The Relationship between Hours Worked and Alcohol Use Disorders

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Abstract

The relationship between an individual's annual hours worked and various measures of alcohol use disorders is estimated using data from the National Longitudinal Survey of Youth. Previous research on wages, hours worked, and employment, using this data has focused on the relationship between these productivity measures and frequency and quantity of alcohol use variables. An emerging contention among some researchers is that while alcohol consumption measures may not affect labor productivity, measures such as alcohol use disorders that reflect problematic drinking do. A time series cross-sectional model is used to estimate the relationship between annual hours worked of individuals reported in two time periods and standard labor supply determining characteristics as well as measures of alcohol use disorders constructed in the spirit of criteria used in the Diagnostic and Statistical Manual of Mental Disorders, third and fourth edition. Also, the relationship between hours worked and other indicators shown in the literature to be related to alcohol dependence or abuse, such as "binge" drinking is investigated. Results are compared to those obtained using alcohol consumption measures.

Key Terms: NLSY, Alcohol Disorders, Labor Supply, Time Series Cross-Sectional Model

Background and Significance

Issues related to alcohol and/or illicit drug use has continued to be the focus of many researchers as well as national organizations on health and social policy. According to the National Institute on Alcohol Abuse and Alcoholism (NIAAA) web site, alcohol is second only to tobacco as the most abused substances in the United States. Fiscal year appropriations for NIAAA activities in 2001 were more than $340 million and estimated at $384 million for fiscal year 2002. Projections of 1992 estimates put the 1998 economic cost of alcohol abuse at $184.6 billion, almost 73 percent of which is attributed to lost productivity (Harwood, 2000).

The major studies on the effect of alcohol use or alcohol use disorders on labor supply, or labor force status carried out in recent years are discussed below. A number of the studies utilized the data from the National Longitudinal Survey of Youth (NLSY) compiled by the Center of Human Resources Research at The Ohio State University. The common model used, was the cross-sectional model. Only the studies by Bryant et al. (1996 and 2001) used longitudinal estimates in addition to cross-sectional estimates.

Using NLSY data, Kenkel and Ribar (1994) investigate the relationship between measures of "problem drinking" including a constructed measure of alcohol abuse and alcohol dependence, and annual earnings, annual hours worked, and martial status. Their ordinary least squares (OLS) estimates show that while controlling for family background, ability, and schooling, alcohol dependence reduce annual male earning by about six percent while female earnings are increased by about 12 percent. Neither alcohol dependence nor alcohol abuse was found to be significantly related to male or female annual hours worked. Kenkel and Ribar also used an instrumental variable (IV) approach to control for unobserved heterogeneity and found alcohol abuse was associated with about a 30 percent decrease in earnings of men and a decrease of about 28 percent in earnings of women. Further, alcohol dependence was associated with about a 31 percent decrease in male earnings. Consistent with OLS results, the IV approach did not find significant relationships between alcohol abuse or dependence and male hours worked. In the female hours equation, however, the IV approach identified a positive relationship between hours and alcohol abuse or dependence

A study by Mullahy and Sindelar (1996) analyzed the relationship between various measures of "problem drinking," including alcohol abuse or dependence, on labor force status: employed or unemployed. Using an OLS approach they found that males with an abuse/dependence problem were more likely to be unemployed and less likely to be employed than those not classified with an abuse/dependence problem. For females, abuse/dependence was associated with a greater probability of being unemployed. When they control for unobserved heterogeneity through an IV approach they found much larger detrimental impacts even though the parameter estimates were insignificant at conventional standards for all cases.

Bryant, et al., (1996) addressed the issue of the relationship between alcohol/drug use and employment. Both cross-sectional data and longitudinal data were used in the study to model the relationship between current and past substance use on the probability of employment. The model allowed for a direct relationship and for a relationship working through human capital variables. Separate equations were estimated for men and for women. For women, both past use and current use were associated with a decrease in the probability of being employed. For the male sample, current substance use was associated with an increase in employment probability, whereas past use was associated with a decrease. One drawback associated with this study is that the employment variable used was determined by the respondent's employment status only in the week prior to the

interview. This is also a weakness of other employment studies that use this particular variable in the NLSY data.

