

# Alcohol and Employment in the Transition to Adulthood\*

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*We elaborate the relationship between work hours and alcohol use during the transition from adolescence to adulthood. Both hours of employment and drinking may be products of weak bonds to school and family. Alternatively, work may exert an independent effect on alcohol use by exposing adolescents to opportunities and associates that facilitate drinking. Using longitudinal data from the Youth Development Study (YDS), we present static score regression models showing that long work hours increase levels of drinking during high school. These effects are mediated in large part by work-derived independence from parents, suggesting that a precocious transition to adult roles may be the mechanism connecting work hours and alcohol use. Work effects on drinking are short-lived, however, as adolescent hours of employment do not significantly influence alcohol use after high school.*

Although the correlation between adolescent work hours and alcohol use is well documented, at least three important questions remain unanswered. First, we have little evidence regarding the nature of this association: Is it causal or is it spurious due to a common or correlated cause? Second, and perhaps most importantly, we have yet to identify the specific mechanism linking work hours and alcohol use: What is it about high-intensity work that increases drinking? Third, what are the longer-term developmental consequences of working

long hours in adolescence? Are youth employment effects short-lived or do they permanently alter drinking patterns? We provide evidence bearing on each of these questions by estimating the relationship between adolescent work hours and alcohol use, specifying the intervening factors that mediate this relationship, and tracing the effects of long hours of employment at three distinct developmental stages.

The social meaning of both drinking and working changes over the life cycle. In childhood and adolescence, legal prohibition of alcohol use parallels laws restricting the employment of teenagers and the number of hours that they may work each week. In early adulthood, however, using alcohol and working long hours become both normatively and legally acceptable. The relationship between these age-linked status transitions (Roman and Blum 1992) illustrates the shifting definition of deviant and conforming behavior as well as the varying effects of formal and informal controls at distinct life stages.

Although employment and alcohol use are both important markers in the transition from adolescence to adulthood, the premature adoption of such behaviors is generally viewed as problematic. Today, there is concern in both

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academic and policy circles that youth who work too much too soon are predisposed to alcohol and other substance use. For example, the National Research Council (1998) reports that long work hours (defined by a 20 hour per week threshold) are associated with early drinking and other problem behaviors and recommends limiting weekly hours of work for 16- and 17-year-olds during the school year.

#### THE NATURE OF THE ASSOCIATION: DOES WORKING LONG HOURS CAUSE ADOLESCENT DRINKING?

The conditions of youth employment affect a wide range of deviant outcomes (Coverdill and Kraft 1996; Mihalic and Elliott 1997; Ploeger 1997). In particular, studies across a range of disciplines employing diverse methodologies report a positive association between adolescent work hours and delinquency (Wright, Cullen, and Williams 1997), premarital sexual activity (Ku, Sonenstein, and Pleck 1993), and substance use (Steinberg and Dornbusch 1991). Alcohol and other drug use are particularly responsive to the conditions of adolescent employment (Mihalic and Elliott 1997; Mortimer and Johnson 1998; Mortimer et al. 1996). The National Research Council (1998) concludes that "the link between intensive work and substance use is one of the strongest in the area, manifest even when the data are subjected to extensive statistical controls for background variables and pre-existing differences" (p. 133).

The strength and robustness of these effects does not necessarily establish causation. Longitudinal research suggests that many youth who work long hours had low levels of school commitment *prior to* entering the workforce (Steinberg, Fegley, and Dornbusch 1993). This may be a result of the precocious adoption of adult behaviors. Newcomb and Bentler's (1988) precocious development theory posits that early involvement in the work force and other behaviors, such as alcohol and drug use, represents an "underlying motivation to engage in adult behaviors that are rewarding at an age that is generally considered to be premature for such behavior" (p. 39). Likewise, Bachman and Schulenberg (1993) argue that both alcohol use and employment are common manifestations of an underlying "pseudomaturity" syndrome. From this perspective, long

work hours during the "early adult transition" period (Levinson 1986:5) is a reflection or consequence of the precocious transition to adult status (Bachman and Schulenberg 1993) rather than an independent cause of alcohol use. Similarly, Gottfredson and Hirschi (1990) posit that both the hours of adolescent employment and drinking may be common manifestations of an underlying "criminal propensity" marked by impulsivity or the inability to delay gratification. Finally, Krohn, Lizotte, and Perez (1997) suggest that the relationship between substance use and precocious transitions is reciprocal: Precocious transitions fuel substance use, which, in turn, disrupt age-appropriate status transitions and engender further substance use.

A previous investigation of the early waves of the longitudinal Youth Development Study data (Mortimer et al. 1996) has provided perhaps the strongest evidence for a causal relationship between high adolescent work hours and alcohol use, yet the specific mechanism linking work hours and drinking has remained elusive. Mortimer and her colleagues (1996) thus conclude, "while we have demonstrated a clear connection between work intensity and alcohol use, the analyses do not elucidate the processes which mediate this effect" (p. 1251).

#### FAMILY, SCHOOL, AND PEER MECHANISMS LINKING WORK HOURS AND DRINKING

Theories of crime and delinquency point to families, schools, and peers as the intervening mechanisms that mediate the association between work hours and alcohol use. Though social control theories emphasize families and schools, and differential association theories emphasize peers in linking the two phenomena, both perspectives are to some extent congruent with the precocious transition explanation. They differ, however, from the pseudomaturity argument by positing an additional and continuing independent effect of work hours on drinking.

Sampson and Laub's (1993) theory of age-graded informal social controls is compatible with a view of high-intensity employment as a precocious transition that is correlated with alcohol use, but it also suggests that long work hours exacerbate drinking. Informal social control theories posit that whenever adolescent

bonds to the family and the school are weakened, the probability of deviance is increased (Sampson and Laub 1993). Long hours of adolescent employment may disrupt age-graded family controls by increasing youths' sense of economic and social independence from their parents (Hirschi 1969, 1983). Likewise, adolescents who work many hours per week may experience conflicts between work and school roles, disrupting school-based social controls.

