ALCOHOL ABUSE, INCOME AND THE LABOUR MARKET EXPERIENCE

FAYE MOFFATT*

Abstract

In 2002, an estimated $39.8 billion was attributed to the economic costs of substance abuse (Rehm et al., 2006). Almost two-thirds of these costs are estimated to be due to losses in labour productivity. However, much debate exists as to the extent and exact mechanisms that lead to problem drinking. As such, there is little consensus as to the effects it has on income, wages, and labour market supply. Many studies have focused on the impact of income on problem drinking, rather than its effects on employment and labour supply. This paper will investigate the impact of problem drinking on income and employment in Saskatchewan by using Canadian Community Health Survey data from 2005. A bivariate probit model was used to control for possible correlation surrounding the factors that affect employment, income and problem drinking. I find an insignificantly positive impact of problem drinking on employment and income for men and an insignificantly negative impact of problem drinking on employment and income for women. These findings are consistent, to a degree, with other research.

I. INTRODUCTION

It was estimated, in 2002, that the economic costs to society of substance abuse have reached $39.8 billion in Canada (Rehm et al., 2006). Of these economic costs, approximately $24.3 billion is due to labour productivity losses, including short-term and long-term disability and premature mortality (Rehm et al., 2006). It was estimated, in 2002, that over 600,000 Canadians had alcohol dependency issues (CCSA, 2004). Males were almost twice as likely to suffer from alcohol dependence as women. With these statistics on the rise, alcoholism has become a silent epidemic across Canada. Of these $24.3 billion in economic losses, $14.6 billion was attributed to alcohol abuse while $7.1 billion was due to losses in productivity over the period (Rehm et al., 2006).

* Faye Moffatt has a Master's degree in Economics from the University of Saskatchewan, Canada.

It is a commonly held view that alcoholism has damaging effects on wages, income and as a consequence, labour market supply and productivity (Rice et al., 1990). However, it is clear that there exists much debate among researchers as to the extent of how alcohol abuse affects productivity as well as debate about the exact mechanisms that lead to alcohol abuse and hence, decreased labour productivity. Mullahy and Sindelar (1993) state that part of the controversy can be resolved by distinguishing between alcohol consumption and alcoholism but admits that this can only solve part of the debate. However, different health organizations have differing criteria on what is considered alcohol abuse or dependency, which complicates this matter even further.

The purpose and objective of this paper is to determine the impact of alcohol abuse on income, employment and labour market outcomes in Saskatchewan. My research will deal with local alcoholism costs with respect to income and employment issues faced by the people of Saskatchewan. Other than national government agencies conducting health surveys and compiling substance abuse information and health characteristics like the Canadian Community Health Survey, little health economic research and literature has been written locally on this issue. In addition, much of the research that has been written has focused solely on the effects of substance abuse with respect to the wages and income of workers, rather than the effects on employment and labour market supply. This paper will supplement the local literature available on alcohol abuse, income and employment issues. The data I use comes from the most current Canadian Community Health Survey (2005).

I estimate the impact of alcohol abuse, or what is considered problem drinking, for men and women on income and employment, using the bivariate probit model which controls for unobserved heterogeneity between the aforementioned three variables. I use the bivariate probit model to regress income and employment on a range of independent variables discussed in Table 1. I found that problem drinking had a statistically insignificant negative impact on employment and income for females, while it had a statistically insignificant and positive impact on employment and income for males. These statistically insignificant results could be attributed to a range of different issues, which I discuss in detail at a later stage.

II. PREVIOUS LITERATURE

There is a wealth of literature written on the topic of alcohol dependence and its related costs. Many of the leading papers written on this topic tend to use American data, statistics and surveys as empirical evidence. A great deal of this literature focuses on income and earnings with regards to substance abuse rather than the relationship between income, employment and substance abuse. Most of the research and study focussing on this subject, has been plagued with methodological issues; heterogeneity among individuals, differing labour market success measures, dissimilar populations and differences in measurements and criteria for alcohol dependence.