In 2001 Bryant, et al. (2001) addressed the issue of the relationship between alcohol/drug use and non-employment. Two variables, total weeks of non-employment and total number of spells of non-employment over a two-year period were defined as two different aspects of an individual's employment history. Rather than use the traditional definition of unemployment, which requires a person to be in the labor force to be considered unemployed, anyone who is not employed was considered "non-employed". The reason for this was the desire to capture those who may have dropped out of the labor force due to heavy alcohol or drug use. The two non-employment variables were measured at three different periods in time, 1989-90, 1993-94, and 1995-96. Thus, each individual accounted for three observations, each representing one of the three, two-year, time periods. A different model was fitted, separated by gender, for each of the two dependent variables, with individual characteristics (e.g. ethnic origin, marital status), demographic (e.g. residence in an urban area, local employment rate), human capital (e.g. age, educational attainment), and substance use measures (e.g. percentile measures of current, recent past, and distant past, monthly drinking quantities) employed as explanatory variables. The model also incorporated terms representing interactions between the substance use measures and human capital variables. Results suggest drinking in the immediate past, or a few years past, had a direct negative impact on employment stability. There was little evidence, however, that drinking had a further indirect affect through proxies for a person's human capital.

In 2004, Bryant and Samaranayake examined the relationship between "problem drinking" and a person's wages. Using the similar methodology, the same cohorts of NLSY data and the same measures of "problem drinking" as used in this study they found that being classified as alcohol dependent, was associated with almost a five percent lower wage, but if classified as alcohol dependent or abuse, the wage penalty was slightly less, about four percent, suggesting alcohol abuse has less of a detrimental impact on wages than does alcohol dependence. When the measure of problem drinking was measured by an index of the number of occasions in the past month a person had six or more drinks, they also found a negative association between this indicator of "binge drinking" and wages. The three past measures of problem drinking: diagnoses of alcohol dependence; or alcohol dependence or abuse; or an index of binge drinking were not statistically related to a person's wage.

Data

A crucial ingredient of this study is the data contained in the National Longitudinal Survey of Youth (NLSY) Labor Market Experience 1979-1994, prepared by the Center for Human Resources Research of The Ohio State University. The NLSY is a nationally representative sample, initially comprised of 12,686 young people who were 14 to 21 years of age when first surveyed in 1979. Interviews were conducted annually from 1979 through 1994. In addition to measures of alcohol use and associated problems, the survey contains an extensive set of questions addressing various social, psychological and economic factors affecting the participants and their labor market experience. Since 1979, the respondents in the survey have attended school, married, divorced, changed jobs, purchased houses, had children, etc. and the data set documents much of this activity. Through the survey in 1994, we have sixteen rounds of interviews of a large group of individuals, ranging in age (in 1994) from 29 to 37. For those not familiar with National Longitudinal panel surveys, a good overview is provided by Pergamit, et al. (2001).

Attrition accompanies a data collection effort of this size and in this case attrition was augmented by two discrete events. After the 1984 survey, 1,079 members of the military sub-sample were discontinued when the Department of Defense cut its funding. In 1991, additional funding constraints led to a second reduction of 1,643 people. At the sixteenth round in 1994, the retention rate was 89.2 percent with a total sample of 8,891 persons. In addition, the analysis requires respondents have reported hours worked in 1994 and in 1988, and a balanced data set. To run a time series, cross-sectional model with two periods requires observations for each individual, for each variable, for each period. Eliminating those individuals without hours worked or with missing values for one of the other variables used in the analysis leaves us with a sample of 2,242 females and 2,591 males.[3] Table 1provides definitions of the variables used in the hours worked equation. Summary statistics, by gender, and by our indicator for alcohol dependence, for selected variables are available from the corresponding author. All tables are located at the end of the paper.