Differential association (Sutherland 1939) and interactional explanations (Thornberry 1987), by contrast, interpret work as a locus of association for deviant and conforming peers. The workplace brings adolescents into contact with new peers outside their immediate neighborhood or school setting, such as older adolescents and young adults who may introduce them to more "adult" behaviors. These peers, in turn, provide definitions favorable or unfavorable to alcohol use. From this perspective, the relationship between drinking and peers should partially mediate the effect of work hours (Ploeger 1997).

We therefore hypothesize that family, school, and peer relations mediate the relationship between work hours and alcohol use. To test whether work affects drinking through these mechanisms, however, the hypothesized mediators must be domain-specific. For example, it is important to determine whether "friends" or "work friends" are driving alcohol use and whether increased independence from parents is derived from work or from some other institution or affiliation. Unless the mediators are specific to the work domain, changes in friendship patterns or perceived independence may have occurred in the absence of changes in the hours of employment.

In sum, if long work hours increase drinking by fostering a precocious transition to adult roles, their effects should be mediated by direct measures of role transition. Gaining independence from parents through employment (Steinberg and Dornbusch 1991), spending time with work friends away from the workplace (Greenberger and Steinberg 1986), and experiencing conflict over competing student/worker roles (Markel and Frone 1997) are three mechanisms that may interpret the association between hours of employment and alcohol use.

## LONG-TERM CONSEQUENCES OF YOUTH WORK HOURS: THE PARADOX OF STATUS OFFENSES IN LIFE-COURSE RESEARCH

Life course studies of deviant behavior typically examine within-person stability or change in antisocial conduct over time. With status offenses such as drinking, however, the definition of "deviant" or "antisocial" is itself problematic. A person may engage in the same behavior at different points in the life course, but its social definition as deviant or conforming may change from year to year. The distinctions between deviant and normative and between legal and illegal are especially fluid with regard to drinking. The tremendous cross-national and historical variation in drinking patterns illustrates the extent to which the developmental norms and legal codes regulating alcohol use are social constructions (Johnstone et al. 1996; Marshall 1979).

Nowhere is the socially constructed nature of the juvenile and criminal code more apparent than in the regulation of alcohol. In the contemporary United States, moderate alcohol use is generally considered counter-normative and illegal at age 14, normative but still illegal at age 18, and normative and legal at age 22. For example, the nationally representative *Monitoring the Future* study reported that 24 percent of 8th graders had used alcohol in the past 30 days relative to 51 percent of 12th graders (Johnston, O'Malley, and Bachman 2000). For those aged 21–25, the corresponding figure is over 60 percent, according to the National Household Survey of Drug Abuse (U.S. Department of Health and Human Services 2000). These age-graded shifts in prevalence suggest that the social and legal meaning of drinking changes with the age of the drinker.

The social and legal meaning of high-intensity *employment* follows a similar age-graded trajectory from deviant to normative in modern America (Greenberg 1977). Employment in a full-time job is both unusual and illegal for 14-year-olds, though it is a positively valued and socially desired status among adults. Theoretical and statistical models of the relationship between work and alcohol use must therefore be sensitive to the age-graded nature of both phenomena. In particular, work hours are likely to exert their greatest effects on drinking in the high-school years, when ado-

lescents are legally permitted to work but retain a primary institutional affiliation with the school. After high school graduation, young adults begin to form independent households and follow differentiated paths, with some entering postsecondary education and others entering full-time employment. During this stage, the mechanism linking work with substance use may be altogether different than the work-derived independence effect that we hypothesize to be a mediator during high school. Analyzing alcohol use during this later period, however, aids in determining whether adolescent work is a "turning point" that permanently alters lifelong trajectories of deviant behavior or whether the effects of adolescent work are more ephemeral.

As the social definition of alcohol use changes over the life course, the effects of ascribed statuses on drinking change as well. Although African Americans and Latinos are more likely than whites to use alcohol before age 13 (Kann 1996), whites of legal drinking age report significantly more alcohol use than nonwhites (Gleason, Veum, and Pergamit 1991). Similarly, males of all ages report more alcohol use than females (Gleason et al. 1991; Lehman et al. 1995), though gender differences in the *growth* in alcohol use are comparatively modest (Johnstone et al. 1996; Kunz and Graham 1996). Finally, income is positively related to drinking among adults (U.S. Department of Justice 1996), but the relationship is indeterminate for youth, with some studies reporting a negative association between family income and growth in alcohol use (Duncan, Duncan, and Hops 1998), some reporting a positive relationship (Conger et al. 1991; Duncan et al. 1998), and others reporting no association (Fawzy et al. 1987).

In the analysis to follow, we wish to estimate work effects after statistically controlling for the influence of pre-existing factors related to both hours of employment and alcohol use. Because race, gender, and income are linked to both employment and alcohol use at different developmental stages, even panel studies must statistically control for their effects in order to disentangle the relationship between work and alcohol use. Similarly, it is necessary to adjust estimates of work effects for family structure, school performance, and minor deviance because these factors are likely to affect both drinking and working at one or more life stages.

## AGE-SPECIFIC HYPOTHESES

Both theory and prior research suggest age-graded hypotheses relating work hours and drinking. During *early adolescence*, the literature on precocious transitions suggests that work hours will be positively associated with drinking. In addition to the hours of employment, we expect early alcohol use to be higher among males (Kann 1996), those from nonintact families (Duncan et al. 1998), those with low grade point averages, and those who report greater school misconduct. We expect stronger work effects during subsequent years than during this period because few adolescents work more than 20 hours per week before 10th grade. Nevertheless, work-derived independence, time with friends, and work/school conflicts should all be positively associated with alcohol use and partially mediate the initial effect of work hours. In addition, we expect grade point average to be negatively associated with adolescent alcohol use (Schulenberg et al. 1994), and we predict school misconduct or "rebelliousness" to be positively associated with early alcohol use (Curran, Stice, and Chassin 1997).