There has been little economic research done and few literary works completed on the relationship between alcoholism and employment. However, there is a great deal of literature available on the association between alcoholism and income/wages. Many of the studies on alcoholism and wages have produced mixed conclusions and therefore, much debate among researchers. Berger and Leigh (1988) completed one of the earlier studies that looked at alcohol abuse and wages. They defined employed drinkers as those who worked for pay $\geq$ 20 hours per week and drank, at least, one to two times a week. Using the Quality of Employment Survey, they found that people who drank, in fact earned higher wages than those who did not. In another early study, Benham and Benham (1982) concluded that there appeared to be no significant relationship between problem drinking and employment. Kenkel and Ribar (1994) used the National Longitudinal Survey of Youth and found that male problem drinkers were more likely to have reduced earnings than their non-problem drinker counterparts, while female problem drinkers were less likely to have reduced earnings than their non-problem drinking counterparts.

Feng et al. (2001) conclude that problem drinking was not negatively related to labour supply. They supposed that their results could be influenced by several factors including the fact that problem drinking in today's tight labour market could be of less importance than education and experience. As well, they considered that problem drinking could happen outside of the workplace and thus have no effect on employee productivity and performance while at work. However, even if problem drinking does not occur within the hours of work for an individual, the effects of problem drinking and perhaps the raison d'être of an individual's problem drinking behaviour would appear on the job in some form, including hangovers, tiredness, and depression among others. Feng et al., (2001) in their empirical research, used the bivariate probit model, in addition to the univariate model, to control for heterogeneity and possible correlation in

the unobservable factors affecting both problem drinking and employment. However, in their empirical study, they used variables which I believe would be insignificant and unrealistic in the regression of this paper. For example, they used military service as an independent variable, as well as a dependent variable considering whether counties were damp, wet, or dry, with regards to the sale of alcohol. I believe that they should have included other sectors of employment to avoid bias across different sectors and spectrums of employment. However, they used survey data and many socio-demographic variables, including race, that were important in constructing my own model.

Mullahy and Sindelar have done a great deal of work in the field of alcoholism, income and employment. The first paper I will talk about, by Mullahy and Sindelar (1993), conclude that the effects of alcoholism depend on the age group studied. As well, their results suggest that problem drinking may affect income more by indirectly restricting labour market participation than by directly affecting the wages of workers. They also suggest that including variables correlated with alcoholism lead to reduced effects on income. In this study, they took their sample from the New Haven Metropolitan area. One could argue that the New Haven Metropolitan area may be mostly a blue collar working area and thus one could suggest that alcoholism in certain industries is more prevalent and perhaps more detrimental than in other sectors of industry. Mullahy and Sindelar (1993) make an interesting point in their analysis. They state, "[for] the youngest group, alcoholism may tend to increase labour market participation and thus increase earnings… [over] their lives, alcoholics may accumulate less financial capital than would non-alcoholics so that early retirement may not be a reasonable option" (Mullahy and Sindelar, 1993).

In another study, Mullahy and Sindelar (1994) look at the role of indirect effects by introducing a dummy variable in their empirical analysis accounting for factors including an individual's family background. They suggest that the costs and effects of alcoholism on labour supply and income can be underestimated, unless we take into account the role of both direct and indirect effects. These indirect effects include family background, father's education and job type among others. Taking into account these effects, they concluded that there exist lifelong adverse effects on the labour market success of recovered alcoholics. They state that, "it is the effect of alcoholism on these [indirect] factors that may have the greatest negative effect on an individual's income" (Mullahy and Sindelar, 1994). They ascertain that alcoholism can interfere with educational attainment, the success or failure of marriage and other social factors in an individual's life, which constitute this indirect effect. Another

paper by Mullahy and Sindelar (1996) found that for both men and women, problem drinking leads to reduced employment.

As shown above, much of the literature on alcoholism and its effects on income have focused on the direct effects in the role of alcoholism on income, instead of including indirect effects in the empirical analysis.

III. METHODOLOGY AND DATA

Much debate has surfaced over how to specify an appropriate econometric model with respect to this area of research. Some researchers, such as Mullahy and Sindelar (1993, 1994, 1996) have used the Ordinary Least Squares (OLS) model, with departures into instrumental variables estimation and maximum likelihood multinomial logistics models. Feng et al. (2001) used a bivariate normal maximum likelihood estimation technique on the basis of normally distributed disturbances and increased efficiency compared to the IV technique. They also suggested that in finite samples, IV estimates are biased. This disagreement among methodological techniques has frequently led to similar conclusions between alcoholism and labour market outcomes but dissimilar numerical weights and opinions as to the exact mechanisms that affect it. Feng et al. (2001), who used the bivariate probit model, found that problem drinking had a statistically insignificant positive impact on employment. Benham and Benham (1982), as well as Kenkel and Ribar (1994), also found no statistically significant relationship between problem drinking and employment even though they used different econometric models and different estimation techniques. In addition, Mullahy and Sindelar (1996) found statistically insignificant relationship between alcoholism and employment, using a reduced form model with IV estimation techniques.

