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Does alcohol use during high school affect educational attainment?: Evidence from the National Education Longitudinal Study

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Abstract

This paper uses data from the National Education Longitudinal Study to estimate the association between high school alcohol use and educational attainment measured around age 26. Initially, the effect of alcohol use on educational attainment is estimated using baseline probit models, which ignore the possibility that unmeasured determinants of alcohol use and educational attainment are correlated. A bivariate probit model is used next to estimate the equations jointly, with alcohol policies as identifying variables. Because these identifying variables are problematic, the bivariate probit model is then re-estimated without any identifying exclusions but with the correlation coefficient fixed at various levels. This part of the analysis allows one to gauge the sensitivity of the estimates to correlation between the unobservable determinants of both outcomes. The results suggest that alcohol use is associated with reductions in educational attainment, but there is little evidence that this association represents a causal relationship.
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1. Introduction and background

Alcohol is the most widely used and the most intensely used drug among high school students. In the 2003 Monitoring the Future Study (MTF), a national survey of adolescent substance use, about 48 percent of high school seniors reported alcohol use in the past month (Johnston, O'Malley, & Bachman, 2003). This high prevalence of drinking among high school seniors is consistent with the fact that a large percentage of

younger adolescents believe that regular and intense use of alcohol is not very harmful. Among 8th grade respondents in the 2003 MTF, only about 30 percent felt that having one or two alcoholic drinks every day was potentially very harmful (Johnston et al., 2003).

At first glance, the widespread belief among adolescents that regular and intense alcohol use is not harmful is at odds with research on the educational consequences of alcohol use during youth. Adolescent alcohol users earn lower grades, are more likely to report academic difficulties, and are less likely to graduate from high school compared to their non-using peers (Cook & Moore, 1993; Ellickson, Tucker, & Klein, 2003;

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Yamada, Kendix, & Yamada, 1996). Existing research, however, offers only limited, conflicting information regarding whether or not this association between alcohol use and negative educational outcomes is causal. Although alcohol dependence is clearly linked to serious cognitive deficits (see National Institute on Alcohol Abuse and Alcoholism (1989) for a review) that would be expected to affect schooling, there is only mixed evidence that "social drinking" impairs cognition, and these studies focus on adults rather than teenagers (Parsons, 1986). In most studies focused on adolescents, the hypothesized causal mechanism linking alcohol use to later alcohol-related problems (such as poor educational attainment) is the progression from experimentation to more intense alcohol use (Bonomo, Bowes, Coffey, Carlin, & Patton, 2004; Ellickson, Tucker, Klein, & McGuigan, 2001; Guilamo-Ramos, Turrisi, Jaccard, Wood, & Gonzalez, 2004). However, this progression does not necessarily imply a causal relationship. Teenage alcohol use is associated with a range of individual and family risk factors, including genetic factors, behavioral and family problems, low levels of parental monitoring, parental substance use, and weak connection to school (Borawski, Ievers-Landis, Lovegreen, & Trapl, 2003; Diego, Field, & Sanders, 2003; Ellickson et al., 2001; Maney, Higham-Gardill, & Mahoney, 2002; Sale, Sambrano, Springer, & Turner, 2003; Silberg, Rutter, D'Onofrio, & Eaves, 2003). These characteristics typically are difficult to measure when using a secondary data set, and they have the potential to directly affect educational attainment. This source of endogeneity may bias estimates of the effect of alcohol use on educational attainment.

In implementing methods that address the potential endogeneity of alcohol use, a main source of concern has been the validity and quality of the variables used to identify the outcome equation (e.g. the validity and quality of identifying instruments in an instrumental variables context). In previous work, state-level alcohol policies have been used as identifying variables because they are expected to be good predictors of adolescent alcohol use, but they are not expected to directly affect educational attainment or to be correlated with the disturbance term. For example, Cook and Moore (1993) use data on high school seniors from the National Longitudinal Survey of Youth (NLSY) and an instrumental variables methodology to study the impact of frequent drinking (drinking on at least 2 days in the past week) on the number of years of education completed. Using state-level alcohol policies as instruments for frequent drinking, they find that frequent drinkers complete 2.3 fewer years of college compared to seniors who are not frequent drinkers (Cook & Moore, 1993).

However, state policy variables may not be good predictors of adolescent alcohol use. Bollen, Guilkey, and Mroz (1995), Bound, Jaeger, and Baker (1995), Nelson and Startz (1990), Staiger and Stock (1997), and others show that a low first stage *F*-statistic for the identifying instrumental variables may suggest that IV estimates are no better than biased OLS estimates. Rashad and Kaestner (2004) also show that these policy variables may be problematic when used as identifying variables in the bivariate probit model, where equations modeling alcohol use and the consequences of alcohol use are estimated jointly. In addition to these concerns, Dee (1999) suggests that state policies may be associated with unobserved state sentiments that underlie both alcohol use and educational attainment.

Because of these issues, two recent studies on alcohol use and educational attainment apply alternative empirical approaches to address the problem of endogeneity. Koch and Ribar (2001), using a sample from the NLSY 1979, estimate the effect of the age of initiation of alcohol use on the number of years of schooling completed by age 25. Using data on siblings, they estimate: (1) family fixed effects models; and (2) instrumental variables models using sibling age of alcohol use initiation as an instrument. The findings suggest that at most, the age of initiation increases years of education by 0.47 years for men and by 0.36 years for women.

Dee and Evans (2003) use pooled data from the 1977–1992 MTF surveys to estimate the impact of minimum drinking ages on drinking, and data from the Census Bureau's 1990 Public Use Sample to estimate reduced form equations modeling the effect of drinking ages on schooling. Using a two-sample IV approach (TSIV), they draw on both sets of results to generate estimates of the impact of drinking on educational attainment. The results indicate that alcohol use has no statistically significant impact on high school completion, college entrance or college persistence.

The present study builds on recent efforts to better understand the nature of the association between high school alcohol use and educational attainment. Data come from the Fourth Follow-Up to the National Education Longitudinal Study (NELS), which allows an assessment of the effects of high school alcohol use on educational attainment measured around age 26. Four educational attainment indicator variables are of interest: (1) graduation from high school on schedule; (2) receiving any type of high school diploma; (3) entering a 4 year college; and (4) college graduation. Initially, the analysis focuses on estimating the effect of a binary measure of alcohol use on each educational attainment indicator using baseline probit models. These models ignore the possibility that the unmeasured determinants of alcohol use and educational attainment may be correlated with each other. To address this issue, a bivariate probit model with alcohol use policies as identifying variables is used next to estimate the educational attainment and alcohol use equations jointly.