During *late adolescence*, as mean levels of drinking rise and drinking becomes more socially acceptable and normative (though still illegal), we expect that long work hours will exert an independent effect on alcohol use net of their effect on early drinking status. If so, those working more than 20 hours per week would exhibit the greatest growth in alcohol use between early and late adolescence. During this period, work hours are hypothesized to operate through work-derived independence, work/school strain, and peer influence. Most importantly, working long hours may weaken parental controls by fueling incipient feelings of independence among young workers. As both work and school may become more demanding over the high school years, student workers may also experience more stress than nonworkers and use alcohol as a result (Greenberger, Steinberg, and Vaux 1981; see also Johnson and White 1995). Because peer influences on deviance and delinquency are particularly salient during the high school years (Patterson 1993; Stoolmiller 1994; Warr and Stafford 1991), we also expect a mediating effect of time with work friends. In sum, youth who (1) believe their work has fostered independence from their families, (2) feel stressed

about their dual role as a worker and a student, and (3) spend more time with work friends will increase their drinking during the high school years.

As drinking becomes a normative and legally approved behavior after high school (characterized by the status ritual of turning 21), the effects of work hours on drinking are likely to diminish. Whereas working more than 20 hours per week in high school is generally regarded as premature, full-time work is age-appropriate behavior after high school. Likewise, the proposed mediators of work effects—independence from the family of origin, stress from the worker/student role, and time with peers at work—may no longer be operative during this transition. Instead, we look to the influence of college attendance and living situations on changes in drinking over this period. As adolescents enter adulthood, changes in school attendance and in living arrangements may influence the relationship between work hours and alcohol use. Marriage and the formation of independent households, for example, appear to reduce alcohol use among young adults (Chilcoat and Breslau 1996; Curran, Muthen, and Harford 1998). We predict that postsecondary education will be positively related to growth in drinking from age 18 to 21 because of the high incidence of drinking among college students (Wechsler et al. 1998). If social ties to peers and family members continue to affect alcohol use in this period, those who live with roommates are likely to drink more than those who live with their parents. In turn, establishing an independent household through marriage, cohabitation, or living alone may inhibit drinking after high school as young persons take on more adult responsibilities. Thus, the same theories of social control and peer association may hold in the early adult period as in adolescence, though mechanisms such as living arrangements become more salient as the cohort ages.

## DATA AND ESTIMATION

### *Data*

We test these hypotheses using data from the first eight waves (1988–1995) of the Youth Development Study (YDS), a prospective longitudinal investigation of the causes and consequences of adolescent employment. The

YDS is a community study of 1,010 adolescents and their parents in St. Paul, Minnesota, a U.S. city with a 1990 population of 272,000 within a metropolitan area of 2,500,000 (U.S. Bureau of the Census 1997:42,47). During the first wave of data collection, youth completed questionnaires in their school classrooms and responded by mail if absent when surveys were administered. In terms of race, family composition, median household income, education, and occupation level, the sample is representative of the general population of 9th-grade students in St. Paul public schools (Finch et al. 1991; Mortimer and Johnson 1998; Mortimer et al. 1996).

The panel was surveyed annually beginning in 1988 when the adolescents were in 9th grade. From 1988 until 1991, data on employment and drinking were gathered in surveys administered in school; the retention rate for this period was 93 percent. During the post-high-school years, respondents were contacted annually by mail to provide tracking information and limited life-history calendars, but they were not asked to report drinking behavior. In the spring of 1995, approximately four years after most participants had graduated from high school, 780 of the original respondents (or 78%) completed a mail survey that included measures of drinking behavior.

### *Measures*

*Alcohol use.* Drinking is measured by a single indicator at the first, fourth, and eighth waves of data collection. Respondents were asked, “How many times have you had alcoholic beverages to drink in the past 30 days?” The six response categories ranged from “none” to “40 or more” and were coded to the number of drinking episodes reflecting the category midpoints. Table 1 shows that adolescents reported drinking an average of 2.878 times per month in 9th grade, 3.015 times per month in 12th grade, and 5.485 times per month at age 22. These levels of alcohol consumption are comparable to other studies. For example, Curren et al. (1997) reported mean levels of 3.2 drinks per month for 14 to 15 year-olds, and Duncan et al. (1998) noted frequency levels of less than 4 drinks per month over four waves in their sample of adolescents.

How does the frequency of drinking episodes relate to binge drinking (Maggs

1997) or the quantity of alcohol consumed? Binge drinking was only measured at age 22 in the YDS. For this year the bivariate correlation between the number of drinking episodes in the past month and the number of times having five or more consecutive drinks in the past two weeks is .72. Although the frequency of drinking episodes may not be an appropriate indicator for addressing risk-taking or binge drinking, it suits our purpose in assessing how employment affects alcohol use over the early life course.

*Work hours.* We examined both continuous and categorical specifications of work hours, based on the number of hours of employment. Across the four years of high school, students' average weekly hours of employment increased gradually from 5.6 in 9th grade, to 12.9 in 12th grade, before increasing dramatically to 25 hours per week by age 22. It would be misleading to characterize the sample with only these measures of central tendency, however. Employment patterns during the adolescent years are inconsistent, and these averages include those students who did not work during a specific year. Among the working adolescents, the average hours worked per week rose from 11 in grade 9 to 20 by grade 12. Bivariate correlations between work hours and drinking during high school ranged from .05 to .10. Excluding nonworkers from these calculations, correlations between number of hours worked and drinking frequency ranged from a low of .11 (during sophomore year) to a high of .20 (during senior year) across the four years.

In keeping with prior research on work and adolescent problem behavior (e.g., Steinberg and Dornbusch 1991; National Research Council 1998; Wright et al. 1997), we adopt a dichotomous indicator of whether work hours exceeded 20 hours per week. Consistent with prior research (National Research Council 1998; Wright et al. 1997), bivariate analyses suggest that moderate work may be slightly more advantageous than either high-intensity work and nonwork (not shown). We aggregate nonworkers and those working fewer than 20 hours per week because the 20-hour threshold has the greatest substantive and policy implications and because the drinking behavior of those who work fewer hours does not differ significantly from nonworkers (see also Mortimer et al. 1996). Because a dichotomous measure may mask a gradient between work

hours and alcohol use, however, we also present results taken from models treating hours of employment as a continuous predictor in Table 2 and Appendix B.