The compiled survey data was collected through the Canadian Community Health Survey (CCHS) (2005). Only data and statistics from Saskatchewan were collected. The CCHS is a cross-sectional survey that collects information from respondents related to health status, health care utilization and various health determinants from Canadians. The survey is split into two cycles. Cycle one is a general population health survey, designed to provide reliable estimates for health regions. Cycle two is a smaller sample and provides results at a provincial level on specific focused health topics. The CCHS covers approximately 98% of the Canadian population for ages 12+. The CCHS was distributed as a questionnaire delivered to people through mail, over the phone or in personal interview. The questionnaire consisted of approximately 25 minutes of common content, including topics of second-hand smoke exposure, alcohol, physical activity, health care utilization, height and

weight among others. Also, approximately 5 minutes of sub-sample content was added, and an additional 10 minutes of optional content for each health region was added. This additional content included questions of depression, alcohol dependence, patient satisfaction, medication use, and work stress. The CCHS data for Saskatchewan was collected from 11 different health regions with a total sample size of 7,720 and a response rate of 84.1%.

Variable definitions

I will be using data for the ages of 25-59, the people of primary working age, as used by Feng et al. (2001), Mullahy and Sindelar (1996), as well as an unpublished work by French et al. This age group was selected because both labour supply and drinking behaviour for the young and the elderly are generally qualitatively different from that of the primary age group (Mullahy and Sindelar, 1996). This age group was also selected in order to account for retirement at the upper end and problems of incomplete education spells at the lower end. I split this larger age group (25-59) into four separate groups. The groups ranged in age from 25-29, 30-39, 40-49, and 50-59. The reason for this was twofold. First, the CCHS age data is compiled not by actual age of the respondent but by multivariable, with age ranges fitting into numbers 1-16, with 1 meaning the very young, and 16 meaning the very old. In order to use this data, I created a dummy variable or binary for my regression to have meaning. At the lower level age groups, individuals tend to be relatively new to the labour force and have little to no experience in the professional work world and are at a lower end of the wage and income spectrum. As they move into their thirties and forties, they are building experience, knowledge and expertise, and thus their wages and incomes climb throughout this period. By the time most people reach the last age group identified (50-59), their income has levelled off and they have reached their maximum attainable.

The criteria I used for alcohol dependency was taken from the Canadian Task Force on Preventive Health Care (Haggerty, 1994), and states that, “the risk of negative consequences increases dramatically after a threshold of regular consumption of 2-3 drinks/day in males and 1-2 drinks/day in females”. However, there is much debate among researchers as to what the criteria is that distinguishes between social drinkers and problem drinkers or alcoholics. Unfortunately, no internationally-recognized criteria have been developed to classify problem drinking and thus, most empirical researchers will use different criteria in selecting problem drinkers, leading to subjective results and perhaps distorted policy implications. In my regression, I selected two different variables to

measure levels of alcohol consumption. The first variable, low daily alcohol consumption is a measure of the amount of alcohol consumed by both men and women that was between 1-2 drinks a day for men and 1 drink a day for women. The second variable, problem drinking, measures the amount of alcohol consumed at the above stated threshold of 3+ drinks for men and 2+ drinks for women. The base group was those who consumed 0 drinks per day in the last week.

I focus my attention on both the male and female population. Mullahy and Sindelar (1993, 1994) in their work focused solely on males, stating that men are far more likely to suffer from alcoholism than females and also participate in the labour force at a greater rate than females. In recent years, females have been participating at much higher rates than previously. Thus, I believe that although these may have been relevant justifications in the past, females today play an important and increasing role in the labour force. According to the CCSA (CCSA, 2004), 47% of men have engaged in heavy drinking in the past year, compared with only 24% of females, but female substance abuse rates are increasing. Thus, while still higher for men, substance abuse rates for women are increasing and therefore, I believe it's important to include the female population in my regression.

