(0.47)	0.31	(0.46)	0.31	(0.46)	0.31	(0.46)
West	0.19	(0.40)	0.18	(0.38)	0.18	(0.38)	0.19	(0.39)

<sup>a</sup> Mean differences between "moderate" and "intensive" workers are statistically significant ( $p < .05$ ).

Table 2. Descriptive Statistics of Predictor Variables, by Propensity Level

Variable	Low Propensity (N = 819)		Middle Propensity (N = 818)		High Propensity (N = 821)	
	Mean	SD	Mean	SD	Mean	SD
Age	15.97	(0.39) <sup>a</sup>	16.18	(0.43)	16.50	(0.59) <sup>a</sup>
Male	0.43	(0.50) <sup>a</sup>	0.53	(0.50)	0.72	(0.45) <sup>a</sup>
Black	0.04	(0.19) <sup>a</sup>	0.08	(0.27)	0.13	(0.34) <sup>a</sup>
Hispanic	0.05	(0.22) <sup>a</sup>	0.11	(0.31)	0.14	(0.35) <sup>a</sup>
Asian	0.06	(0.24) <sup>a</sup>	0.03	(0.18)	0.02	(0.12) <sup>a</sup>
Native American	0.00	(0.05)	0.01	(0.08)	0.02	(0.14) <sup>a</sup>
White	0.84	(0.36) <sup>a</sup>	0.77	(0.42)	0.69	(0.46) <sup>a</sup>
Number of siblings	1.99	(1.32) <sup>a</sup>	2.35	(1.52)	2.61	(1.73) <sup>a</sup>
Family size	4.58	(1.28)	4.68	(1.41)	4.73	(1.57) <sup>a</sup>
Parents' highest degree						
Less than high school	0.03	(0.17) <sup>a</sup>	0.10	(0.29)	0.16	(0.36) <sup>a</sup>
High school	0.14	(0.35) <sup>a</sup>	0.24	(0.43)	0.29	(0.46)
Some college	0.39	(0.49) <sup>a</sup>	0.53	(0.50)	0.47	(0.50) <sup>a</sup>
BA degree	0.22	(0.41) <sup>a</sup>	0.07	(0.26)	0.05	(0.22)
MA degree	0.15	(0.35) <sup>a</sup>	0.03	(0.16)	0.01	(0.11)
Ph.D.	0.07	(0.26) <sup>a</sup>	0.02	(0.15)	0.01	(0.10)
Two-parent household	0.76	(0.42) <sup>a</sup>	0.68	(0.47)	0.61	(0.49) <sup>a</sup>
Stepparent household	0.08	(0.27) <sup>a</sup>	0.15	(0.36)	0.18	(0.39)
Single-parent household	0.16	(0.37)	0.17	(0.38)	0.21	(0.41)
Mother employed	0.81	(0.40) <sup>a</sup>	0.74	(0.44)	0.69	(0.46)
Income (in \$1,000s)	47.11	(32.95) <sup>a</sup>	36.65	(26.04)	31.87	(25.97) <sup>a</sup>
Mother's aspirations						
Less than high school	0.00	(0.00)	0.00	(0.05)	0.01	(0.10)
High school	0.02	(0.15)	0.04	(0.19)	0.06	(0.23)
Vocational	0.02	(0.15) <sup>a</sup>	0.08	(0.27)	0.12	(0.32) <sup>a</sup>
Some college	0.07	(0.25) <sup>a</sup>	0.11	(0.32)	0.10	(0.30)
BA degree	0.55	(0.50) <sup>a</sup>	0.41	(0.49)	0.31	(0.46) <sup>a</sup>
MA degree or higher	0.26	(0.44)	0.24	(0.43)	0.27	(0.45)
Autonomy from parents	3.00	(0.64)	2.95	(0.60)	2.92	(0.63)
Grades in 8th grade	3.22	(0.60) <sup>a</sup>	2.80	(0.66)	2.60	(0.71) <sup>a</sup>
Reading IRT score	30.68	(7.75) <sup>a</sup>	25.80	(7.40)	23.26	(7.12) <sup>a</sup>
Math IRT score	41.91	(11.07) <sup>a</sup>	33.80	(9.97)	30.11	(8.89) <sup>a</sup>
Held back	0.06	(0.24) <sup>a</sup>	0.17	(0.38)	0.40	(0.49) <sup>a</sup>
Educational aspirations						
Less than high school	0.00	(0.00)	0.00	(0.07)	0.01	(0.10)
High school	0.04	(0.20) <sup>a</sup>	0.09	(0.29)	0.12	(0.33)
Vocational	0.04	(0.18) <sup>a</sup>	0.14	(0.35)	0.20	(0.40) <sup>a</sup>
Some college	0.08	(0.27) <sup>a</sup>	0.15	(0.36)	0.19	(0.39)
BA degree	0.53	(0.50) <sup>a</sup>	0.41	(0.49)	0.30	(0.46) <sup>a</sup>
MA degree or higher	0.31	(0.46) <sup>a</sup>	0.21	(0.41)	0.18	(0.38)
Dropout risk	0.43	(0.74) <sup>a</sup>	0.64	(0.91)	0.95	(1.09) <sup>a</sup>
Homework in 8th grade	6.69	(5.18) <sup>a</sup>	5.57	(4.71)	4.85	(3.96) <sup>a</sup>
Hours spent watching television	18.63	(8.15) <sup>a</sup>	20.57	(8.56)	21.24	(9.14)
Absences in 8th grade	1.24	(1.78) <sup>a</sup>	1.54	(2.03)	1.61	(2.23)
School detachment	3.28	(2.53) <sup>a</sup>	4.10	(2.96)	4.91	(3.47) <sup>a</sup>
Teacher support	2.90	(0.57)	2.75	(0.60)	2.76	(0.62)

