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High Work Stress as a Risk Factor for Problematic Alcohol Use in the Canadian Working Population

Birney, Arden

UNIVERSITY OF CALGARY

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Canadian Working Population

by

Arden Riley Joanna Birney

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Abstract

Objective: To investigate the longitudinal relationship between work stress and problematic drinking in the Canadian working population using data from the National Population Health Survey.

Methods: Participants (n=4,326) were classified by work stress based on the Job Content Questionnaire. Problematic drinking was defined in three ways: 5+ drinks on one occasion at least once per month during the past 12 months, 10+ drinks/week for women and 15+ drinks/week for men, and a proxy of the AUDIT-C.

Results: Men with high work stress at baseline were at lower risk of problematic drinking, regardless of the way in which work stress or problematic drinking were defined. Problematic drinking was not consistently associated with work stress among women.

Conclusions: Among men, high work stress was associated with a decreased risk of problematic drinking. Future research is necessary to further clarify the relationship between work stress and problematic drinking among working Canadians.

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Chapter 1: Introduction

Problematic alcohol use imposes a substantial burden on society and has been identified as an important risk factor for an array of diseases such as neuropsychiatric disorders, cardiovascular disease, and cirrhosis of the liver (Rehm, et al. 2009). The use of alcohol also has potential deleterious effects in the workplace in regards to employee attendance, performance, health and workplace safety, and disruption of employers' ability to participate effectively in a competitive market (Frone, 2008). Literature suggests that work stress is a risk factor for problematic alcohol use (Marchand & Blanc, 2011; Azagba & Sharaf, 2011); however, there are few longitudinal studies on this topic, particularly in the Canadian working population. In view of the fact that the majority of adults spend a large portion of their time in formal employment, developing a thorough understanding of how the workplace influences alcohol use is vital.

The purpose of this project is to examine the longitudinal relationship between work stress and problematic alcohol use among the Canadian working population (those aged 18-65) using data from the longitudinal National Population Health Survey (NPHS). The NPHS, conducted by Statistics Canada, is a nationally representative sample of the Canadian population which collects vital information on health related behavior, as well as corresponding economic and socio-demographic variables. Specific attention will be given to the role of major depression in the relationship between work stress and problematic alcohol use.

Chapter 2: Literature Review

2.1 Literature Review Strategies

A literature search strategy was developed in collaboration with a Health Sciences Librarian. The literature search involved the following databases deemed relevant for the subject area: PsycInfo, Psychology and Behavioral Sciences Collection, Ovid, CINAHL, EBM Reviews, MEDLINE, and PubMed. The following grey literature sources were also used: OAISter, HSO (Health Sciences Online), ProQuest Dissertations & Theses, Google, and Google Scholar. Each search was conducted using the following keywords: "work stress", "occupational stress", and "alcohol". Results were first screened by title, and then abstract to determine the relevance of the document to this project. Reference lists of included documents were scanned to ensure that relevant sources were not missed.

2.2 Alcohol Use

Alcohol consumption has been defined and operationalized in a number of ways. For the purpose of this study we are interested in problematic alcohol use. Problematic alcohol consumption, or alcohol misuse, has been defined as 10 drinks or more per week for females, and 15 drinks or more for males per week in Canadian literature (Marchand & Blanc, 2011). Further, the Canadian Centre on Substance Abuse released Canada's Low-Risk Alcohol Drinking Guidelines in 2011, which identify similar levels of alcohol use considered to be problematic (Butt, et al. 2011). Long term health risks associated with alcohol consumption should be reduced by staying within the following average consumption levels: 0-2 standard drinks per day for women, with no more than 10 drinks per week; and 0-3 drinks per day for men, with no more than 15 drinks per week. Further, the guidelines recommend the following daily limits: men should not consume more than 4 drinks on a single occasion, and women should consume no more than 3 drinks on a single occasion (Butt, et al. 2011). In Canada, a standard drink of beer, wine, spirits and coolers are those that contain 17.05 ml or 13.45 g of pure alcohol. The following are roughly equal to one standard drink: 341 ml (12 oz.) bottle of 5% beer, cider, or cooler; 142 ml (5 oz.) glass of 12% wine; and a 43 ml (1.5 oz) shot of 40% spirits (Butt, et al. 2011).

2.2.1 Epidemiology of Alcohol Use in Canada

According to the 2004 Canadian Addiction Survey, 79.3% of the Canadian population aged 15 years and older consumed alcohol in the year prior to the survey (Adlaf, Begin & Sawka, 2005). Most Canadians drink in moderation; of those who reported drinking alcohol in the past year, 44% indicated drinking at least once a week and 9.9% consumed alcohol four or more times a week. The survey revealed that 6.2% of past-year drinkers engaged in heavy drinking (five drinks or more in a single sitting for males and four or more drinks for females) at least once a week and 25.5% reported this pattern of drinking at least once a month. Further, based on the Alcohol Use Disorder Identification Test (AUDIT), which identifies hazardous patterns of alcohol use and possible indications of alcohol dependency, 17% of current drinkers were considered high-risk based on the standard cutoff score of 8. Most heavy and hazardous drinkers were young males under the age of 25 (Adlaf, Begin & Sawka, 2005).