Depression was also initially used as an independent variable, which has not been used in many other research papers on this topic. I used this variable because according to the CCSA (CCSA, 2004), people dependent on alcohol had elevated levels of depression compared to the rest of the population. I thus collected the data for this variable. The data definition for depression described a person as 'depressed' if the individual stated that they felt depressed or lost interest in things for ≥ 2 weeks in the last year. However, when I collected my data, I found that everyone in my sample was depressed. Therefore, because there was no other variable, or binary, I could not use this data.

For the dependent variable income, I used total household income from all sources. I would have preferred to use household income from employment wages, or market work, however, this variable was not available from the CCHS (2005). This income variable was also a multivariable, with income ranging from 0 - $80,000+, occupying a range of variables from 1-5. Therefore in order to make this data more useable in my regression, I split income into two groups. One group consisted of yearly income from $0 -$49,999. The other group ranged in income from $50,000 -$80,000+. I split them into these groups with the higher range accounting for 1, and the lower range accounting for 0 in the indicator variable. Mullahy and Sindelar (1993) also used this specification and cut income into different groups, one with a lower income, and the other, with

higher yearly income. The other dependent variable I used is employment, also an indicator variable. Full-time employment, according to the CCHS data dictionary, was defined as working ≥ 30 hours per week within the last year and was assigned the indicator of 1. Part-time work was defined as < 30 hours per week in the last year, which I assigned an indicator variable of 0.

I have chosen the rest of the sociodemographic variables based on previous models (Mullahy and Sindelar, 1993; Feng et al., 2001; Mullahy and Sindelar, 1996; Mullahy and Sindelar, 1994), and the rest are self-explanatory and defined in Table 1, which lists the entire selection of dependent and independent variables chosen for the econometric model of this paper.

Table 1. Definition of major variables

Variables	Definition of Variables
Age (25-29)	0/1 indicator variable with 1 indicating respondent between ages of 25-29, 0 otherwise
Age (30-39)	0/1 indicator variable with 1 indicating respondent between ages of 30-39, 0 otherwise
Age (40-49)	0/1 indicator variable with 1 indicating respondent between ages of 40-49, 0 otherwise
Age (50-59)	0/1 indicator variable with 1 indicating respondent between ages of 50-59, 0 otherwise
Marital status	0/1 indicator variable with 1 indicating married respondent, otherwise single
Health excellent	0/1 indicator variable with 1 indicating self-perceived health excellent
Health good	0/1 indicator variable with 1 indicating self-perceived health good
Health fair	0/1 indicator variable with 1 indicating self-perceived health fair
Health poor	0/1 indicator variable with 1 indicating self-perceived health poor
Low daily alcohol	0/1 indicator variable with 1 indicating 1 drink for women, 1-2 drinks for males consumed per day in the last week (non-problem drinking)
Problem drinking	0/1 indicator variable with 1 indicating ≥ 2 drinks for women, ≥ 3 drinks for males consumed per day in the last week
Family problem	0/1 indicator variable with 1 indicating that either parent drank or used drugs often enough to cause problems for the family
White	0/1 indicator variable with 1 indicating that respondent is white
Less than secondary	0/1 indicator variable with 1 indicating that respondent has < high school education
Secondary	0/1 indicator variable with 1 indicating the highest level of education completed is high school
Post-Secondary	0/1 indicator variable with 1 indicating the highest level of education completed is post-secondary
Income	0/1 indicator variable with 1 indicating income ≥ $50,000, otherwise ≤ $49,999
Employment	0/1 indicator variable with 1 indicating worked ≥ 30 hours/week in the past year (full-time status)

Empirical model

I have chosen to use the bivariate probit model to regress income and employment on the aforementioned selected independent variables. I chose this model based on Feng et al. (2001) and Gill et al. (1992), who researched the impact of drug use on wages. This bivariate probit model

was chosen instead of the IV model for several reasons. Both IV and the bivariate probit model use the assumption of normally distributed disturbances. However, IV estimation is less efficient and in finite samples IV estimates are biased (Greene, 2003). I assume that health variables are econometrically exogenous (Mullahy and Sindelar, 1993). However, there exists debate about whether problem drinking or alcoholism is a self-selected state. If problem drinking is a self-selected state, then it is potentially correlated with other personal factors. Otherwise, alcoholism is considered a disease and thus, not correlated with other personal characteristics. Feng et al. (2001), state that problem drinking is a self-selected variable. Thus, they account for heterogeneity among preferences using the bivariate probit method in their empirical model. Since medical literature treats alcoholism as a disease, Mullahy and Sindelar (1993) handle alcoholism as an exogenous variable in the econometric model. However, they readily admit that biased estimates of the role of alcoholism on labour market success could result if this assumption proves invalid.