Table 2. Continued

Variable	Low Propensity (N = 819)		Middle Propensity (N = 818)		High Propensity (N = 821)	
	Mean	SD	Mean	SD	Mean	SD
Extracurricular activities	5.39	(3.38) <sup>a</sup>	4.69	(3.50)	4.24	(3.35) <sup>a</sup>
Public school	0.77	(0.42) <sup>a</sup>	0.92	(0.28)	0.96	(0.20) <sup>a</sup>
Private school	0.06	(0.24) <sup>a</sup>	0.02	(0.13)	0.01	(0.12)
Catholic school	0.14	(0.34) <sup>a</sup>	0.06	(0.23)	0.03	(0.17)
Private, religious	0.03	(0.16) <sup>a</sup>	0.01	(0.10)	0.00	(0.00)
Hours worked in 8th grade	3.94	(4.77)	4.25	(5.96)	7.50	(8.08) <sup>a</sup>
Job type						
Lawn work	0.02	(0.13)	0.01	(0.11)	0.03	(0.16)
Waiter/waitress	0.11	(0.31) <sup>a</sup>	0.05	(0.22)	0.02	(0.15)
Newspaper delivery	0.40	(0.49) <sup>a</sup>	0.29	(0.45)	0.14	(0.35) <sup>a</sup>
Baby-sitting	0.01	(0.09)	0.03	(0.16)	0.14	(0.34) <sup>a</sup>
Manual labor	0.05	(0.22)	0.05	(0.21)	0.05	(0.22)
Store clerk	0.03	(0.16)	0.02	(0.15)	0.03	(0.17)
Office job	0.01	(0.08)	0.01	(0.09)	0.01	(0.10)
Odd jobs	0.04	(0.19)	0.05	(0.23)	0.07	(0.26)
Other job	0.07	(0.26)	0.10	(0.30)	0.16	(0.36) <sup>a</sup>
Not employed	0.13	(0.34) <sup>a</sup>	0.18	(0.38)	0.16	(0.37)
Urban	0.24	(0.43)	0.22	(0.41)	0.23	(0.42)
South	0.19	(0.39) <sup>a</sup>	0.32	(0.47)	0.43	(0.50) <sup>a</sup>
Northeast	0.28	(0.45) <sup>a</sup>	0.16	(0.36)	0.14	(0.34)
North Central	0.34	(0.47)	0.33	(0.47)	0.26	(0.44) <sup>a</sup>
West	0.19	(0.39)	0.19	(0.39)	0.17	(0.38)