In addition to standard labor supply determining characteristics, the analysis incorporates measures related to "problem drinking," e.g., alcohol dependence (AD), or alcohol abuse or dependence (AAD), and frequency of binge drinking (BINGE). A comparison is made with results obtained using a measure of the number of drinks in the last month (DRKLM). A list of variables available on the NLSY data set that indicate the presence of behavior patterns and symptoms that are similar to criteria listed in the fourth edition of Diagnostics and Statistical Manual of Mental Disorders (American Psychiatric Association, DSM-IV, 1994) as indicators of possible alcohol dependence and/or abuse was compiled and is available from the authors. Twenty-five of these variables are available for 1994, nineteen for the year

[3] In the model that uses a measure of current drinking, there is one less female and eight fewer males.

1988, and eighteen for 1984. Although there is some commonality between the questions asked in the three years, variations in question wording and in questions across years present a problem. Nonetheless, a dummy variable was constructed as an indicator of alcohol dependence (AD), or alcohol dependence or abuse (AAD), for each year, using DSM-IV as a guide.

A person was classified as alcohol dependent if they met three or more of seven criteria within a twelve month period preceding their NLSY interview. The DSM-IV seven criteria for alcohol dependence, AD1—AD7, are: Tolerance (AD1); Withdrawal (AD2); Larger (AD3); Cut down (AD4); Time (AD5); Giving up (AD6); and, Continued (AD7). A table that provides a short description of each of the seven criteria and links specific NLSY questions to each criterion. is available from the corresponding author. For example, a person is considered to have met the Tolerance criteria if they responded positively to either of two questions in 1994 (Found same amount of alcohol has less effect; Found you had to drink more than once did to get the same effect). Similarly, a person is considered to have met the Withdrawal criteria (AD2) if they responded positively to any of three questions in 1994 (Sick/vomited after drinking; Sweat/shake after drinking; Heard/saw things not there). A person was classified as alcohol dependence or abuse if they met the criteria for alcohol dependence or for alcohol abuse.[4]

Two additional alcohol variables are also created. A variable indexing the number of occasions a respondent had six or more drinks in the month prior to interview in 1984, 1988, and 1994. This variable, BINGE, reflects the prevalence of "binge drinking." Another variable, DRKLM, is calculated to measure the total number of drinks consumed in the month prior to the interview.

Empirical Model

The analysis is carried out on panel data for individuals who reported positive hours worked and had non-missing values for all variables used in models for each of the years 1994 and 1988. The empirical model uses the natural log of hours worked as the dependent variable in an "hours equation" for each time period, 1988 and 1994:

$$(1) \quad Y_{it} = \beta_0 + \beta_1' \mathbf{X}_{it} + \beta_2' \mathbf{H}_{it} + \beta_3 A_{it} + \beta_4 A_{i,t-1} + \varepsilon_{it}$$

where Y_{it} is the log hours worked of the i^{th} individual at time t (1988 or 1994), $\mathbf{X}_{it}$ is a vector of economic and demographic variables including wage determining characteristics. The vector $\mathbf{X}_{it}$ also includes an inverse Mills ratio calculated from a probit equation estimating the probability a person was included in our sample.[5] $\mathbf{H}_{it}$ is a vector of personal characteristics, including human capital, and A_{it} is one of four measures of an alcohol characteristic, i.e., alcohol dependence, alcohol dependence or alcohol abuse, binge drinking, or drinks last month. $A_{i,t-1}$ is a measure of the corresponding alcohol characteristic in the past, in 1984 when t=1988, and in 1988 when t= 1994. The β_j , j = 0, 3 and 4 are scalar parameters and β_1, β_2 , are vectors of parameters.

The cross-sectional time series nature of the data is accounted for by assuming the following structure for the error term ε_{it} :

$$(2) \quad \varepsilon_{it} = a_i + b_t + e_{it},$$

where a_i represents a time-invariant individual specific random effect, b_t a cross-sectional invariant time dependant random effect, and e_{it} is a random variable independent of a_i, and b_t, such that $\{e_{it}\}_t$ denotes a first order moving average time series. The time-series cross-sectional model (1) is estimated using the Da Silva's method for pooled time series, cross-sectional data using generalized least squares (SAS, 1979).