As a result of the above considerations, I have chosen to use the bivariate probit model. This bivariate probit model will be specified as such:

$$y_t^* = \beta C_t + \gamma X_t + u_t$$
$$\textit{and}$$
$$z_t^* = \delta C_t + \alpha X_t + v_t$$

Where y is a measure of employment; z_t is a measure of income; C is a vector of human capital components, such as education; X is a vector of socio-demographic variables, such as age, sex, race, etc.; u_t and v_t are vectors of disturbance terms. The variables included in C_t and X_t are assumed exogenous. Both β and γ are unknown parameters of y_t^* and both α and δ are unknown parameters of z_t^*. The probit model will be specified as such:

$$y_t = 1 \text{ if } y_t^* \geq 0 \quad \textit{and} \quad y_t = 0 \text{ if } y_t^* < 0$$
$$z_t = 1 \text{ if } z_t^* \geq 0 \quad \textit{and} \quad z_t = 0 \text{ if } z_t^* < 0$$

Where both y_t and z_t are dichotomous variables. $y_t = 0$ if person t was employed part-time or < 30 hours per week in the last year and $y_t = 1$ if person t was employed full-time or ≥ 30 hours per week in the last year. $z_t = 1$ if person t had income ≥ \$50,000 in the past year, and $z_t = 0$ if person t had income ≤ \$49,999 in the past year.

Descriptive analysis

Table 2 presents the descriptive gender specific statistics for all the independent and dependent variables used in the analysis. This analysis suggests that men are more likely to be employed full-time than their female counterparts (96% for men versus 80% for women). These findings support the work of Mullahy and Sindelar (1996), as well as work by Feng et al. (2001). As well, males are also more likely to earn at or above the $50,000 income range (72%) while women are less likely (66%) to meet or exceed the upper income range of $50,000. In a striking difference, women are more likely (68%) to obtain a post-secondary degree than men (58%), which contrasts many of the previous findings of researchers including Feng et al. (2001) and Mullahy and Sindelar (1993, 1994, 1996). The post-secondary graduate education variable includes non-university certificates or diplomas, or university degrees below or above the bachelor level. Another striking statistic is that males are more likely to have not obtained a secondary or high school degree (13%) compared with females with only 6% not having completed a high school degree. There are few differences among males and females between the independent variables of white, family problems, age and self-perceived health measures. These statistics also indicate that females are more likely to be married (78%), than males accounting for 72%.

The last variables I want to talk about are low daily alcohol and problem drinking. In contrast to many other findings, I found that from my sample, women and men reported similar rates of problem drinking, or drinking over the threshold limit set by the Canadian Task Force on Preventive Health Care (Haggerty, 1994). My results indicated that 3% of males and 4% of females drink at or above the problem drinking threshold. Women were more likely to drink at the low daily alcohol level, or what one could call social drinking, accounting for 18%, while males were at 13%.

Table 2. Descriptive statistics

Variable	Female (n = 907)		Male (n = 928)	
	Mean	Std dev.	Mean	Std dev.
Age (25-29)	0.15	0.36	0.14	0.34
Age (30-39)	0.30	0.46	0.33	0.47
Age (40-49)	0.31	0.46	0.28	0.45
Age (50-59)	0.25	0.43	0.25	0.43
Marital status	0.78	0.42	0.72	0.45
Health excellent	0.22	0.41	0.20	0.40
Health poor	0.01	0.11	0.02	0.13
Health good	0.27	0.44	0.30	0.46
Health fair	0.06	0.24	0.07	0.26
Low daily	0.18	0.39	0.13	0.33
alcohol	0.04	0.20	0.03	0.17
Problem	0.18	0.39	0.16	0.36
drinking	0.90	0.30	0.93	0.26
Family problem	0.06	0.24	0.13	0.33
White	0.17	0.38	0.20	0.40
< Secondary	0.68	0.47	0.58	0.49
Secondary	0.66	0.47	0.72	0.45
Post-Sec grad	0.80	0.40	0.96	0.20
Income				
Employment				

