

Does Drinking Bring a Wage Bonus?

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ABSTRACT

In this paper, we use data from 1989 and 1994 to examine the effects of recent drinking, long-term drinking, long-term abstinence, daily drinking frequency, and drinking frequency within 30 days on the income of men and women. The results show that recent drinking has a positive effect on both men and women, while the effect on women is greater than that on men; long-term drinking has a significant positive effect on both men and women, while long-term abstinence has a negative effect on women, but has almost no effect on men. Furthermore, the impact of average daily drinking times on wages fluctuates with the specific number of changes and is different for men and women; finally, abusive drinking is negatively correlated with income and has more significant side effects on men. After three parts of the study, we conclude that moderate drinking with 2 drinks for the male and 1 drink for the female is best for wages. Through qualitative and quantitative analysis, this article examines the effect of both drinking behaviour and the drinking amount on income, helping people make better decisions and providing references for the formulation of related policies.

Keywords: Wages, Current drinking, Long-term drinking, Drinking frequency, Moderate drinking

1. INTRODUCTION

Drinking and alcohol abuse is widespread among the public. National U.S. surveys illustrated that alcohol abuse was more common for elderly adolescents. Meanwhile, Monitoring the Future 2020 reported that 90% of people had ever drunk by 23 years old and 31% of people aged 21-26 had over 5 drinks in a row in one year[1]. However, the trend may be vicious. For instance, alcohol abuse could be harmful to inner organs like the liver. Additionally, productivity and wealth could be prone to it. Even quarrels among family members could increase due to the violence and other bad behaviour after drinking,

Due to the popularization of alcohol and its harmful impact on health and social relationships, many researchers paid more attention to the issues about drinking. Many documents show that there is a significant positive relationship between drinking and personal income. This phenomenon is called "drinker's bonus". The impact of drinking on income and productivity is closely related to personal life and significantly connected to the formulation of national

policies. If drinking directly affects income, the persuasive power of related alcohol-free publicity and campaigns will be greatly reduced. The purpose of this research is to examine the exact relationship between drinking and income through empirical analysis, thus reasonably explaining these results and exploring whether it is drinking itself that causes a wage increase.

Although results in the regression models show an apparently positive trend, current studies still lack persuasiveness in explaining the relationship between drinking and income. For example, a 2005 study by Philip J. Cook Bethany Peters showed that an increase in income led to increased alcohol consumption, but whether alcohol consumption may bring a wage increase is still unknown [2]. In addition, other studies have also explored the possibility of other factors indirectly affecting income by affecting drinking. So far, the instrumental variables that can explain this situation are still insufficient. As a result, it is still difficult to determine how alcohol consumption affects income.

Therefore, our research has two contributions. For one, we studied the non-linear relationship between drinking and wage with drink frequency variables. For

another, we found some new instrumental variables to improve models.

The paper proceeds as follows. In section 2, we reviewed the past studies about alcohol usage and wage. Next, in section 3 and section 4, we introduced our models and data, respectively. Then from the views of the latest 30 days and lifetime, we tested whether drinkers tend to earn more than non-drinkers in section 5. Next, we explored the impact of the number of drinks on wage, followed by the study of over-drinking and income. Finally, we listed our conclusions and limitations in section 6.

2. LITERATURE REVIEW

Many researchers studied the impact of drinks on wages with data from different countries. Berger and Leigh proposed the first paper about this topic in 1988 [3]. Using the American data in 1972 and considering the endogenous of models, they found that people drinking could earn more money than those not drinking, and such positive effects tended to not disappear as over-drinking.

Some following researchers supported the positive influence of drinking on wages. With instrumental variables, Kenkel and Ribar [4] found that moderate drinking could increase youngsters' income by 12%, and over-drinking could increase by 30%. Analysing the data of the Netherlands in December 2001, Ours' result differed by gender [5]. He found that the gap between drinkers and non-drinkers among the male was prominent at 10%, whereas that among the female was not remarkable. Besides, Auld [6] utilized Maximum Likelihood Estimation and the data of Canada in 1991 and found that the average growth rate of wage of moderate drinkers was 10%, and that of heavy drinkers was 12%.