*Social position and exogenous background characteristics.* Sex and race are dummy variables, with females and nonwhites as reference categories. Household income, reported by parents during the first wave of data collection in 1988, is a 13-point ordinal variable ranging from "less than \$2,500" (1) to "\$105,000 or more" (13) that we recoded to midpoints, ranging from \$2,500 to \$105,000. Midpoints were then divided by 1,000 to provide a metric of thousands of dollars (range = 2.5 to 105.0). In our multivariate models, we also control for freshman grade point average as an indicator of initial academic performance and for school misconduct as an indicator of antisocial behavior. School misconduct is a composite of the number of times adolescents report getting into "trouble" at school and the number of times they report being sent to the principal's office or detention in the 9th grade ( $r = .78$ ).

*Mediating variables.* We measure work-derived independence by a self-reported item asking students whether their jobs made them more independent of their families, financially or otherwise. Work disruption of the student role is measured by asking whether students agree or disagree that being both a worker and a student is stressful. Peer association is measured by a 5-point index of the amount of time the student reports spending with friends from work. Because nonworkers were not asked these questions, their data were recoded to reflect negative responses.

*Adult role transitions.* College attendance is a composite variable created by summing the number of years respondents reported attending school full time between 1992 and 1995. Living arrangements or patterns during these post-high-school years were coded into dummy variables indicating where the respondent had spent the majority of months, on average, over this four-year period: (1) living with a spouse/partner, (2) living at home, (3) living alone, or (4) living in mixed situations, versus (5) living with roommates as the reference category. We sought to characterize the *pattern* of the panel's transition to adulthood through the use of a college attendance measure and living arrangement indicators, rather than focus on year-specific changes during these years. This allows us to adjust estimated work effects for

general educational and residential characteristics during the early adult transition period.

### *Analytic Strategy*

To examine the influence of hours of employment on alcohol use in adolescence and early adulthood, we utilize static-score or conditional-change regression models (Finkel 1995), entering high work hours predictors into a series of ordinary least squares equations predicting drinking behavior. Lagged indicators of drinking and fixed social position variables are included in the models to strengthen causal inferences and to estimate differences in change over time across individuals. To assess the role of our hypothesized mediating variables, we follow Baron and Kenny's (1986) criteria for establishing a mediation process. First, we examine the bivariate relationships between high work hours and alcohol use in each period to determine the size of the effects to be moderated. We then assess whether our hypothesized mediators predict adolescent drinking after controlling for the effects of high work hours. If the introduction of the mediating variables substantially reduces the effect of high work hours on alcohol use, it provides evidence for an intervening relationship.

We repeat this analysis of the relationship between high work hours and alcohol use three times: in 9th grade, 12th grade, and early adulthood (age 22). We also estimated a series of models among the subset of working students (available from authors). Although the sample size is dramatically reduced in these models, the substantive results are similar to those reported below. Because the YDS is a longitudinal investigation, sample attrition reduces the number of respondents in each year. If unmeasured factors related to persistence in the study also affect drinking, our estimates for the effects of work hours and other characteristics may be biased by sample selectivity. To address this possibility, we use Heckman's two-step approach to model participation and drinking simultaneously (Heckman 1976; Winship and Mare 1992). If unmeasured factors, such as impulsivity, drive both alcohol use and the probability of attrition, this would be reflected in a negative value of  $\lambda$ , the correction term produced in the persistence equation. Although this selectivity approach is

not a panacea for curing problems arising from attrition (Stolzenberg and Relles 1990), a well-specified model can provide evidence for the robustness of uncorrected estimates and help to bridge the gap between the "data one can get and the data one would like" (Stolzenberg and Relles 1997:504).

## RESULTS

### *Descriptive Statistics*

Table 1 shows that drinking increases slightly over the high school years and significantly between ages 18 and 22. As with many measures of substance use, the YDS alcohol measures have highly skewed distributions. We therefore transformed drinking scores by adding a constant (one) to account for non-drinkers' reports of zero drinking episodes in the past month and then taking the natural logarithm of the number of episodes. Subsequent analyses utilize this natural logarithmic scoring as the metric for our dependent variable.

The proportion of adolescents working more than 20 hours per week, our primary measure of work hours, also increases gradually over the high school years, from 5.6 percent among 9th graders to 24.8 percent among 12th graders. As expected, this proportion jumps to almost 58 percent by ages 21–22. The YDS sample is approximately 71 percent white and 52 percent female, with a median household income of approximately \$35,000 in 1988. We note that small proportions of students are missing on exogenous variables such as family composition (1%), race (3%), grade-point average (5%), and school misconduct (2%). To minimize missing cases in multivariate regression models, we utilize mean imputation to assign values to these variables (Cohen and Cohen 1983). This strategy does not affect our substantive results; in regression models controlling for dummy variables that reflect missing versus nonmissing cases on the four variables (available upon request), we found negligible effects.

Students reported greater work-derived independence from their families and more time with peers in 10th grade than in 9th grade. We treat these variables and work/student stress as mediators between work hours during 9th and 10th grade and drinking trajectories. Proxy measures of two of our mediators in 9th

**TABLE 1. Descriptive Statistics for Study Variables**

	Mean	SD
<i>Dependent Variables</i>		
Drinking in 9th Grade (number of times per month)	2.878	6.873
Drinking in 12th Grade (number of times per month)	3.015	6.293
Drinking at Age 21–22 (number of times per month)	5.485	7.761
<i>Work Hours</i>		
Percent Working > 20 Hours/Week (9th Grade)	5.6	
Percent Working > 20 Hours/Week (10th Grade)	12.5	
Percent Working > 20 Hours/Week (12th Grade)	24.8	
Percent Working > 20 Hours/Week (Age 21–22)	57.7	
<i>Exogenous Variables</i>		
Percent with Intact Families	68.4	
Family Income (in thousands of U.S. dollars)	35.069	20.288
Percent Male (vs. Female)	48.0	
Percent White Race (vs. Other)	71.4	
Grade-point Average	2.483	.809
School Misconduct (number of times)	2.206	2.838
<i>Mediators</i>		
Percent Saying Work Increases Independence (9th Grade)	30.6	
Percent Saying Work Increases Independence (10th Grade)	50.3	
Percent Saying Work Leaves Less Time for Homework (9th Grade)	11.6	
Percent Saying Work/Student Stress (10th Grade)	23.0	
Time with Friends (9th Grade)	2.560	.916
Time with Work Friends (10th Grade)	2.704	3.416
<i>Adult Transitions</i>		
Number of Years of Full-time Education (0–4)	1.431	1.531
Percent Live with Spouse/Partner (vs. Live with Roommates)	7.9	
Percent Live with Parents (vs. Live with Roommates)	60.7	
Percent Live Alone (vs. Live with Roommates)	5.6	
Percent Live in Mixed Places (vs. Live with Roommates)	1.8	