<sup>a</sup>The mean difference in comparison to the middle-propensity group is statistically significant ( $p < .05$ ).

week? In Table 3, we present logistic regression estimates for a series of models predicting the effects of intensive work on high school dropout. We first analyzed the effect of intensive work on high school dropout for the entire matched sample. We then regressed dropout on work intensity within each propensity stratum. Net of differences in family background, prior school performance, and prior work orientations that precede treatment, intensive work exerts a statistically significant effect on the probability of leaving high school. The odds for students who work more than 20 hours per week of dropping out of high school are more than 1.5 times higher than what they would have been if the students had worked moderately. Because there is variation in family background and prior academic achievement within each propensity stratum, we also included measures of race, family income, number of siblings, family structure, prior grades, and test

scores in the analyses. Table 3 reports these "regression-adjusted" estimates as well. After we account for variation in family background and prior school performance, the effect of working more than 20 hours per week remains roughly the same.

Next, we conducted separate analyses for students with various propensities to work more than 20 hours per week. The magnitude of the effect of working intensively in the early years of high school on dropout is smaller and not statistically significant among students with high propensities to work more than 20 hours per week. Among students with low propensities for intensive work, the effect of intensive work is not statistically significant, although the magnitude of the effect is relatively large. Among students in the middle-propensity group, the effect of intensive work on dropout is statistically significant. For students in this propensity stratum, intensive work increases the dropout risk 2.5 times.

**Table 3. Effects of Intensive Work on High School Dropout, by Propensity Level (Intensive and Moderate Workers)**

	Total Sample (n = 2,458)		Low Propensity (n = 819)		Middle Propensity (n = 818)		High Propensity (n = 821)					
	b	exp(b)	b	exp(b)	b	exp(b)	b	exp(b)				
Effect of intensive work before adjustment for prior academic performance and sociodemographic characteristics	.445**	(.166)	1.56	.865	(.493)	2.37	.822**	(.310)	2.27	.164	(.224)	1.18
Effect of intensive work after adjustment for prior academic performance and sociodemographic characteristics	.493**	(.173)	1.64	.884	(.506)	2.42	.853**	(.321)	2.35	.255	(.235)	1.29

Note: Academic performance and sociodemographic characteristics include 8th grade GPA and test scores, gender, race, family income, number of siblings, and family structure.  
 \*p < .05, \*\*p < .01, \*\*\*p < .001.

**Table 4. Effects of Intensive Work on High School Dropout, by Propensity Level (Intensive Workers and Nonworkers)**

	Total Sample (n = 2,672)		Low Propensity (n = 890)		Middle Propensity (n = 892)		High Propensity (n = 890)					
	b	exp(b)	b	exp(b)	b	exp(b)	b	exp(b)				
Effect of intensive work before adjustment for 8th-grade academic performance and sociodemographic characteristics	.253	(.149)	1.29	.498	(.359)	1.65	.493	(.270)	1.64	.022	(.211)	1.02
Effect of intensive work after adjustment for 8th-grade academic performance and sociodemographic characteristics	.362*	(.156)	1.44	.574	(.385)	1.78	.595*	(.281)	1.81	.196	(.224)	1.22

Note: Academic performance and sociodemographic characteristics include 8th-grade GPA and test scores, gender, race, family income, number of siblings, and family structure.  
 \*p < .05, \*\*p < .01, \*\*\*p < .001.