Nevertheless, other researchers argued with the non-linear relationship. For example, Heien [7], applying Non-Linear Three Stage Least Square (NL3SLS), found that moderate drinkers could earn more than non-drinkers and over-drinkers. Before that, French and Zarkin [8] found that the peak was around 1.5 or 2.5 drinks per day. But the peak was found at around 4 drinks per day, according to the data of Australia in 1995 [9].

However, a few researchers deemed that the impact was not positive but negative. For example, Mullahy and Sindelar [10] proved that drinking could limit the labour in the market and then could reduce wages.

In a word, the question about how drinking affects wages has not been solved as the various results. Besides, it is also noticeable that most of the researches used instrumental variables, such as religion and price of wine, which was summarized by Cook and Peters [2].

3. METHODS AND HYPOTHESES

To research the effect of drinking behaviour on income, the first thing we need to know is whether workers' wages tend to change if they currently drink and whether if they drink or do not drink in an observed long term. Following that, we doubt how much drinks could affect their wage most significantly. Considering the health problems caused by heavy drinking, we then need to test whether the trend will change if they are over-drinkers. Since drinking behaviour is quite different between the male and the female, our studies differ by gender.

We use the logarithm of wages as the dependent variable and relevant drinking variables as explanatory variables. But considering omitted variables bias, we try to control variables related to wages and drinking behaviour and add them into our regression models. According to Peters [11], to test the robustness of the relationship, we vary the degrees of control variables, dividing them as background characteristic variables and all control variables. The former ones are used to reduce simultaneous equations bias, and the latter ones are selected due to being influenced by drinking behaviours. All variables are listed in Table 1.

For the first study about non-drinking, we hypothesise that drinking could increase workers' salaries because alcohol could improve their life satisfaction and then enhance their productivity. For the influence of current drinking status, we built Model 1 to 3 to test that:

$$lwage = \beta_0 + \beta_1 drinkcurr + e \quad (1)$$

$$lwage = \beta_0 + \beta_1 drinkcurr + A_i' \gamma + e \quad (2)$$

$$lwage = \beta_0 + \beta_1 drinkcurr + A_i' \gamma + B_i' \sigma + e \quad (3)$$

where *lwage* is log wages, A_i is the vector of background characteristic variables, and B_i is the vector of all control variables. Finally, we use *drinkcurr*, a dummy variable, as an explanatory variable, which means whether the employee drank last month.

We suspect that there is an endogenous problem with the variable *drinkcurr*. On the one hand, although drinking may lead to an increase in income, it is also possible that with the increase in income, people's drinking habits may change. On the other hand, the work pressure brought by high income may cause people to start drinking [11]. Due to the endogenous problem of the variable *drinkcurr*, we use the drinking status of the respondent in 1989 (*drinkcurr89*) as an instrumental variable to perform Two Stage Least Squares (2SLS) to improve Model 1 to Model 3. Since the drinking status of the respondent in 1989 is not

affected by the current conditions, we consider it as a reasonable instrumental variable.

Besides, in the second study, to explore the effects of long-term drinking and long-term non-drinking, we use Model 4 to Model 9, similar to the first three models:

$$lwage = \beta_0 + \beta_1 drinklong + e \tag{4}$$

$$lwage = \beta_0 + \beta_1 drinklong + A_i' \gamma + e \tag{5}$$

$$lwage = \beta_0 + \beta_1 drinklong + A_i' \gamma + B_i' \sigma + e \tag{6}$$

$$lwage = \beta_0 + \beta_1 drinkab + e \tag{7}$$

$$lwage = \beta_0 + \beta_1 drinkab + A_i' \gamma + e \tag{8}$$

$$lwage = \beta_0 + \beta_1 drinkab + A_i' \gamma + B_i' \sigma + e \tag{9}$$

where *lwage* is log wages, A_i is the vector of background characteristic variables, and B_i is the vector of all control variables. We use *drinklong* and *drinkab*, two dummy variables, as explanatory variables, which mean whether the person is drunk and did not drink in the observed period.