grade are also shown in Table 1. Unfortunately, questions about work/student stress and time spent with work friends were not asked in this first wave, and we must utilize alternate measures of employment's effect on homework and time with friends for this period. After high school, YDS respondents attended 1.4 years of

college, on average, between 1992 and 1995. Many (61%) continued to live with their parents for the majority of months in this four-year time span, in contrast to the 22 percent who reported living with roommates. A relatively small proportion established indepen-

**TABLE 2. Coefficients from OLS Regressions of Alcohol Use on Work Intensity (without Selection)**

	9th Grade		12th Grade		Age 22	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	.667**	.689**	.758**	.814**	1.24**	1.25**
Work Hours (9th)	.006* (.003)		-.002 (.004)		-.003 (.005)	
High Work Hours (9th)		.261* (.130)		-.151 (.145)		-.087 (.017)
Work Hours (10th)			.014** (.003)		.004 (.004)	
High Work Hours (10th)				.371** (.099)		.094 (.121)
Work Hours (age 22)					.004* (.002)	
High Work Hours (age 22)						.163* (.078)
R <sup>2</sup>	.004	.004	.025	.018	.007	.008
N	902	902	805	805	675	675

\*  $p < .05$ ; \*\*  $p < .01$ . (directional tests).

Note: Table reports unstandardized coefficients and standard errors in parentheses



dent households, either by living alone or with a spouse/partner.

### *The Association between Work Hours and Drinking*

Table 2 shows estimates from OLS regressions of freshman, senior, and young adult drinking on hours of employment. We display coefficients for both continuous (work hours) and discrete (high work hours) specifications to demonstrate the robustness of the relationship. In the first two columns, adolescents who work long hours in 9th grade drink significantly more than moderate workers and nonworkers. Working more than 20 hours per week increases the natural logarithm of drinking episodes by .261 ( $p < .05$ ). Likewise, each hour worked per week produces a .006 increase in the natural logarithm of drinking ( $p < .05$ ).

Although working long hours as a freshman represents a precocious transition, it does not predict drinking during the senior year once 10th grade work is statistically controlled, as shown in the third and fourth columns of Table 2. In these regressions of 12th grade drinking, however, both specifications of 10th grade work hours are large, positive, and statistically significant, indicating a strong association between work hours and alcohol use during high school. In the analysis to follow, we will test whether this association is spurious by including a selectivity correction and a lagged measure of prior drinking, and we will attempt to mediate the remaining effect by introducing indicators of family, school, and peer relations.

The final two columns of Table 2 suggest that the effects of early work experiences have little effect on drinking practices in young adulthood. Although the coefficients for 9th and 10th grade work hours have the same sign as those in the 12th grade model, they are smaller in magnitude and no longer statistically predict drinking at age 22. Instead, the contemporaneous effect of working long hours is positively associated with drinking during this period.

While Table 2 establishes the magnitude of the relationships that we intend to mediate, it also raises the possibility that sample selectivity (Winship and Mare 1992) may be biasing our results, as the sample size decreases from 902 in 9th grade to 675 in young adulthood. Unmeasured characteristics related to adoles-

cent drinking may also affect the decision to participate in subsequent surveys. To address this possibility, we use Heckman's (1976) two-step approach to model attrition and alcohol use jointly, using Greene's (1998) *LIMDEP* program.

Appendix A shows the results of our probit selection equation predicting participation in each survey year. Each of these equations includes regressors measured in 9th grade, including family structure, race, sex, income, and school misconduct. For models that include the mediating variables, the selection equation also includes 9th grade measures of the family, friends, and school mediators (they are excluded from other models because data are missing on 54 cases for these indicators). Because Heckman's method is most appropriate when at least one determinant of the selection equation can be excluded from the substantive equation, we introduce a measure of academic self-esteem (a three-item rating scale of intelligence, reading, and school ability in the 9th grade,  $\alpha = .72$ ) into the selection equation. Academic self-esteem is correlated with grade point average ( $r = .42$ ), and we could argue for its inclusion in our alcohol use equations. However, initial analyses indicated that this measure did not predict drinking as strongly or as consistently as GPA. We therefore include it as a measure of the probability of persistence in the sample over time. To test the robustness of our results, we also specified models placing academic self-esteem in the drinking equation and grade point average in the persistence equation, with results almost identical to those presented below.

The results of the selection models for each regression step are reported in Appendix A. For 9th grade, we find that respondents from intact families, with low levels of school misconduct, and little conflict between work and school were most likely to answer the alcohol use questions. In 12th grade and at age 22, when the attrition problem became more severe, females, whites, and those with higher levels of academic self-esteem were most likely to persist in the sample. Although the substantive results of the selection model may be informative, our real purpose in estimating these probit equations is to produce a correction term, lambda, to introduce into each of our alcohol use equations. Although no statistical procedure can overcome the threat of selectivity bias completely (Stolzenberg and Relles

1997), this method has the advantage of using the known information about those lost to attrition to adjust estimates obtained from the remaining sample of persisters.

### *Elaborating the Relationship between Work Hours and Alcohol Use*

In Table 2, we detailed the strength and direction of the relationship between work hours and alcohol use under various specifications. Table 3 displays the results of our multivariate analyses. Here, we step in the social position and background variables, the mediators, and the selectivity correction term lambda. Model 1 regresses alcohol use on 9th grade work hours. After adjusting for selection into the sample, the original work-alcohol relationship is reduced to nonsignificance. The significant coefficient for lambda ( $b = 3.227, p < .01$ ) indicates that factors related to participation are positively related to drinking in 9th grade. Part of the effect of work hours is therefore due to either the selection of heavier drinkers into the sample or the attrition of those who drink less.