More recently, results from a Statistics Canada publication using data from the Canadian Community Health Survey found that 24.8% of males and 10.1% of females reported heavy drinking in 2010. Heavy drinking referred to having consumed five or more drinks, per occasion, at least once a month during the past year. Males aged 18 to 19 (39.2%) and 20 to 34 (41.1%) were the most likely to report heavy drinking, and females aged 18 to 19 (26.1%) and 20 to 34 years (20.2%) were more likely to report heavy drinking than females in all other age groups (Statistics Canada, 2011).

Finally, a longitudinal study found that 17.1% of Canadian workers experienced at least one episode of alcohol misuse between 1994/95 and 2002/03; 7.5% had more than one episode, 3.4% had three or more, and 1.5% had four or more episodes. Alcohol misuse was defined as 10 drinks or more for females, and 15 drinks or more for males per week (Marchand & Blanc, 2011).

2.2.2 Costs of Alcohol Use

Problematic alcohol use has both economic and health-related costs. According to a recent study of substance abuse in Canada, after tobacco, alcohol is the psychoactive substance that causes the greatest harms in terms of health, legal, social, and economic costs and problems (Rehm, 2006). Alcohol abuse is estimated to have accounted for $3.3

billion in direct health care costs and an additional $14.6 billion in regards to additional health care, law enforcement, and loss of productivity in the workplace or at home in 2002 (Rehm, 2006). The effects of alcohol dependence on health are detrimental, with an estimated 4% of all global deaths attributable to alcohol in 2004 (Rehm, et al., 2009). The Global Burden of Disease Study, sponsored by the World Bank, estimated the prevalence of alcohol dependence and problematic use to be 7.3 million among those younger than 59 years in high income countries in 2004; additionally alcohol use disorders are among the 10 leading causes of Years Lost due to Disability (Department of Health Statistics and Informatics in the Information, Evidence and Research Cluster, World Health Organization, 2008). Alcohol use disorders are an important preventable contributor to burden of disease.

Chronic alcohol abuse has serious effects on physical and mental health and can lead to an increased risk of workplace accidents (McGinnis & Foege, 1999). Furthermore, excessive long-term alcohol use can exacerbate some medical conditions and is associated with a high risk of morbidity and mortality (Testino, 2008; McGinnis & Foege, 1999). For instance, alcohol dependence has been identified as an important risk factor for diseases such as neuropsychiatric disorders, cardiovascular disease, and cirrhosis of the liver (Rehm, et al., 2009). The use of alcohol also has potential deleterious effects in the workplace in regards to employee attendance, performance, health and workplace safety, and disruption of employers' ability to participate effectively in a competitive market (Frone, 2008).

2.3 Work Stress

Work stress has been defined as the harmful physical and emotional responses that occur when job requirements do not match the worker's capabilities, resources, and needs (National Institute for Occupational Safety and Health, 1999). Common work stressors include, but are not limited to: dangerous work conditions, noxious physical work environments, interpersonal conflict with colleagues, heavy workloads, unfair treatment and job insecurity (National Institute for Occupational Safety and Health, 1999). The work environment has undergone dramatic changes in recent years due to globalization, competition, technological advances and economic circumstances. Current

work conditions are characterized by a high workload, effort-reward imbalance, job insecurity, and a constant need to update skills (Cooper, Quick & Schabracq, 2010). As such, there is increasing concern that the workplace has adverse effects on psychological and physical well-being. A growing body of literature has linked chronic work stress to a range of adverse health outcomes such as cardiovascular disease, anxiety, depression, heart attack, chronic headaches, back pain, and colorectal cancer (Chandola, et al., 2008; Shain, 2000; Stansfeld & Candy, 2006). In particular, stress can induce unhealthy behaviors such as smoking and excessive alcohol use (Ng & Jeffery, 2003).

2.3.1 Theoretical Models of Work Stress and Alcohol Use

There are several theoretical models that describe the impact of work stress on health. The demand-control and the effort-reward imbalance are two widely used theoretical models in occupational health research. The demand-control model posits that negative health outcomes such as fatigue, depression, and physical illness, result from situations in which control over work is low and psychological demands imposed by work are high. The demand-control model suggests that support from supervisors and/or co-workers may act as a buffering mechanism between psychological stressors and adverse health outcomes by affecting physiological processes important to maintenance of long-term health (Karasek, 1979). The demand control model is commonly represented in figure form:

Figure 1. Demand-Control Model

	Job Demands	
	Low	High
Job Decision Latitude — Low	"Passive" Job	"High Strain" Job
Job Decision Latitude — High	"Low Strain" Job	"Active" Job