These two variables further expand study one and explain the impact of drinking on income from a more detailed perspective. However, since the essence of study two is the same as that of study one, and also because of the space limitation, we no longer look for instrumental variables for it.

For the third study, we try to test the hypothesis about the non-linear relationship between the volume of drinks and wages with a peak. The hypothesis is based on two considerations. For one, moderate drinking could prevent people from cardiopulmonary diseases, thus helping them become a productive members of society [12]. For another, moderate drinking could avoid the negative impact caused by abusive drinkings, such as drunken violence and brain injury. Therefore, we develop high power explanatory variables for the overall regression, divide the drinking level by how many the average number of drinks consumed per day and then run multi-stage regressions. Again, model 10 to Model 18 are used:

$$lwage = \beta_0 + \beta_1 perday + e \tag{10}$$

$$lwage = \beta_0 + \beta_1 perday + A_i' \gamma + e \tag{11}$$

$$lwage = \beta_0 + \beta_1 perday + A_i' \gamma + B_i' \sigma + e \tag{12}$$

$$lwage = \beta_0 + \beta_1 perday + \beta_2 perday^2 + \beta_3 perday^3 + e \tag{13}$$

$$lwage = \beta_0 + \beta_1 perday + \beta_2 perday^2 + \beta_3 perday^3 + A_i' \gamma + e \tag{14}$$

$$lwage = \beta_0 + \beta_1 perday + \beta_2 perday^2 + \beta_3 perday^3 + A_i' \gamma + B_i' \sigma + e \tag{15}$$

$$lwage = \beta_0 + \beta_1 perday + \beta_2 perday^2 + \beta_3 perday^3 + \beta_4 perday^4 + e \tag{16}$$

$$lwage = \beta_0 + \beta_1 perday + \beta_2 perday^2 + \beta_3 perday^3 + \beta_4 perday^4 + A_i' \gamma + e \tag{17}$$

$$lwage = \beta_0 + \beta_1 perday + \beta_2 perday^2 + \beta_3 perday^3 + \beta_4 perday^4 + A_i' \gamma + B_i' \sigma + e \tag{18}$$

where *lwage* is log wages, A_i is the vector of background characteristic variables, and B_i is the vector of all control variables. We use *perday* as an explanatory variable, representing the average number of drinks per day when the person drinks.

We think moderate drinking is less likely affected by their income because several drinks are affordable for most people. Thus, the endogeneity issue is not serious in the study of moderate drinkers. However, abusive drinking spending tends to be prohibitive for the ordinary. Therefore, wages could influence the possibility to be an abusive drinker. Therefore, we consider this endogeneity issue in the third study.

Although the third study could test the impact of abusive drinking, few individuals are likely averagely drinking heavily. Thus, we change into an alternative explanatory variable to explore the effect of abusive drinking behaviour in the fourth study. The Substance Abuse and Mental Health Services Administration, SAMHSA defined alcoholism as 5 or more drinks for normal adult males or 4 or more alcoholic drinks for normal adult females in the past 30 days [1]. Considering the different kinds of containers and alcohol that are missing data in the dataset, we defined alcoholism as 6 or more drinks each time for both adult males and females. Existing literature mentions that for men who binge 6 or more times in a month, the effect is significantly negative in the short term [3]. Furthermore, alcohol is the necessary root cause of more than 30 diseases, and it is also a factor leading to more diseases [13]. Therefore, we hypothesise that alcohol abuse could decrease their income. Model 19 to Model 21 tend to be used in this process:

$$lwage = \beta_0 + \beta_1 drinkfre + e \tag{19}$$

$$lwage = \beta_0 + \beta_1 drinkfre + A_i' \gamma + e \tag{20}$$

$$lwage = \beta_0 + \beta_1 drinkfre + A_i' \gamma + B_i' \sigma + e \quad (21)$$

where *lwage* is log wages, A_i is the vector of background characteristic variables, and B_i is the vector of all control variables. We use *drinkfre* as an explanatory variable, which represents the number of times the person has had 6 or more drinks in the past month in one setting.