Regression results

Table 3 below presents the results of the bivariate probit model regression analysis for employment by age and sex. The estimated effect of problem drinking on employment is insignificantly negative for females of all defined age ranges and insignificantly positive for males of all age ranges. Thus, females who are problem drinkers are less likely, but insignificantly so, to be employed full-time relative to female non-problem drinkers (the variable indicating low daily alcohol consumption in the regression). The estimated effect of problem drinking on employment for males indicates an insignificantly positive result, thereby indicating that males who drink at problem levels are more likely to be employed full-time. However, if we look at these numbers compared with males who consume low daily alcohol levels, those males who problem drink are less likely to be employed full-time than those males who drink low levels daily. The aggregate effect of these findings is males who drink at or above the threshold do exhibit signs of decreasing full-time labour supply and employment levels. Females exhibit this negative effect of increased amounts of alcohol consumption on labour supply directly, as we can see from the regression statistics.

A very interesting result is that of marital status, which has a statistically significant impact on the likelihood of being employed for

males and females of every age range. A married female is less likely to be employed full-time, and more likely to be employed part-time than a single female at all ages. A married male is more likely to be employed full-time at all ages. In addition, a male whose self-perceived health is poor is significantly less likely to work full-time. One last finding was that a female within the age ranges of 30-39 and 50-59 who were post-secondary graduates were significantly more likely to be employed full-time, while females in the other age ranges with post-secondary education were more likely to be employed full-time, but insignificantly so.

The second bivariate probit regression was focused on income by age and sex, and the results are listed in Table 4 below. Low daily alcohol consumption and problem drinking for females exhibited the same trends as what was observed in the regression of employment. Female problem drinkers were insignificantly less likely to earn ≥ $50,000 while male problem drinkers were insignificantly more likely to earn ≥ $50,000 per year. Those males who consumed low daily alcohol levels were significantly more likely to earn the upper income range of ≥ $50,000. Again, as in the employment regression, compared to males who consumed low daily alcohol levels, problem drinkers were less likely (even though the results were insignificantly positive) to earn the upper income range, as shown in Table 4.

Age, however, illustrated interesting results for both males and females across age ranges. Females in the age range of 25-29 were significantly less likely to earn ≥ $50,000. Females in the age ranges of 30-39 and 50-59 were also less likely, but insignificantly so, to earn the upper echelon. However, females in the 40-49 age range were significantly more likely to earn ≥ $50,000. Males in the 25-29 and 40-49 age range were insignificantly more likely to earn the upper echelon while those 30-39 and 50-59 were insignificantly less likely to earn the upper echelon.

Marital status was again a statistically significant variable in the regression. Married females and males of all ages were significantly more likely to earn the upper income range. However, in an interesting turn, the estimates for married females were higher than those for married males indicating that females are more likely to earn more than their married male counterparts.

Females whose self-perceived health was poor were significantly less likely to earn the upper income range at all age levels. Males whose self-perceived health was fair were significantly less likely to earn the upper income range but at a much smaller scale than women whose self-perceived health was poor. Females with less than a secondary education were significantly less likely to earn the upper range of income, which I would have expected. Males with less than a secondary education were

also less likely to earn the upper income range, but insignificantly so. However, both females and males at all age ranges who possess a post-secondary degree are significantly more likely to attain the upper income range. However, males were more statistically likely than females to earn this upper range, which can be seen in the regression analysis below.

IV. CONCLUSION AND RESULTS

This paper examined the relationship between income, employment and problem drinking. The effects of problem drinking on income and employment, to date, have yielded conflicting results and consequently, more research in this area is required. Different measures of dependent and independent variables and populations, as well as measures of problem drinking criteria, have led to these disagreements. In addition, as stated in Mullahy and Sindelar (1993), the extent to which one controls for variables correlated with problem drinking also has a major impact on the estimated effects of alcoholism.