Once we introduce exogenous background factors in Model 2, however, the effect of selection on drinking is diminished. Although the magnitude of the work effect is comparable in the two models, its standard error is reduced after covariate adjustment, and the original relationship is again marginally significant: Adolescents who work more than 20 hours per week tend to drink more ( $b = .201, p < .10$ ). The controls generally behave as predicted, with family income, white race, and school misconduct all positive predictors of drinking and the overall model explaining about 15 percent of the variance in 9th grade drinking.

The addition of the mediators in Model 3 does not significantly improve our ability to predict drinking in 9th grade, nor do they account for the effect of work hours, which increased in size and significance. Only time spent with friends is statistically significant, and this result could be due to general sociability or differential association rather than employment (recall that this variable is a proxy measure for time with work friends, which was not measured during this wave of data collection).

Models 4–6 in Table 3 confirm initial findings that working long hours in 9th grade does

not predict 12th grade drinking net of working long hours in 10th grade. The positive coefficient for lambda in Model 4 ( $b = .828, p < .01$ ) again suggests that unmeasured respondent characteristics that increase the probability of persistence also predict alcohol use in the senior year. However, as control variables are introduced, the size and significance of lambda decreases, suggesting that our covariates would have accounted for these selection processes in unadjusted equations. Model 5 also includes a lagged dependent variable for 9th grade drinking, resulting in a static-score or conditional-change model (Finkel 1995). The positive effect for males ( $b = .239, p < .01$ ) in this model means that boys have greater growth in alcohol use between 9th and 12th grades than girls, controlling for initial levels of alcohol use. Whites and youth with lower grade point averages also report greater drinking net of their prior alcohol use. Note that the impact of family structure and income decline in the 12th grade models that include the lagged dependent variable.

Model 6 of Table 3 tests our most important mediation hypotheses, predicting 12th grade alcohol use as a function of 9th grade use, 10th grade work hours, and the 10th grade mediating variables. The hypothesized mediators produce a significant increase in explained variation in alcohol use in Model 6, although only one of the three variables is statistically significant. Youth who report that work gives them greater independence from their families are more likely to increase their drinking during the high school years. Time with work friends and work/school stress are not significant, however, net of work independence and the other covariates. When the hypothesized mediators are included in Model 6, the effect of high work hours decreases from .359 to .156, a reduction of 56 percent, though it remains marginally statistically significant ( $p < .10$ ). Under the continuous specification in Appendix B, the mediators and other variables explain about half of the effect of work hours, reducing the coefficient from .014 to .007. This provides sound evidence for the role of work-derived independence as an intervening mechanism linking work hours and alcohol use during high school.

Models 7–9 in Table 3 show that by age 22, work hours in 9th and 10th grades are no longer significantly related to drinking. Social position effects begin to reverse sign or

TABLE 3. Coefficients from OLS Regressions of Alcohol Use on Work Hours, Exogenous, and Mediating Variables with Selection

	9th Grade			12th Grade			Age 22		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	.049 (.232)	.664 <sup>+</sup> (.132)	.345 (.128)	.539** (.098)	.991 <sup>+</sup> (.133)	.949** (.140)	1.300** (.111)	-.025 (.132)	-.309 (.132)
High Work Hours (9th Grade)	.204 (.232)	.201 <sup>+</sup> (.132)	.209 <sup>+</sup> (.128)	-.194 <sup>+</sup> (.143)	-.158 (.133)	-.168 (.140)	-.074 (.169)	-.025 (.176)	-.023 (.179)
High Work Hours (10th Grade)				.359** (.098)	.276** (.092)	.156 <sup>+</sup> (.104)	.111 (.121)	.005 (.132)	.025 (.132)
High Work Hours (Age 22)									.139* (.083)
Drinking in 9th Grade					.246** (.036)	.248** (.037)			
Drinking in 12th Grade								.260** (.045)	.264** (.046)
Intact Family		-.222* (.163)	-.161 (.201)		-.130 (.165)	-.115 (.098)		-.113 (.103)	-.034 (.140)
Male (vs. Female)		-.032 (.078)	-.075 (.065)		.239** (.094)	.246** (.067)		.185* (.111)	.005 (.179)
Family Income		.004* (.002)	.005** (.002)		.001 (.002)	.001 (.002)		.006** (.002)	.005* (.003)
White Race (vs. Other)		.204* (.096)	.225** (.072)		.191 <sup>+</sup> (.146)	.191* (.090)		.348* (.164)	.552* (.275)
Grade-Point Average		-.058 (.047)	-.063 <sup>+</sup> (.041)		-.145** (.045)	-.171** (.045)		.140** (.057)	.103 <sup>+</sup> (.063)
School Misconduct		.139** (.044)	.109** (.040)		.043 (.035)	.039* (.018)		.012 (.019)	.008 (.024)
Time with Friends (9th)		.067 <sup>+</sup> (.045)	.067 <sup>+</sup> (.045)						
Work Independence (9th)		-.067 (.097)	-.067 (.097)						
Less Time for Homework (9th)		.111 (.308)	.111 (.308)						
Time with Work Friends (10th )						-.011 (.032)		.030 (.040)	.017 (.041)
Work Independence (10th)						.330** (.086)		-.077 (.109)	-.043 (.111)
Student/Work Stress (10th)						-.028 (.086)		.065 (.107)	.061 (.108)

(Continued)

TABLE 3. *Continued*

	9th Grade			12th Grade			Age 22	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Full-time School								
Live with Roommates <sup>a</sup>								
Live with Spouse/Partner								
Live at Home								
Live in Mixed Places								
Live Alone								
<i>Lambda</i>	3.227** (1.048)	-1.320 (1.837)	-.507 (2.417)	.828** (.287)	-.639 (1.181)	-.578 (.497)	.088 (.204)	.548+ (.422)
R <sup>2</sup>	.076	.154	.159	.031	.168	.198	.002	.120
N	902	902	873	805	774	741	675	633
Hierarchical F-test <sup>b</sup>	37.180** 2.899	7.803** 7.862	2.014 3.859	8.540** 3.801	13.138** 8.728	6.190** 3.725	.410 3.671	6.069** 11.580
								2.917** 6.574

\*  $p < .10$ ; \*\*  $p < .01$ . (directional tests for coefficients).