Using a series of *t*-tests, we examined whether the magnitude of effects differed for each propensity group. We found that the effect of intensive work on high school dropout is significantly different ( $p < .05$ , one-tailed test) for the low- and middle-propensity groups in comparison to youths who have a high propensity to work intensively. However, the effect of intensive work is not significantly different among youths in the low- and middle-propensity groups. We conclude that intensive work does not affect the likelihood of high school dropout among youths who have a high propensity to spend long hours on the job.

## ALTERNATIVE SPECIFICATION

We found that among some students who are employed in the 9th or 10th grade, working more than 20 hours per week increases the risk of high school dropout. But what if students who work intensively had not worked at all? Prior research on the association between work intensity and school performance has shown that students who do not work at all are more similar to intensive workers in that they tend to have lower grades and test scores and are less engaged in school than are students who moderate their work hours (Warren et al. 2000). We might expect to see a smaller difference (or no difference) in the probability of dropping out of high school. Using a sample of intensive workers and nonworkers, we analyzed an alternative specification of our model. Nonworkers are those who never held a job during the 9th or 10th grade or who worked only during the summer months. We did not include moderate workers in this analysis; the resulting sample size was 9,221 students.

In this analysis, we matched intensive workers to students who did not work in either the 9th or 10th grade and then estimated the treatment effect of working more than 20 hours per week on dropping out of high school. Propensity scores for nonworkers ranged from .002 to .85, with a mean of .13 (all but 27 intensive workers had a nonworking match). We found that students with low propensities to work intensively were the

most advantaged, whereas students with high propensities were the most disadvantaged (estimates from the matching equations and comparisons of pretreatment covariates among the "intensive" workers and nonworkers are available from us on request). Again, we modeled the impact of working more than 20 hours per week among this group of students and then assessed whether the effects vary by propensity. The estimates of the effects of intensive work on dropout are reported in Table 4.

We found that there is a small effect of "intensive" work on high school dropout. For students who work more than 20 hours per week, the odds of dropping out would be reduced had they not worked at all. Similar to our previous analyses, however, the results of these analyses reveal that the impact of intensive work is not homogeneous. The effects of working more than 20 hours per week, compared to not working at all, are statistically significant only among youths in the middle-propensity stratum. It is important to note, however, that the magnitude of the effect among the low-propensity group is large but not statistically significant. Among these more academically and socioeconomically advantaged students, those who work more than 20 hours per week, compared to those who do not work at all, are more than 1.5 times more likely to drop out of high school.

## DISCUSSION

The primary goal of this analysis was to assess the effect of paid work on school dropout once we accounted for observable differences between youths who work intensively and those who work moderately during the early high school years. Consistent with prior research, we found that the decision to work in adolescence, and to work intensively, varies by educational aspirations, socioeconomic background, and prior school performance. Although studies have found that these pre-existing differences account for the observed association between work hours and academic performance (Schoenhals et al. 1998; Warren et al. 2000), our results suggest that there is an effect of working more than 20

hours per week on the probability of dropping out of school. For intensive workers, working fewer than 20 hours per week during the school year lowers the risk of dropping out of high school. These findings support the view that intensive work hours, not just the characteristics of students, affect the likelihood of completing school.

We also speculated that the effects of intensive work may be conditional on students' preexisting characteristics. Our use of propensity-score matching techniques not only yielded a less biased estimate of the effect of paid work on high school dropout, but allowed us to uncover the conditional effects of early work roles on subsequent life chances (Entwisle et al. 2000). Upon closer examination, we found that working intensively (as opposed to working moderately or not working) is not associated with high school dropout for students with high propensities for intensive work. The effects of work intensity by propensity level may be due to the characteristics of students within each group. For example, students with high propensities for intensive work tend to be more disadvantaged in terms of socioeconomic status and prior educational performance than are students with lower propensity levels. We found that these youths are also the least likely to be college bound and see less value in high grades and test scores. These students may feel a stronger need to work to accrue human capital that could be of benefit for future labor market experiences (Entwisle et al. 2000). In other words, they may already feel the push out of school, so a part-time job may not pull them away from school any further.