Results

Results from four models differentiated by alcohol variables are shown in Tables 2 and 3 for females and males respectively. As expected, the indicator as to whether the respondent was a full-time worker (FTW) at the time of the NLSY interview is a significant and positive determinant of a person's annual hours worked as is the person's age (AGE), and residence in the southern region of the U.S. (SRD). At a significance level of 0.10, hours worked by men and by women are negatively associated with being black (BLACK), having a health characteristic that limits the type of work the respondent can do (HLIMIT), or having a lower perception of self-esteem (ROSEN). In the male hours worked equation, the Armed Forces Qualification Test (AFQT) is positively related to hours worked as is being married (MARRIED), living in the northeast region of the U.S. (NERD), or working in an industry classified as agriculture, forestry, or mining

[4] In 1980 with DSM-III, the definition of "alcoholism" was refined by differentiating between alcohol abuse and alcohol dependence using nonoverlapping criteria. Dependence is described as including both physiological symptoms, e.g., tolerance and withdrawal, and behavioral symptoms, such as impaired control over drinking. Alcohol abuse became a residual category for diagnosing those who never met the criteria for dependence, but who drank despite alcohol-related physical, social, psychological, or occupational problems, or who drank in dangerous situations, such as in conjunction with driving.

[5] Probit equations were estimated separately by gender with the dependent variable equal to one for persons included in our final sample, or equal to zero otherwise. Results from the probit analysis are available upon request.

(AGMINE), or wholesale or retail trade (TRADE). Male hours worked are negatively associated with attending school (ATTSCL), being a Hispanic (HISPANIC), living in an area with a higher local unemployment rate (UNEMP), working in construction (CONSTR), or believing your life is determined largely by forces outside your control (ROTTER).

Hours worked by females are positively associated with having wages set by a collective bargaining agreement (BARGAIN), or having a higher level of educational attainment (EDUC). Women hours worked are negatively related to a higher non labor income (NLI), or having children of various ages (KIDS1(2)(3)(5)). At a significance level of 0.10 female hours are positively related to working in manufacturing (MANUF) and negatively related to working in agriculture, forestry, or mining (AGMINE). Finally, the inverse mills ratio (MILLSf(m)) is statistically significant at the 0.10 level in all the hours worked equations suggesting the importance of correcting for self-selection into the sample.

In contrast to our previous study on the relationship between measures of problem drinking and wages that suggested a continuum of alcohol impacts on a person's wage, running from no impact to a relatively large negative impact when a person is associated with physiological or behavioral symptoms linked to alcohol abuse or dependence, this study does not find adverse impacts using our indicators of alcohol dependence or, alcohol dependence or abuse. In the female hours equation, at a significance level of 0.10, "binge drinking" (BINGE) in the current period is negative associated with hours worked, but binge drinking in the past (BINGEp) is positively associated with hours worked. Also in the female equation, the calculated number of alcoholic drinks
in the current month (DRKLM) is negatively associated with hours worked, but the number of drinks calculated for the past (DRKLMp) has a positive association. In the male hours equation, only the calculated drinks for the past (DRKLMp) is negatively and statistically associated with lower hours worked.

One problem noted by other researchers is that the measures of alcohol disorders may be correlated with the error term. When such a correlation can not be ruled out the alcohol disorder measure is endogenous and least squares estimates of the disorder effect are typically biased. Other researchers have used an Instrumental Variable approach to reduce or eliminate the bias (Kendel & Ribar, 1994; Mullahy & Sindelar, 1996). One difficulty, however, with the IV approach is finding instruments that are strong predictors of, in this case, alcohol disorders, yet are not directly associated with hours worked. We use a variety of hypothesized determinants of an individual's propensity to be alcohol dependent or abuser to estimate the probability of falling into such a category (AD or AAD). The estimated probability was then used as an instrumental variable. Variables such as: a dummy variable indicating the respondent had in the past any relative living with them at any time that was an "alcoholic;" ages at which the respondent first used a variety of illicit drugs; the number of months from January 1979 through July 1984 the respondent reported they used marijuana or hashish; the number of times the respondent reported using marijuana or hashish in 1980; the Pearlin Mastery Scale; and the Rosenburg Self-Esteem Scale were used in a logistic regression model to estimate the above probability separately for men and women. Table 3 below presents the estimated parameters for alcohol dependence and for dependence or abuse.[6]