As the same, we suspect that there also is an endogenous problem with the variable *drinkfre*. Non-alcoholics are more educated and more likely to work in higher-paying jobs, both male and female. Women who drink alcohol are more likely than men who drink alcohol to never marry, have fewer children, and have more mental illness [2]. The same way to study on this is application of instrumental variables, and we chose 89 years of alcoholism data as instrumental variables. Previous drinking habits may affect subsequent drinking behaviour.

4. DATA AND DESCRIPTIVE STATISTICS

The data comes from the National Longitudinal Survey of Youth (NLSY) and includes information on

labor market outcomes, alcohol consumption, and assorted demographics for individuals in each of 2 years (1989 and 1994).

After getting the original data, we first removed samples with the missing and abnormal value of key variables. Since we planned to delve into the impact on employees' wage and used some variables in 1989 as IV, we only kept the employees with wage and both 1989 and 1994 data as samples. Then we only used the data in 1994. Finally, we did 1% and 99% tailing treatment to tackle with extreme data.

Table 1 shows descriptive statistics. There are 1718 male responders and 1295 female responders for the survey in 1994. The male tends to earn more money than the female as the higher mean of wages. As a result, men are inclined to drink: 81.3% of men drink currently and 72.1% of them drink in the long term; however, 68.5% of women drink recently, and 52.1% of them drink in a long-observed period. Additionally, men averagely have 2.4 drinks per day, whereas women only with 1.5 drinks.

Table1. Descriptive Statistics

Variable	Definition	Male				Female			
		Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Dependent variable									
lwage	Total wage and salary in the past calendar year, in dollars (natural log)	10.22	0.66	7.09	11.5	9.84	0.79	7.09	11.4
Independent variables									
drinkcurr	Whether the individual drunk in the last month	0.81	0.39	0	1	0.685	0.46	0	1
drinklong	Whether the individual drunk both in 1989 and in 1994	0.72	0.45	0	1	0.52	0.5	0	1
drinkab	Whether the individual did not drink both in 1989 and in 1994	0.02	0.12	0	1	0.04	0.19	0	1
drinkfre	The number of times in the past month the individual has had 6 or more drinks in one sitting	1.19	1.734	0	6	0.41	0.96	0	6
perday	The average number of drinks per day on a day when the individual drinks	2.412	2.333	0	24	1.47	1.54	0	12
Background characteristic									
wdad14	Whether the individual lived with their father when they were 14	0.774	0.418	0	1	0.76	0.43	0	1
wmom14	Whether the individual lived with their mother when they were 14	0.948	0.223	0	1	0.95	0.21	0	1
momhgc	The number of years of education the individual's mother has	10.63	4.02	0	20	10.95	3.50	0	20