Overall, many of the results I obtained were statistically insignificant, especially the variables contained in the employment regression in Table 3. This could be attributed to many factors, including, a lesser sample size than other researchers who have published their results. As well, I may have obtained improved and more statistically significant results had I been able to extract actual ages and income levels of the respondents rather than the multivariable data that was available. Moreover, in future work, I may want to change my definition of employment to a 0/1 indicator variable indicating 1 as those who have ever worked in the past year (employed) and 0 as unemployed as Feng et al. (2001) and Mullahy and Sindelar (1993) carried out in their work. However, that data and those statistics were unavailable through CCHS (2005) data. Perhaps this would have lead to improved and more statistically significant results. Extremely tight labour markets in recent years may also be influencing the results by forcing employers to value education and experience more than potential employee problems (Feng et al., 2001). Also, problem drinking may be occurring outside the workplace and may have no bearing on employee productivity. However, this is only valid up to a certain point after which major problem drinkers would demonstrate signs of inefficiency and unproductiveness at the workplace.

An area of further study would be to see whether alcoholism or problem drinking is more industry or sector related. As well, looking at and trying different estimation models would also be an appropriate next step. Future work could include looking at the role of indirect effects on alcoholism, income and employment. Mullahy and Sindelar (1994)

included indirect effects such as family background, a father's education and the type of job the head of household worked in. Mullahy and Sindelar (1994) state that the effect of alcoholism on these indirect factors may have the greatest negative effect on an individual's future income and employment prospects.

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Table 3. Bivariate probit model estimation results for employment by age and sex

Variable	Female	*(n = 907)*			Male	*(n = 928)*		
	25-29	30-39	40-49	50-59	25-29	30-39	40-49	50-59
Age	-0.065	-0.109	0.030	0.125	0.246	0.130	0.203	-0.47***
	(-0.449)	(-1.007)	(0.281)	(1.092)	(0.956)	(0.711)	(1.053)	(-2.585)
Marital status	-0.72***	-0.71***	-0.71***	-0.73***	0.588***	0.571***	0.548***	0.676***
	(-4.892)	(-4.954)	(-4.931)	(-5.036)	(3.532)	(3.469)	(3.359)	(3.878)
Health	-0.030	-0.025	-0.029	-0.030	-0.141	-0.124	-0.112	-0.138
excellent	(-0.235)	(-0.192)	(-0.224)	(-0.239)	(-0.596)	(-0.528)	(-0.474)	(-0.577)
	0.089	0.089	0.092	0.079	-0.255	-0.232	-0.231	-0.213
Health good	(0.737)	(0.741)	(0.756)	(0.657)	(-1.282)	(-1.166)	(-1.163)	(-1.057)
	0.014	0.018	0.016	0.017	-0.424	-0.412	-0.435	-0.343
Health fair	(0.064)	(0.084)	(0.077)	(0.081)	(-1.477)	(-1.432)	(-1.523)	(-1.183)
	0.046	0.013	0.036	0.033	-1.16***	-1.08***	-1.12***	-1.009**
Health poor	(0.104)	(0.030)	(0.082)	(0.073)	(-2.876)	(-2.694)	(-2.784)	(-2.448)
	0.089	0.078	0.087	0.084	0.342	0.320	0.352	0.349
Low daily alc.	(0.692)	(0.601)	(0.673)	(0.649)	(1.211)	(1.135)	(1.243)	(1.201)
	-0.049	-0.061	-0.053	-0.056	0.244	0.258	0.289	0.185
Problem drink.	(-0.200)	(-0.248)	(-0.216)	(-0.225)	(0.482)	(0.520)	(0.574)	(0.366)
	-0.080	-0.076	-0.079	-0.074	-0.113	-0.130	-0.130	-0.138
Family	(-0.616)	(-0.585)	(-0.614)	(-0.569)	(-0.528)	(-0.601)	(-0.608)	(-0.638)
problem	-0.300	-0.316	-0.303	-0.313	-0.529	-0.532	0.537	-0.431
	(-1.560)	(-1.634)	(-1.572)	(-1.625)	(-1.171)	(-1.191)	(-1.192)	(-0.956)
White	0.201	0.192	0.199	0.206	-0.138	-0.183	-0.184	-0.133
	(0.792)	(0.757)	(0.781)	(0.812)	(-0.438)	(-0.582)	(-0.581)	(-0.418)
< Secondary	0.004	0.000	0.005	0.011	-0.006	-0.017	-0.020	0.029
	(0.018)	0.000	(0.027)	(0.059)	(-0.020)	(-0.058)	(-0.066)	(0.094)
Secondary	0.275	0.284*	0.278	0.284*	0.222	0.206	0.199	0.200
	(1.598)	(1.655)	(1.617)	(1.655)	(0.803)	(0.739)	(0.714)	(0.714)
Post-	1.514***	1.539***	1.484***	1.489***	1.941***	1.955***	1.962***	1.959***
Secondary	(5.474)	(5.588)	(5.467)	(5.505)	(3.630)	(3.678)	(3.689)	(3.708)
Constant								

Z-statistics in parentheses*Statistically significant, $p \leq 0.10$; **statistically significant, $p \leq 0.05$; ***statistically significant, $p \leq 0.01$.