The point estimates from the IV approach are considerably larger and more consistently negative than the estimates obtained using the original measures of alcohol dependence or dependence or abuse. Also, the IV approach yields coefficient estimates that show a statistically negative association between predicted past alcohol dependence and annual hours worked by men, and between predicted past alcohol dependence or abuse and hours worked by women.

Conclusion and Discussion

The results presented suggest the three measures of problem drinking: alcohol dependence; alcohol dependence or abuse; binge drinking, are not important determinants of hours worked if one can maintain the assumption that these alcohol disorders are not correlated with the error term in the time series cross-sectional model. If that assumption can not be maintained the parameter estimates may be biased. An Instrumental Variable approach, that may correct for that bias shows past alcohol dependence or abuse are associated with lower hours of work. These findings, however, are preliminary and tentative prior to addressing a number of important methodological issues. There are also important limitations of the analysis that are imposed by the data.

First, research is planned to analyze existing tests for endogenity proposed by Hausman (1978), Wu (1973), and Hausman and Taylor (1982). If endogenity is suspected replacing an endogenous by its predicted value in a two-stage least squares setting has been a standard practice in addressing the issue. There are, however, two concerns about the adaptation of such an approach to this problem. As shown by Hogan and Lancaster (2004) if the probability estimates obtained are not highly correlated with the predicted endogenous variable an additional type of bias may be introduced. Also, the independent variables used in the dependence/abuse equation may themselves be correlated with hours worked via the presence of unobserved variables that influence hours worked as well as alcohol dependence or abuse. Further studies exploring other approaches to controlling endogenity are needed.

[6]Parameter estimates from the full model using instrumental variables are available upon request.

Second, some previous research suggests alcohol problems may impact labor market success, such as hours worked, indirectly through the formation of characteristics that affect hours worked. In future work, hours equations will be reestimated and interaction terms between hours determining characteristics and an alcohol measure will be used to capture this indirect impact. Another model specification issue concerns the number of periods used. Two periods were used here, 1988 and 1994, due to the decision to include lagged alcohol dependence/abuse variables in the model. Since current alcohol dependence or abuse does not appear to be significantly related to current hours worked another formulation could include as the dependant variable the hours reported in 1995, 1990, and 1985 with a measure of alcohol dependence, or alcohol dependence or abuse defined for the year preceding, i.e., 1994, 1989, and 1984. This would extend the period of the analysis to nine years with measures taken at three points in time five years apart.

A third methodological issue is a consequence of only observing persons with hours worked (and reported wages) in the hours equation. Since only those with non-zero hours can be used in the analysis, a correction based on the procedure proposed in Heckman (1979) can be made to account for possible bias due to selection into the hours worked category. The present analysis corrects for self-selection into our sample, but does not distinguish between attrition from the NLSY, and those not in the sample because they are not in the labor force.

There are also limitations imposed by the data used in the analysis. First, the NLSY was designed to survey the labor market experience of young people aged 29 to 37 in 1994, so results are confined to this specific age cohort. Second, alcohol experiences were included only for select years and not on a systematic basis. Consequently, classification as alcohol dependence or alcohol abuse was constrained to certain specific years by question availability.