dadhgc	The number of years of education the individual's father has		10.20	5.15	0	20	10.31	4.99	0	20
numsib	The number of siblings the individual has		3.50	2.49	0	17	3.51	2.36	0	16
rgnow	Current religion	No Religion	0.11	0.31	0	1	0.09	0.27	0	1
		Protestant	0.05	0.22	0	1	0.05	0.21	0	1
		Baptist	0.23	0.42	0	1	0.25	0.43	0	1
		Episcopalian	0.02	0.14	0	1	0.015	0.12	0	1
		Lutheran	0.07	0.26	0	1	0.061	0.24	0	1
		Methodist	0.066	0.25	0	1	0.072	0.25	0	1
		Presbyterian	0.021	0.14	0	1	0.025	0.15	0	1
		Roman Catholic	0.334	0.47	0	1	0.341	0.47	0	1
		Jewish	0.011	0.11	0	1	0.008	0.08	0	1
		Other Religion	0.094	0.29	0	1	0.099	0.29	0	1
racenow	Current race	Hispanic	0.17	0.38	0	1	0.168	0.37	0	1
		Black	0.208	0.41	0	1	0.232	0.42	0	1
		Other Race	0.622	0.48	0	1	0.601	0.49	0	1
momwork	Whether the individual's mother worked when they were 14		0.519	0.50	0	1	0.596	0.49	0	1
dadwork	Whether the individual's father worked when they were 14		0.811	0.39	0	1	0.795	0.40	0	1
age	Age of the individual in years		32.97	2.235	29	37	32.876	2.19	29	37
urate	The unemployment rate for the local labor market of the individual		7.10	2.723	1.5	16.5	7.099	2.68	1.5	16.5
health	Whether the individual has a health problem that limits the amount or kind of work that can be done		0.025	0.156	0	1	0.046	0.21	0	1
hrswrk	Total number of hours worked in the past calendar year		2310	642.1	0	4732	1988	610	0	5115
liq	The percentile in which the individual scored on an intelligence test given in 1979 (natural log)		3.529	1.037	0	4.60	3.648	0.79	0	4.595
Instrumental variables										
drinkcurr89	Whether the individual drunk in the last month in the 1989 survey		0.825	0.38	0	1	0.671	0.47	0	1
drinkfre89	The number of times in the past month the individual has had 6 or more drinks in one sitting in the 1989 survey		1.269	1.696	0	6	0.447	0.99	0	6

5 RESULTS AND DISCUSSION

5.1. Study 1: Effect of current drinking on log wages (Model 1-3)

Table 2. The effect of current drinking on log wages (coefficients and standard errors)

	No	Background	All
	controls	characteristics	controls
Males			
Log wage	0.157 ***	0.101***	0.044
(N=1718)	(0.041)	(0.039)	(0.032)

Females			
Log wage	0.183***	0.138***	0.054 *
(N=1261)	(0.040)	(0.041)	(0.032)

Note: Each column represents a different regression. Background characteristics include the following variables: whether R lived with mom when R was 14, whether R lived with dad when R was 14, whether mother worked when R was 14, whether father worked when R was 14, mother's education, father's education, the number of siblings, current religion and current race. All controls include background characteristics plus the following variables: the unemployment rate, whether R has serious health problems, worked hours in the past year and log IQ.

*Significant at the 0.10 level. **Significant at the 0.05 level. ***Significant at the 0.01 level.

Table 2 shows the effect of current drinking on log wages. For males, the change of current drinking (from 0 to 1) leads to an increase of 15.7% (p<0.01) in wage with no control, but turns to insignificant after adding more control variables. For females, the change of current drinking (from 0 to 1) leads to an increase of 18.3% (p<0.01) in wage with no control but turns to 5.4% after adding more control variables (p<0.01). Thus, the effect of current drinking on wages is more severe on females than males, which is consistent with Mark Berger and Paul Leigh [3]. This shows that females benefit more from drinking than males, and a female who drinks moderately may have a larger chance of income development.

We speculate that the reason for this phenomenon may be related to the purpose and occasion of drinking. From the data in this survey, in the past 30 days, women's alcoholism is generally less than that of men. 106 men have experienced alcoholism more than six times in the past month, compared with only six women. Since women experience less alcohol abuse, we have reason to speculate that compared with men, the purpose of women's drinking may be more related to work, and drinking is more like social behaviour. In most cases, male drinking has no purpose, which is a kind of relaxation behaviour.