Table 4. Bivariate probit model estimation results for income by age and sex

Variable	Female	*(n = 907)*			Male	*(n = 928)*		
	25-29	30-39	40-49	50-59	25-29	30-39	40-49	50-59
Age	-0.262**	-0.050	0.266**	-0.067	0.026	-0.023	0.057	-0.057
	(-1.972)	(-0.479)	(2.536)	(-0.602)	(0.189)	(-0.225)	(0.537)	(-0.495)
Marital status	1.317***	1.365***	1.362***	1.380***	0.981***	0.975***	0.975***	0.988***
	(11.49)	(12.18)	(12.12)	(12.06)	(9.652)	(9.759)	(9.779)	(9.680)
Health excellent	0.025	0.030	0.041	0.030	-0.096	-0.095	-0.093	-0.096
	(0.199)	(0.236)	(0.321)	(0.238)	(-0.740)	(-0.729)	(-0.714)	(-0.740)
Health good	-0.144	-0.142	-0.133	-0.137	-0.103	-0.104	-0.101	-0.097
	(-1.261)	(-1.249)	(-1.169)	(-1.204)	(-0.910)	(-0.920)	(-0.893)	(-0.855)
Health fair	0.148	0.167	0.153	0.166	-0.418**	-0.421**	-0.415**	-0.406**
	(0.740)	(0.836)	(0.764)	(0.830)	(-2.210)	(-2.227)	(-2.193)	(-2.129)
Health poor	-0.972**	-0.994**	-1.006**	-0.985**	-0.437	-0.442	-0.433	-0.419
	(-2.119)	(-2.191)	(-2.185)	(-2.159)	(-1.266)	(-1.276)	(-1.257)	(-1.213)
Low daily alc.	0.122	0.102	0.106	0.108	0.278*	0.279*	0.279*	0.276*
	(0.969)	(0.811)	(0.839)	(0.860)	(1.915)	(1.921)	(1.927)	(1.901)
Problem drink.	-0.240	-0.253	-0.247	-0.250	0.034	0.039	0.038	0.028
	(-1.057)	(-1.122)	(-1.087)	(-1.107)	(0.128)	(0.145)	(0.144)	(0.105)
	-0.087	-0.087	-0.092	-0.087	-0.070	-0.072	-0.075	-0.072
	(-0.716)	(-0.709)	(-0.745)	(-0.710)	(-0.539)	(-0.551)	(-0.573)	(-0.550)
Family problem	0.151	0.129	0.139	0.142	0.262	0.257	0.259	0.269
	(0.958)	(0.819)	(0.876)	(0.898)	(1.464)	(1.446)	(1.455)	(1.502)
White	-0.73***	-0.72***	-0.76***	-0.71***	-0.268	-0.272	-0.274	-0.267
	(-3.051)	(-2.998)	(-3.158)	(-2.989)	(-1.375)	(-1.395)	(-1.409)	(-1.368)
< Secondary	-0.276	-0.239	-0.299	-0.234	0.102	0.100	0.099	0.102
	(-1.441)	(-1.260)	(-1.556)	(-1.232)	(0.563)	(0.557)	(0.552)	(0.566)
Secondary	0.290*	0.319*	0.299*	0.317*	0.472***	0.475***	0.474***	0.474***
	(1.715)	(1.901)	(1.778)	(1.887)	(2.903)	(2.905)	(2.900)	(2.895)
Post-Secondary	-0.71***	-0.78***	-0.86***	-0.80***	-0.494**	-0.474*	-0.488**	-0.490**
	(-2.968)	(-3.254)	(-3.618)	(-3.417)	(-1.997)	(-1.927)	(-2.050)	(-2.025)
Constant								

Z-statistics in parentheses *Statistically significant, $p \leq 0.10$; ** statistically significant, $p \leq 0.05$; * statistically significant, $p \leq 0.01$.**