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Table 1: Definition of Variables used in the Hours Worked Equations	
Mnemonic	***Definition (unless otherwise stated, the variables are measured in 1988 and in 1994)***
AFQT	Armed Forces Qualification Test score calculated from the Armed Services Vocational Aptitude Battery administered to all respondents in 1980
AGE	Respondent's age
EDUC	Education, highest grade completed
KIDS1	Number of respondent children less than a year old
KIDS2	Number of respondent children between one and two years old
KIDS3	Number of respondent children between two and five years old
KIDS5	Number of respondent children over five years old
lHOURS	Natural logarithm of annual hours worked
MILLSf(m)	Inverse Mills ratio calculated from a probit estimation of the probability a female (male) person being included in our analysis.
NLI	Respondent's non labor income
UNEMP	Unemployment rate for the respondent's local labor market
ROSEN	Measure of the respondent's self-esteem in response to 10 yes/no questions on a 10-point scale, with 1 (*high*) and 10 (*low self-esteem*) (Rosenberg, 1965)
ROTTER	Measure of the respondent's "external/internal" view of life's events (external person thinks their life is determined by forces beyond their control; an internal view reflects the ability to alter one's environment) on a 0-4 scale measuring increasing external view (Rotter, 1966)
Dummy Variables	
ATTSCL	=1 if the respondent was in school during the survey year
BARGAIN	=1 if the respondent's wages were set by collective bargaining agreements
Ethnic: BLACK	=1 if the respondent's racial/ethnic origin was Black
Ethnic: HISPANIC	=1 if the respondent's racial/ethnic origin was Hispanic (other ethnic groups omitted)
FTW	=1 if the respondent worked more than, or usually worked more than 35 hours during the survey week
HLIMIT	=1 if the respondent stated their health limited the amount or type of work they could perform
INDUSTRY	Vector of industry dummy variables: AGMINE—Agriculture, Forestry, and Mining; CONSTR—Construction; MANUF—Durable and Nondurable Manufacturing; TRADE—Retail and Wholesale Trade; OTHIND—Other industries (OTHIND is omitted)
MARRIED	=1 for a respondent who is married with spouse present
REGION	Vector of regional dummy variables: NERD—Northeast; NCRD—North Central; SRD—South; and WRD—West (NCRD and WRD are omitted)
Alcohol Variables	
AD	=1 if the respondent indicated three or more of the seven DSM-IV criteria for alcohol dependence
ADp	=1 if the respondent indicated three of more of the seven DSM-IV criteria for alcohol dependence in 1988 for the 1994 period, and in 1984 for the 1988 period
AAD	=1 if the respondent indicated three or more of the seven DSM-IV criteria for alcohol dependence or alcohol abuse (one or more of the four DSM-IV criteria for alcohol abuse, but not dependence)
AADp	=1 if the respondent indicated three or more of the seven DSM-IV criteria for alcohol dependence or alcohol abuse in 1988 for the 1994 period, and in 1984 for the 1988 period
BINGE	An index of the frequency the respondent had six or more alcoholic drinks at one occasion in the last month, scaled from 0 (*never*) to 5 (*10 or more*)
BINGEp	An index of the frequency the respondent had six or more alcoholic drinks at one occasion in the last month, in 1988 for the 1994 period and in 1984 for the 1988 period, scaled from 0 (*never*) to 5 (*10 or more*)
DRKLM	The product of the number of days the respondent reported drinking last month and the number of drinks the respondent usually has on days they drank
DRKLMp	In 1988 for the 1994 period—the product of the number of days the respondent reported drinking last month and the number of drinks they usually have on days they drank ; In 1984 for the 1988 period—the sum of the number of days the respondent reported having one drink last month, two, three, four, five, and six or more drinks, with each term weighted by the associated number of drinks: 1-6