The null effect of work hours on high school dropout among the high-propensity group of youths may also reflect recent research that suggested that intensive work during adolescence has a different effect on disadvantaged youths. While youths from families of lower socioeconomic status are likely to enter the labor force at a younger age, work more hours, and have less connection to the educational system than their more advantaged peers (Kerckhoff 2003), intensive work actually increases the chances of completing high school for many youths in

low-income neighborhoods (Entwisle et al. 2005). For example, employment during the teenage years may help economically disadvantaged youths pay for educational expenses, such as field trips, transportation, and lab fees (Newman 1999). Furthermore, youths from disadvantaged families may need to work long hours to support their families (Entwisle et al. 2000). Thus, the decision to work intensively may be less of a choice that reflects prior school and commitment than it is for their more advantaged peers. For students who are employed, working more than 20 hours per week increases the probability of high school dropout only for individuals with low to middle propensities to work intensively. These students represent the "average" student worker in certain respects. For them, employment may detract from school and pull them out of school prematurely. Among this group, students who work long hours during the school year are more likely to drop out between the 10th and 12th grades than are students who work fewer hours.

Past studies that have found an association between intensive work and the probability of dropping out of high school have assumed a single causal effect of working more than 20 hours per week and have estimated an average effect among students of varied socioeconomic and educational backgrounds. These studies may mask the differential effects of intensive work for students who are either highly advantaged or disadvantaged. Perhaps the controversy surrounding the association between teenage employment and academic performance, as demonstrated in grades, homework, and extracurricular activities, may also reflect these differential effects of students who have high and low propensities to work during the school year. Many of these studies have investigated the impact of intensive work in the 10th grade on school performance in the 12th grade. If some students who work intensively are more likely to drop out, those who are still in school by the 12th grade are those who were not negatively affected by long work hours. Our findings suggest that research on teenage work and schooling should account for possible variation in the effects of intensive work on different types of students.

Our analyses have some limitations. First, because we matched treated individuals with their nontreated counterparts, we excluded students whose propensities to work intensively were very low. Therefore, our analyses did not estimate the expected change in the probability of dropping out of high school for a randomly selected moderate worker if he or she worked more than 20 hours per week. Second, we assumed that relevant differences between students who work intensively and those who work less intensively were observed and that other unobserved covariates were irrelevant. Although we considered a range of variables that past research identified as important factors that affect high school employment, it is plausible that we did not capture all relevant differences between student workers (see Hotz et al. 2002). Because there may be some factors that play a part in determining both intensive work patterns and dropout that we failed to observe, we face the same problem of omitted variable bias as other traditional methods. We acknowledge that matching methods do not provide the definitive solution to overcoming biases that arise from nonrandom assignment, but we believe that such methods provide an alternative solution. Similarly, we were able to model an individual's orientation toward work and school only by his or her behavior or background factors that might shape these orientations, but we were not able to include measures of individuals' attitudes toward the relative importance of work and school (Warren 2002). Last, we did not consider the impact of the type of job on high school dropout (McNeal 1997). Future studies should consider the selection process into both work hours and particular types of jobs.

Nonetheless, our findings have contributed to existing research on the association between work intensity and high school dropout by investigating alternative methods to account for differences between intensive and moderate workers. First, we considered not only the impact of paid employment on the probability of dropping out of high school, but the factors that influence students' propensities to work long hours. Second, by disaggregating the average effect

of working, we were able to gain a better understanding of how relative orientations toward work and school moderate the effect of work intensity on schooling outcomes. Certain background factors and prior orientations toward employment and school influence both work status and intensity (perhaps out of the need to support one's family or out of socialization processes that place more importance on work than education), and these factors similarly condition the effects of long work hours.