++  $p < .01$ . (significance level for F-tests).

<sup>a</sup> This variable is the reference category for the living situation variables.

<sup>b</sup> This row reports the results of nested F-tests (degrees of freedom in subscript) that indicate improvement over the previous model. F-tests for Models 1, 4, and 6 represent comparisons to the null model (which includes only the constant term). Nested F-tests are based on  $N = 873$  for Models 1-3,  $N = 741$  for Models 4-6, and  $N = 596$  for Models 7-9.

Note: Table reports unstandardized coefficients and standard errors in parentheses.

become nonsignificant as alcohol use is now both legally permitted and normatively encouraged. Young adults with better high school grade point averages and those from more affluent families report greater alcohol use net of senior year drinking levels. These effects are somewhat diminished after controlling for adult life course transitions and college attendance in Model 9. Here, the gender coefficient becomes nonsignificant, as does the effect for early school misbehavior. Predictably, college attendance is positively associated with drinking, although its coefficient is only marginally significant net of living arrangements. Young adults who live with roommates are the heaviest drinkers, relative to those respondents who live with their parents, those who are married or cohabiting in independent families, or those who live alone. Working longer hours (in both the dichotomous and continuous specifications of work hours) remains positively associated with drinking at age 22, net of 12th grade drinking. As expected, the hypothesized mediators do not predict changes over this period, since neither work nor drinking is precocious at this stage in the life course. The coefficients for lambda in the last two columns reach significance at the .10 level, suggesting that unmeasured characteristics related to persistence in the study are also positively related to drinking.

In sum, our results indicate that the hours of employment in the freshman and sophomore years of high school are an important predictor of drinking in 9th grade and in 12th grade, but that working long hours in high school has little influence on drinking as a young adult. As hypothesized, the mediators significantly decreased the effect of high work hours on senior-year drinking but had little effect on 9th grade drinking and almost no effect on drinking at ages 21–22. Specifically, working long hours during high school fosters growing independence from parental controls that, in turn, escalates drinking between 9th and 12th grades. Nevertheless, these effects are short-lived. By age 22, the contemporaneous effects of living arrangements, college attendance, and work hours are more important predictors of drinking than work independence or the other adolescent mediators.

As a final test for the robustness of our findings, we also examined the relationship between work hours and changes in drinking using two-period growth curve models (Bryk

and Raudenbush 1987, 1992). Results from that analysis are consistent with those reported above, although missing data problems were more severe for the hierarchical models and no selectivity procedure was available to address potential biases (results available upon request).

## DISCUSSION AND CONCLUSION

This analysis examined the short-term and long-term consequences of adolescent work hours for alcohol use. We find evidence for both a common pseudomaturity syndrome, consistent with Bachman and Schulenberg (1993), and a marginal or additional age-graded effect of work hours on drinking. The 9th grade drinking equation supports the precocious transition explanation by demonstrating how the hours of employment and alcohol use covary as early as age 14. The senior year model, however, suggests an additional independent effect of work hours on growth in high school alcohol use that holds net of 9th grade drinking and hours of employment.

Perhaps more importantly, our analysis identifies one of the key mechanisms linking work hours and alcohol use. Our 12th grade model provides evidence that longer hours of employment affect drinking by giving adolescents greater independence from parental controls (see Hirschi 1969, 1983). Youth who work long hours are more likely to believe that employment gives them greater independence from their families which in turn leads to increased drinking. In the post-high-school period, however, the effects of adolescent work hours and work-derived independence no longer influence drinking. Instead, college attendance and living arrangements are important predictors of alcohol use among young adults.

Although these findings speak to important debates in the literatures on adolescent development, work, and deviant behavior, our study has several limitations. First, since our drinking measure is a recoded-to-midpoint scale that is essentially ordinal in nature, our analysis is vulnerable to ceiling effects due to top coding. True change in drinking behavior can be estimated more effectively if the metric of the dependent variable is truly ratio in nature (see Elliott and Ageton 1980). Second, we lack data on alcohol use initiation. Drinking status in 9th grade simply represents the starting

point in our models and the beginning of data collection for the YDS study. Although half of the sample (52%) reported they were not using alcohol in 9th grade, we know that many adolescents take their first drink before age 14 (Curran et al. 1997), and, therefore, we cannot predict initiation into drinking. For the present analysis, 9th grade drinking is perhaps most important for its role in establishing baseline levels in the 12th grade alcohol use equations. On a related note, we propose a progression model of alcohol use that is associated with movement into the labor force, although we acknowledge that other patterns of drinking, such as discontinuation, characterize adolescence and young adulthood. Third, a significant proportion of the sample was lost to attrition by age 22. Although we addressed selectivity by estimating persistence models for each regression step and including a correction term in our alcohol use equations, no statistical procedure can rule out the possibility of selection bias. Our analysis suggests that selective attrition is most likely to be problematic at ages 21–22, but poses less of a problem for our 9th and 12th grade equations.

Because 9th grade drinking is too late to establish onset and much of the sample had been lost by age 22, we place the greatest confidence in the results of our 12th grade models. Moreover, these models provide the most important and direct evidence addressing the three main issues raised in the introduction. First, the association between work hours and alcohol use appears to be causal rather than spurious. Even in models that include lagged alcohol use measures, work hours are positively associated with drinking in late adolescence and early adulthood.

Second, we have shed some light on the mechanism linking work hours and alcohol use. Consistent with an understanding of intensive employment as a precocious transition, youth whose jobs give them greater independence from their parents are most likely to increase their drinking between 9th and 12th grades. Our 12th grade model showed that

about half of the effect of work hours was mediated by work-derived independence and our other independent variables.