Table 2: TSCS Procedure – Da Silva Method Estimation – Dependant Variable – Log of Female Annual Hours Worked								
	Model 1		Model 2		Model 3		Model 4	
Variable	Parameter Estimate	Pr > |t|	Parameter Estimate	Pr > |t|	Parameter Estimate	Pr > |t|	Parameter Estimate	Pr > |t|
Intercept	6.777516**	<.0001	6.777818**	<.0001	6.778058**	<.0001	6.789718**	<.0001
AFQT	0.000446	0.5523	0.000443	0.5554	0.000466	0.5355	0.000442	0.5564
AGE	0.010818**	0.0030	0.010812**	0.0028	0.010777**	0.0029	0.011035**	0.0026
ATTSCL	-0.04282	0.1664	-0.04267	0.1679	-0.04247	0.1700	-0.04373	0.1574
BARGAIN	0.113061**	<.0001	0.113204**	<.0001	0.114042**	<.0001	0.111686**	<.0001
EDUC	0.011879*	0.0170	0.011877*	0.0170	0.011499*	0.0212	0.011152*	0.0250
FTW	0.466532**	<.0001	0.466517**	<.0001	0.467562**	<.0001	0.46739**	<.0001
HLIMIT	-0.0647+	0.0902	-0.06449+	0.0912	-0.06622+	0.0828	-0.06633+	0.0822
KIDS1	-0.06961*	0.0229	-0.06949**	0.0024	-0.07333**	0.0014	-0.07485**	0.0011
KIDS2	-0.21801**	<.0001	-0.21834**	<.0001	-0.21656**	<.0001	-0.21829**	<.0001
KIDS3	-013587**	<.0001	-0.13582**	<.0001	-0.13477**	<.0001	-0.13507**	<.0001
KIDS5	-0.05273**	<.0001	-0.05276**	<.0001	-0.05254**	<.0001	-0.05256**	<.0001
MARRIED	0.022371	0.2423	0.022681	0.2363	0.020946	0.2762	0.018262	0.3424
NLI	-7.03E-7*	0.0492	-7.01E-7*	0.0498	-7.03E-7*	0.0492	-6.94E-7+	0.0523
ROSEN	-0.05408*	0.0173	-0.05425*	0.0170	-0.0537*	0.0181	-0.05452*	0.0164
ROTTER	0.005759	0.5072	0.005793	0.5046	0.005811	0.5035	0.006265	0.4703
UNEMP	-0.00131	0.6794	-0.00131	0.6786-	-0.00123	0.6980	-0.00128	0.6851
BLACK	-0.05755*	0.0495	-0.05738+	0.0501	-0.05618+	0.0572	-0.06003*	0.0414
HISPANIC	-0.02892	0.3293	-0.02878	0.3313	-0.02744	0.3576	-0.03049	0.3058
NERD	0.012327	0.6125	0.012202	0.6162	0.011979	0.6228	0.012899	0.5959
SRD	0.092717**	<.0001	0.092732**	<.0001	0.093496**	<.0001	0.092827**	<.0001
AGMINE	-0.1216+	0.0964	-0.12148+	0.0967	-0.127+	0.0826	-0.12487+	0.0875
CONSTR	-0.13968	0.1082	-0.1404	0.1064	-0.14383+	0.0984	-0.14508+	0.0951
MANUF	0.042747+	0.0830	0.042469+	0.0851	0.041289+	0.0947	0.041481+	0.0927
TRADE	-0.02696	0.2248	-0.02715	0.2215	-0.02738	0.2174	-0.02748	0.2154
MILLSF	-0.10354+	0.0818	-0.10336+	0.0820	-0.10046+	0.0919	-0.10046+	0.0738
AD	0.042475	0.2825						
ADp	-0.02838	0.6472						
AAD			0.039992	0.2853				
AADp			-0.02809	0.6503				
BINGE					-0.01494+	0.0853		
BINGEp					0.015514+	0.0501		
DRKLM							-0.00129*	0.0042
DRKLMp							0.000945+	0.0654
No. of obs	2,242		2,242		2,242		2,241	

+Statistically significant, $p \leq 0.10$; *statistically significant, $p \leq 0.05$; **statistically significant, $p \leq 0.01$