Table 3. The effect of current drinking on log wages with an instrumental variable (coefficients and standard errors)

IV: drinkcurr89	No	Background	All
Specification	controls	characteristics	controls
Males			
Log wage	0.531***	0.353 **	0.102
(N=1718)	(0.125)	(0.123)	(0.101)

Females			
Log wage	0.641***	0.524 ***	0.232*
(N=1261)	(0.149)	(0.163)	(0.125)

Note: Each column represents a different regression. Background characteristics include the following variables: whether R lived with mom when R was 14, whether R lived with dad when R was 14, whether mother worked when R was 14, whether father worked when R was 14, mother's education, father's education, the number of siblings, current religion and current race. All controls include background characteristics plus the following variables: the unemployment rate, whether R has serious health problems, worked hours in the past year and log IQ.

*Significant at the 0.10 level. **Significant at the 0.05 level. ***Significant at the 0.01 level.

It can be seen from the regression results in Table 3 that after using the instrumental variables, the coefficient is increased by 3-4 times, and the significance is basically unchanged compared with the original model, indicating that the influence of drinking in the original model is seriously underestimated. After adding all the control variables, the effect of drinking on men's income is no longer significant, while for women, the coefficient increases from 0.054 to 0.232 while the significance remains unchanged. Thus, drinking has increased women's income by an average of 23.2%.

5.2. Study 2: Effect of long-time drinking and long-time abstaining on log wages (Model 4-9)

Table 4. The effect of long-time drinking and long-time abstaining on log wages (coefficients and standard errors)

	No	Background	All
Specification	controls	characteristics	controls
Males(N=1718)			
Drinklong	0.171***	0.120***	0.053*
	(0.036)	(0.035)	(0.029)
Drinkab	-0.100	0.009	0.100
	(0.130)	(0.125)	(0.103)
Females(N=1235)			
Drinklong	0.193***	0.062*	0.139**
	(0.042)	(0.032)	(0.056)
Drinkab	-0.299***	-0.160*	-0.211*

	(0.115)	(0.086)	(0.117)
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Note: Each column represents a different regression. Background characteristics include the following variables: whether R lived with mom when R was 14, whether R lived with dad when R was 14, whether mother worked when R was 14, whether father worked when R was 14, mother's education, father's education, the number of siblings, current religion and current race. All controls include background characteristics plus the following variables: the unemployment rate, whether R has serious health problems, worked hours in the past year and log IQ.

*Significant at the 0.10 level. **Significant at the 0.05 level. ***Significant at the 0.01 level.

Table 4 shows the effect of long-time drinking and long-time abstaining on log wages. For males, the change of long-time drinking (from 0 to 1) leads to an increase of 17% ($p < 0.01$) in wage with no control, but turns to 5% after adding more control variables ($p < 0.1$), while long-time abstaining almost have no significant effect to male from the whole model. For females, change of long-time drinking (from 0 to 1) leads to an increase of 19.3% ($p < 0.01$) in wage with no control but turns to 13.9% after adding more control variables ($p < 0.05$); change of a Long time abstaining (from 0 to 1) leads to a decrease of 29.9% ($p < 0.01$) in wage with no control, but turns to 21.1% after adding more control variables ($p < 0.1$). Thus, long-time drinking has a more positive effect on females than males, while long-time abstaining has more negative effects on females than males. This confirms the regression results in 5.1. Thus, the positive impact of drinking on women is greater than that of men, and the negative impact of abstinence is also more serious, which indicates that drinking has a greater opportunity cost and may bring females more chances on career development.

5.3. Study 3: Effect of drinking level on log wage (Model 10-18)

Table 5. The effect of drinking level on log wage (the overall regression) (coefficients and standard errors)

	No	Background	All
Specification	controls	characteristics	controls
Male (N=1718)			
perday	0.1787*** (0.0334)	0.1305*** (0.0320)	0.0695*** (0.0265)
perday2	-0.0547*** (0.0097)	-0.0409*** (0.0093)	-0.0212*** (0.0077)
perday3	0.0041*** (0.0009)	0.0031*** (0.0009)	0.0015** (0.0007)

perday4	-0.00009*** (0.00002)	-0.00007*** (0.00002)	-0.00003* (0.00002)
Female (N=1295)			
perday	0.1406*** (0.0481)	0.0963*** (0.0484)	0.0535* (0.0337)
perday2	-0.0533*** (0.0158)	-0.0426*** (0.0158)	-0.0260*** (0.0111)
perday3	0.0035*** (0.0012)	0.0030*** (0.0012)	0.0018*** (0.0008)