Our analysis has implications for policies on the employment of youths in the United States. Although some states have more stringent guidelines concerning such employment, federal law restricts the employment of youths younger than age 16 during the school year. Given our findings that long work hours may not be harmful to all students, especially those who have a high propensity to work more than 20 hours per week, a broad policy limiting the number of work hours for students may not be the best method to foster greater school performance. Disadvantaged students who suffer academically or who already know they will not be going to college may see less reward from finishing school and may work to build human capital and improve their life chances. To increase the rate of high school completion, policy should focus not only on deterring excessive work among students, but on keeping students engaged in school.

## NOTES

1. While 24,599 students responded to the survey in 1988, NELS dropped a subsample of students prior to 1990, selecting only 21,474 students from the original sample. After we excluded the additional 2,247 students who dropped out of high school prior to 1990, we were left with a sample of 17,424 respondents who responded to the baseline and first follow-up survey. The remaining excluded cases were due to survey attrition.

2. We recognize the potential bias we created by omitting respondents who dropped out of high school prior to 1990. In comparison to our analysis sample, the 2,247 stu-

dents who either dropped out of school between the baseline and first follow-up survey or whose dropout status could not be determined had greater proportions of youths who were African American, Hispanic, and from low socioeconomic backgrounds and displayed poor school performance during the eighth grade. However, we had to exclude them because they were no longer enrolled in school and were not at risk of working intensively during the school year.

3. We excluded the small number of students who dropped out and then returned to school from our analyses because there is ambiguity as to whether they should be considered dropouts or nondropouts. Although not shown, an analysis of the differences in the independent variables showed that students who dropped out and returned to school were more similar to those who dropped out permanently than to students who did not drop out at all. We conducted additional analyses in which we coded students who dropped out but later returned to school as nondropouts, and there were no differences in our overall findings (not shown).

4. Unfortunately, the measure of hours worked in the NELS data is reported as a categorical variable in 10-hour increments, which limits the possibility of exploring various cutoffs for what is considered intensive versus moderate employment. Of the students who were employed in the first two years of high school, almost 70 percent worked more than 10 hours per week, so we did not want to use 10 hours as a cutoff for intensive work. It is certainly plausible that intensive employment for 14- and 15 year olds might be 15 hours per week, not 21 or more. Future research should explore this hypothesis.

5. An alternative view is that the inclusion of irrelevant variables and higher-order inter-

action terms in the propensity equation may bias the results (for a discussion of this issue, see Frisco, Muller, and Frank forthcoming; Smith and Todd 2005). We followed Rubin and Thomas (1996) and included only theoretically relevant variables that prior research showed to affect the decision to work intensively during adolescence.

6. Note that although we excluded a large number of individuals through the one-to-one matching process, much of the loss in cases was among moderate workers who already had a match with intensive workers based on their similar propensity scores.

7. Although we excluded 134 treated individuals who did not have a nontreated match, note that in Table 1, the differences in the treatment group (the intensive workers) before and after matching are slight.

8. To replicate prior research on work intensity and high school dropout, we conducted a standard logistic regression model controlling for background and prior school performance and engagement on the full unmatched sample. Similar to Warren and Lee (2003), who also used NELS data, we found a significant positive effect of working more than 20 hours per week on high school dropout (estimates not shown but are available from us on request). Students who work more than 20 hours per week are about 1.5 times more likely to drop out of high school.

9. We also conducted the analyses with five propensity categories and found similar results (these estimates are available from us on request). To simplify the interpretation, we present our results with three categories.

In the full unmatched sample, 11 percent of the students in the low-propensity category, 23 percent of the students in the middle-propensity category, and 41 percent of the students in the high-propensity category worked more than 20 hours per week in the 9th or 10th grade.