Finally, we find little evidence that working long hours in adolescence is a turning point that permanently alters long-term trajectories of alcohol use. Although those who work more tend to drink more in high school, these effects dissipate rapidly. This research thus provides some evidence bearing on current policy debates about youth employment. The *timing* of work in late middle school and early high school is an important policy consideration. Adolescents who work more than 20 hours per week early in their high school careers (9th–10th grades) experience greater independence from their parents, which increases the frequency of their drinking during high school. This effect does not appear to persist into adulthood, however, as the drinking levels of young adults who work fewer hours in high school increase to match the levels of those who worked longer hours.

More generally, the processes described in this paper exemplify the social construction of deviance over the life course. The predictors of drinking vary markedly with age and the changing normative and legal status of work and alcohol use. Whereas working more than 20 hours per week may be deviant during adolescence, working more than 40 hours per week is generally considered normal for adults. Likewise, alcohol use is frowned upon, both formally and informally, during the teenage years, though generally considered normative during adulthood. Consistent with these social and cultural expectations, we find that long work hours, whether measured as a 20-hour per week threshold or a continuum, exert their greatest effect on alcohol use during the high school years. Not surprisingly, the key intervening mechanism identified in our analysis—work-derived independence from parents—also reflects the age-graded role expectations governing adolescence as a distinct stage in the life course.

APPENDIX A. Estimated Coefficients from Probit Analysis Predicting Survey Participation at 9th Grade, 12th Grade, and Age 22

	9th Grade			12th Grade			Age 22		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	1.554**	1.554**	1.362**	-.022	.132	.079	-.338	-.465*	-.366
Intact Family	.240*	.240*	.289*	.227*	.273**	.273**	.148*	.168*	.173*
Male (vs. Female)	-.030	-.030	.042	-.156*	-.142*	-.092	-.412**	-.405**	-.422**
Family Income	.001	.001	.000	.003	.003	.003	.002	.002	.005*
White Race (vs. Other)	.076	.076	-.020	.299**	.225*	.183*	.553**	.548**	.583**
School Misconduct	-.070**	-.070**	-.057**	-.050**	-.055**	-.046**	-.042**	-.026*	-.019
Academic Self-esteem	-.034	-.034	-.008	.057*	.034*	.049*	.049*	.075**	.052*
Time with Friends (9th)			.047			.004		-.048	-.071*
Work Independence (9th)			-.105			-.115		-.181*	-.100
Less Time for Homework (9th)			-.387*			-.354*		-.353**	-.179
Log-likelihood	-331.891	-331.891	-270.637	-484.878	-525.367	-487.463	-597.250	-566.170	-571.522
Chi-square	23.118**	23.118**	22.991*	49.320**	47.469**	44.236**	88.936**	90.594**	94.128**
(df)	(6)	(6)	(9)	(6)	(6)	(9)	(6)	(9)	(9)
N	1,010	1,010	956	1,010	1,010	956	1,010	956	956
Number Persisting	902	902	873	805	774	741	675	633	596

\*  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < .01$ . (directional tests for coefficients).  
\*  $p < .10$ ; \*\*  $p < .01$ . (significance tests for Chi-square statistics)  
Note: Table with standard errors available upon request.

**APPENDIX B. Coefficients from Regressions of Alcohol Use on Continuous Work Hours, Exogenous, and Mediating Variables with Selection**

	9th Grade			12th Grade			Age 22		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	.017	.647*	.336	.469**	.986*	.995**	1.279**	-.061	-.413
Work Hours (9th Grade)	.006	.006*	.007*	-.002	-.000	.001	-.003	-.003	-.003
Work Hours (10th Grade)				.014**	.012**	.007*	.005*	.002	.002
Work Hours (Age 22)									.003*
Drinking in 9th Grade									
Drinking in 12th Grade									
Intact Family					.243**	.248**		.260**	.265**
Male (vs. Female)		-.226*	-.160		-.141	-.130		-.110	-.029
Family Income		-.016	-.063		.264**	.261**		.167*	-.027
White Race (vs. Other)		.004*	.005**		.001	.001		.006**	.006*
Grade-point Average		.195*	.223**		.160	.181*		.366*	.595*
School Misconduct		-.058	-.062*		-.150**	-.176**		.142*	.110*
Time with Friends (9th )		.141**	.110**		.045	.041*		.011	.007
Work Independence (9th)			.061*						
Less Time for Homework (9th)			-.103						
Time with Work Friends (10th )			.094						
Work Independence (10th)						-.028		.029	.014
Student/Work Stress (10th)						.291**		-.089	-.059
Full-time School						-.057		.054	.054
Live with Roommates <sup>a</sup>									.042*
Live with Spouse/Partner									-.485**
Live at Home									-.308**
Live in Mixed Places									-.363
Live Alone									-.326*
<i>Lambda</i>									1.316*
R <sup>2</sup>	3.259**	-1.377	-512	.853**	-.736	-.711*	.101	.611*	.143
N	.077	.154	.160	.039	.175	.197	.003	.120	.596
	902	902	873	805	774	741	675	633	596
Hierarchical F-test <sup>b</sup>	37.670 <sup>1,2999</sup>	7.611 <sup>1,7862</sup>	2.248 <sup>3,859</sup>	10.710 <sup>1,3801</sup>	13.220 <sup>1,8728</sup>	3.867 <sup>1,3725</sup>	.660 <sup>3,671</sup>	6.037 <sup>1,1580</sup>	2.814 <sup>1,6574</sup>

\*  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < .01$ . (directional tests for coefficients).

\*\*  $p < .01$ . (significance level for F-tests).

<sup>a</sup> This variable is the reference category for the living situation variables.

<sup>b</sup> This row reports the results of nested F-tests (degrees of freedom in subscript) that indicate improvement over the previous model. F-tests for Models 1, 4, and 6 represent comparisons to the null model (which includes only the constant term). Nested F-tests are based on N = 873 for Models 1-3, N = 741 for Models 4-6, and N = 596 for Models 7-9.

Note: Table reports unstandardized coefficients. Table with standard errors available upon request.



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