Note: Each column represents a different regression. Background characteristics include the following variables: whether R lived with mom when R was 14, whether R lived with dad when R was 14, whether mother worked when R was 14, whether father worked when R was 14, mother's education, father's education, the number of siblings, current religion and current race. All controls include background characteristics plus the following variables: the unemployment rate, whether R has serious health problems, worked hours in the past year and log IQ.

*Significant at the 0.10 level. **Significant at the 0.05 level. ***Significant at the 0.01 level.

Results in Table 5 prove our hypothesis about the non-linear relationship between drinking level and wages, with the fourth power pattern for the male and the third power pattern for the female. Since the coefficients of *perday2* and *perday4* are all significantly negative, at least one peak likely exists for each pattern, meaning that optimal drinking level, representing moderate drinking, possibly exists and could improve income most. As further tests about moderate drinking, we divide the drinking level into three levels and run multi-stage linear regressions with Model 10 to Model 12 for each gender separately.

Table 6. The effect of drinking level on log wage at three levels (the multi-stage linear regression)

Explanatory variable: perday	Male	Female
Specification	(N=1718)	(N=1295)
	$0 \leq \text{perday} \leq 2$	$0 \leq \text{perday} \leq 1$
No controls	0.1073***	0.1519***
Background characteristics	0.0843***	0.1152**
All controls	0.0449**	0.0357
	$2 \leq \text{perday} \leq 6$	$1 \leq \text{perday} \leq 6$
No controls	-0.0699***	-0.0798***

Background characteristics	-0.0490***	-0.0763**
All controls	-0.0274**	-0.0595***
	perday≥6	perday≥6
No controls	-0.0303*	0.0225
Background characteristics	-0.0318*	-0.0852
All controls	-0.0292*	-0.0030

Note: Each column represents a different regression. Background characteristics include the following variables: whether R lived with mom when R was 14, whether R lived with dad when R was 14, whether mother worked when R was 14, whether father worked when R was 14, mother's education, father's education, the number of siblings, current religion and current race. All controls include background characteristics plus the following variables: the unemployment rate, whether R has serious health problems, worked hours in the past year and log IQ.

*Significant at the 0.10 level. **Significant at the 0.05 level. ***Significant at the 0.01 level.

Table 6 illustrates that moderate drinking (2 drinks for a male and 1 drink for a female) could increase wages, compared to non-drinking, due to the positive coefficients in the first level regression and the negative ones in the second level. However, the third level results are not significant and not meaningful because of few individuals (less than 30 people). Thus, the impact of abstainers cannot be proved with such models. We test this hypothesis with another explanatory variable in the next study.

5.4. Study 4: Effect of alcoholism frequency on log wage (Model 19-21)

Table 7. The effect of alcoholism frequency on log wage (coefficients and standard errors)

	No	Background	All
	controls	characteristics	controls
Males			
Log wage	-0.045***	-0.037***	-0.022***
(N=1718)	(0.010)	(0.009)	(0.007)
Females			
Log wage	-0.047**	-0.035	-0.027*
(N=1295)	(0.023)	(0.023)	(0.016)

Note: Each column represents a different regression. Background characteristics include the following variables: whether R lived with mom when R was 14, whether R lived with dad when R was 14, whether mother worked when R was 14, whether father worked

when R was 14, mother's education, father's education, the number of siblings, current religion and current race. All controls include background characteristics plus the following variables: the unemployment rate, whether R has serious health problems, worked hours in the past year and log IQ.

*Significant at the 0.10 level. **Significant at the 0.05 level. ***Significant at the 0.01 level.