Table 3: TSCS Procedure – Da Silva Method Estimation – Dependant Variable – Log of Male Annual Hours Worked								
	Model 1		Model 2		Model 3		Model 4	
Variable	Parameter Estimate	Pr > |t|	Parameter Estimate	Pr > |t|	Parameter Estimate	Pr > |t|	Parameter Estimate	Pr > |t|
Intercept	6.989006**	<.0001	6.988344**	<.0001	6.998785**	<.0001	6.993648**	<.0001
AFQT	0.000949*	0.0272	0.00095*	0.0270	0.000927*	.0309	0.000931*	0.0309
AGE	0.016104**	<.0001	0.016112**	<.0001	0.016335**	<.0001	0.016484**	<.0001
ATTSCL	-0.15985**	<.0001	-0.15966**	<.0001	-0.16119**	<.0001	-0.15882**	<.0001
BARGAIN	0.008138	0.6318	0.008225	0.6281	0.007354	0.6649	0.007285	0.6691
EDUC	-0.00211	0.5615	-0.00209	0.5653	-0.00247	0.4992	-0.00234	0.5212
FTW	0.260491**	<.0001	0.260412**	<.0001	0.260359**	<.0001	0.260454**	<.0001
HLIMIT	-0.08501**	0.0097	-0.0849**	0.0098	-0.08481**	0.0100	-0.08485**	0.0100
KIDS1	0.007089	0.6353	0.007154	0.6322	0.006685	0.6551	0.00641	0.6689
KIDS2	0.020351	0.2860	0.020362	0.2858	0.020185	0.2899	0.020303	0.2877
KIDS3	0.00847	0.4384	0.008426	0.4408	0.007979	0.4656	0.008555	0.4355
KIDS5	-0.00789	0.2299	-0.00788	0.2300	-0.00801	0.2231	-0.00786	0.2330
MARRIED	0.106301**	<.0001	0.106582**	<.0001	0.105082**	<.0001	0.106496**	<.0001
NLI	3.173E-7	0.2902	3.171E-7	0.2907	3.184E-7	0.2887	3.019E-7	0.3158
ROSEN	-0.03221+	0.0617	-0.03227+	0.0613	-0.03129+	0.0692	-0.03192+	0.0643
ROTTER	-0.01633*	0.0107	-0.01636*	0.0106	-0.01624*	0.0112	-0.01713**	0.0076
UNEMP	-0.00536*	0.0216	-0.00536*	0.0215	-0.00519*	0.0261	-0.00505*	0.0308
BLACK	-0.0753**	<.0001	-0.07533**	<.0001	-0.07925**	<.0001	-0.07926**	<.0001
HISPANIC	-0.04662*	0.0201	-0.04665*	0.0200	-0.0479*	0.0169	-0.05022*	0.0126
NERD	0.040193*	0.0257	0.040445*	0.0248	0.040356*	0.0251	0.04008*	0.0263
SRD	0.0521**	0.0004	0.05208**	0.0004	0.051357**	0.0005	0.051112**	0.0006
AGMINE	0.101602**	0.0012	0.101376**	0.0012	0.101307**	0.0012	0.101458**	0.0012
CONSTR	-0.05154*	0.0122	-0.05155*	0.0122	-0.05006*	0.0150	-0.05031*	0.0145
MANUF	0.023914	0.1213	0.023845	0.1224	0.024392	0.1141	0.023691	0.1257
TRADE	0.05356**	0.0016	0.053496**	0.0016	0.05307**	0.0018	0.051389**	0.0025
MILLSM	-0.12725**	0.0018	-0.12742**	0.0018	-0.13267**	0.0012	-0.13534**	0.0010
AD	-0.03115	0.1212						
ADp	0.041824	0.1223						
AAD			-0.02625	0.1800				
AADp			0.040756	0.1319				
BINGE					-0.00115	0.7748		
BINGEp					-0.00535	0.1658		
DRKLM							0.00008	0.6682
DRKLMp							-0.00037+	0.0674
No. of obs.	2,591		2,591		2,591		2,583	

+Statistically significant, $p \leq 0.10$; *statistically significant, $p \leq 0.05$; **statistically significant, $p \leq 0.01$

Table 4: Alcohol Disorder Parameter Estimates from Time Series Cross Section, IV Model		
	Male Equation	Female Equation
Predict Current AD	-0.2301 (p = 0.27)	-0.2716 (p = 0.38)
Predicted Past AD	-0.3232+ (p = 0.07)	-0.5092 (p = 0.14)
	Male Equation	Female Equation
Predict Current AAD	-0.1728 (p = 0.24)	0.1400 (p = 0.63)
Predicted Past AAD	-0.1439 (p = 0.21)	-0.5699+ (p = 0.06)

+ Significant at $p \leq 0.10$