## APPENDIX

Table A1. Logit Estimates of the Effects of Pretreatment Variables on "Intensive" Work ( $N = 4,985$ )

	<i>b</i>	( <i>se</i> )
Age	.265	(.05)
Male (versus female)	.186	(.05)
Black (versus white race)	.019	(.09)
Hispanic (versus white race)	.012	(.08)
Asian (versus white race)	-.118	(.10)
Native American (versus white race)	.408	(.21)
Number of siblings	.012	(.02)
Family size	-.005	(.02)
Parents' highest degree: less than high school	-.054	(.10)
Parents' highest degree: some college	-.071	(.05)
Parents' highest degree: BA	-.301	(.08)
Parents' highest degree: MA	-.354	(.09)
Parents' highest degree: Ph.D. or professional degree	-.353	(.12)
Parents' highest degree: Respondent does not know	.121	(.30)
Two-parent household (versus single-parent household)	.103	(.07)
Stepparent household (versus single-parent household)	.229	(.09)
Mother employed (versus not employed)	-.056	(.05)
Household income (in \$1,000s)	.000	(.00)
Household income squared	.000	(.00)
Mother's aspirations: less than high school	.417	(.31)
Mother's aspirations: vocational	.142	(.14)
Mother's aspirations: some college	.002	(.13)
Mother's aspirations: BA	.027	(.12)
Mother's aspirations: MA or higher	.182	(.12)
Mothers' aspirations: Respondent does not know	.045	(.13)
Autonomy from parents	.003	(.03)
Grades in 8th grade	-.065	(.18)
Grades squared	-.039	(.04)
Reading IRT score	.005	(.02)
Reading IRT squared	.000	(.00)
Math IRT score	.003	(.01)
Math IRT squared	.000	(.00)
Reading IRT * Math IRT	-.001	(.00)
Grades * Reading IRT	.008	(.00)
Held back	-.026	(.07)
Educational aspirations: less than high school	.296	(.26)
Educational aspirations: vocational	.149	(.10)
Educational aspirations: some college	.124	(.10)
Educational aspirations: BA	.015	(.09)
Educational aspirations: MA or higher	.119	(.10)
Educational aspirations: Respondent does not know	-1.206	(.66)
Dropout risk	.032	(.04)
Homework in 8th grade	.006	(.02)
Homework squared	.000	(.00)
Hours spent watching television	-.019	(.01)
Hours watching television squared	.000	(.00)
Absences in 8th grade	.004	(.01)

## APPENDIX

Table A1. Continued

	<i>b</i>	( <i>se</i> )
School detachment	.010	(.02)
Detachment squared	.000	(.00)
Teacher support	-.033	(.04)
Extracurricular activities	-.005	(.01)
Private school (versus public)	-.119	(.12)
Catholic school (versus public)	-.215	(.08)
Private, religious (versus public)	-.381	(.14)
Hours worked in 8th grade	-.007	(.01)
Hours worked squared	.002	(.00)
Lawn work	-.307	(.26)
Waiter/waitress	-.308	(.13)
Newspaper delivery	-.064	(.07)
Baby-sitting	.243	(.17)
Manual labor	-.249	(.17)
Store clerk	-.176	(.26)
Office job	-.798	(.34)
Odd job	.070	(.12)
Other job	.006	(.11)
Hours worked * lawn work	.039	(.02)
Hours worked * waiter/waitress	.007	(.02)
Hours worked * newspaper delivery	-.011	(.01)
Hours worked * baby-sitting	.003	(.02)
Hours worked * manual labor	.002	(.02)
Hours worked * store clerk	-.001	(.02)
Hours worked * office job	.066	(.03)
Hours worked * odd job	-.020	(.02)
Hours worked * other job	-.003	(.01)
Urban (versus rural or suburban)	.026	(.05)
Northeast region (versus South)	-.200	(.06)
North Central region (versus South)	-.174	(.05)
West region (versus South)	-.164	(.06)
Constant	-4.470	(.95)

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