The using variable *drinkfre* represents the times of alcoholism in the past 30 days. Table 7 of the OLS analysis shows the coefficients, standard errors, and the level of significance. The effect of drink frequency on log wage is both very significant for males and females. By adding the control variables, drinking frequency still affects log wage for males while less significant for females. For males, per unit increasing of *drinkfre* leads to a decrease of 2.16% in wage. For females, per unit increasing of *drinkfre* leads to a decrease of 2.74% in wage. Thus, it shows, no matter with gender, the alcoholism frequency is negatively correlated with log wages, which is consistent with our hypothesis.

Table 8. The effect of alcoholism frequency on log wage with an instrumental variable (coefficients and standard errors)

IV:	No	Background	All
drinkfre89			
Specification	controls	characteristics	controls
Males			
Log wage	-0.084***	-0.074***	-0.045***
(N=1718)	(0.019)	(0.019)	(0.016)
Females			
Log wage	0.016	0.013	-0.002
(N=1295)	(0.056)	(0.056)	(0.040)

Note: Each column represents a different regression. Background characteristics include the following variables: whether R lived with mom when R was 14, whether R lived with dad when R was 14, whether mother worked when R was 14, whether father worked when R was 14, mother's education, father's education, the number of siblings, current religion and current race. All controls include background characteristics plus the following variables: the unemployment rate, whether R has serious health problems, worked hours in the past year and log IQ.

*Significant at the 0.10 level. **Significant at the 0.05 level. ***Significant at the 0.01 level

By applying the instrumental variable, *drinkfre89*, in 2SLS regression, we found something interesting. For males, the p-value that is so small shows the effect is still significant. Then test the endogeneity, p-values are less than 0.1, so we can reject the null hypothesis that

variables are exogenous. The first-stage F-statistic is larger than 10. And the coefficient of *drinkfre* is from -0.022 to -0.045, which decreases around 2 times. Thus, the *drinkfre89* as IV is good and corrects the original model. For females, the p-value larger than 0.1 shows the effect of *drinkfre* on log wages is not significant. Then test the endogeneity. P-values are close to 0.5, which is too large, so we cannot reject the null hypothesis that variables are exogenous. Therefore, the model for females does not have an endogeneity problem.

6. CONCLUSION

6.1. Conclusion of key findings

Results from the models show that the effect of current drinking on wage is both positive. At the same time, it is more significant on males compared to females, when it comes to a specific behaviour, long time drinking has a more positive effect on females than males. In contrast, long time abstaining has a more negative effect on females, for males, the impact is relatively insignificant.

This article uses the drinking data of 1989 as an instrumental variable. After demonstrating its rationality, we found that the regression coefficient of 2sls has increased significantly, indicating that the impact of drinking on income may be underestimated.

In general, among the four models, Study1 and Study2 are qualitative analyses that illustrate the impact of drinking or not on income. At the same time, Study3 and Study4 are quantitative analyses that explore the impact of alcohol consumption on income. It can be seen from Study1 that the wages of drinkers are higher than those of non-drinkers, and Study2 further proves the conclusion that long-term drinking has a positive effect on the increase of income. At the same time, the negative impact of abstinence on income has a negative effect on women. It is more significant. In Study3 and 4, the influence of the amount of alcohol consumption on the income of men and women is different. However, in general, the positive influence of moderate drinking on income is greater than that of excessive drinking and non-drinking. Although drinking is generally conducive to increasing wages, the more extreme alcoholism has a certain negative impact. According to this result, we conclude that suitable drinking is better for both male and female's income, rather than non-drinking or over-drinking. The best choice of the male is 2 drinks per day, and that of the female is 1 drink per day.

6.2. Limitations and Future studies

We plan to add other variables as instrumental variables in future studies for further research. The current preliminary ideas are Average beer price,

Diabetes, Stomach ulcer, Asthma, Alcohol tax, Whether the father or mother smokes. Those variables are related to drinking decisions but have nothing to do with wages or have little effect on them. By substituting these data into the model for regression, we may be able to get more accurate results.

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