Karasek noted that "high strain" jobs are of particular importance in predicting mental strain, while "active" jobs will result in learning motivations to develop new behavior patterns. The focus for this research project was in regards to the demand-control model, as the NPHS contains several questions related to decision latitude (skill discretion and decision authority) together with psychological demands in the workplace

to assess stress at work. However, a brief discussion of the effort-reward imbalance model is warranted given the substantive presence of this model in the literature. The effort-reward imbalance model posits that the experience of a lack of reciprocity in terms of high costs and low gains elicit negative emotions. Feelings of not being appreciated in an adequate way or of being treated unfairly in the workplace, as well as disappointments resulting from inadequate rewards, are paralleled by sustained strain reactions in the autonomic nervous system (Siegrist, 1996; Siegrist, et al., 2004).

Other theoretical models that describe the relationship between stress and health outcomes do exist; although these models are not as rampantly seen in the current work stress-alcohol literature and there is some overlap with previously discussed theoretical models, a brief discussion is still warranted. The tension-reduction theory states that alcohol consumption reduces tension, and that individual's drink alcohol for its tension-reducing properties (Conger, 1956). The tension-reduction theory is very similar to the stress buffering and self-medication hypotheses, which state that individuals use alcohol as a means to reduce stress and unpleasant psychiatric symptoms (Cohen & McKay, 1984; Blume, Schmaling & Marlatt, 2000). The stress-response-dampening hypothesis states that if alcohol consumption reduces the stress response, this effect will reinforce the consumption of alcohol in response to future stressors; the stress-response-dampening effect of alcohol refers to the degree to which alcohol reduces an individual's stress response and may be measured by psychophysiological measures of stress (i.e. cardiovascular response) (Levenson, Sher, Grosman, Newman & Newlin, 1980).

2.3.2 Workplace Factors and Alcohol Use

This section will review previous studies on the relation between work stress and alcohol use. Due to concerns of space limitation and statistical power, studies with a sample size less than 500 were not described.

Cross-sectional studies:

At an international level, there have been several cross-sectional studies examining the relationships between work factors and alcohol use. Researchers in Israel, using a random sample of 569 blue-collar workers, found that job hazards (employee's perceived exposure to health risks, such as air pollution, heavy loads, and extreme

temperatures) were significantly associated with alcohol use (p< 0.010) (Biron, et al. 2011). A study conducted in Finland (n = 3276) found a positive relationship between burnout at work and alcohol dependence among both men (OR=1.5, 95% CI: 1.27–1.78) and women (OR=1.8, 95% CI: 1.35-2.40) (Ahola, et al. 2006). Finally, Bobak and colleagues conducted a cross-sectional study of men aged 45-64 from three European urban samples (Russia, Poland, and the Czech Republic) in 1999-2000 (2005). Effort-reward imbalance was associated with problem drinking (OR=1.23, 95% CI: 1.02-1.50) after adjustment for age, education, and material deprivation (Bobak, et al. 2005).

Despite interesting findings from international studies, the majority of literature in this field has used samples from the United States. A cross-sectional study using a sample of 747 urban police officers found that lower educational attainment (p <.05), greater work stress (p <.01), and greater general psychiatric symptoms (p <.01) were related to higher scores on the Michigan Alcoholism Screening Test. The strongest predictor of at-risk alcohol use was education; those with a high school education or less were more likely to engage in at-risk drinking (p<0.01). There was a significant interaction by gender, indicating that the association between work stress and alcohol use differs between men and women (Ballenger, 2011). Another US study (n=583) found that men experiencing low skill variety had 2.81 times greater odds to be heavy alcohol users than men with more skill variety in their work (p<0.001) (Wiesner, Windle & Freeman, 2005).

Despite the numerous studies that provide support for a relationship between workplace factors and alcohol use, a cross-sectional study conducted by Mezuk and colleagues found no relationship between job strain and heavy drinking (five or more drinks on a single occasion) among 2, 902 older adults using data from the Health and Retirement Study in the United States (2011). A recent cross-sectional study conducted in the US (n=3099) also revealed some unexpected findings. High work strain showed no associations with drinking when compared to low strain jobs, while workers in passive jobs had increased odds of heavy drinking (OR=1.29, 95% CI: 1.02-1.64) and lower odds of frequent drinking (OR=0.71, 95% CI: 0.52-0.97). Unexpectedly, the authors found that low complexity in the workplace combined with low constraint related to more frequent drinking (OR=1.60, 95%CI: 1.22-2.10) (Gimeno, et al., 2009).

Qualitative research in Alberta recently reported that the following occupational focused themes were associated with a higher susceptibility to substance use, including alcohol: (1) shift work, which prevents opportunities for consistent and productive social relationships; (2) high incomes, which lead to material competition and high levels of stress; and (3) high turnover, which makes it difficult to maintain a sense of job expectations and requirements as well as relationships (Parkins & Angell, 2011).

Other research in Alberta has found differing results. Hodgins and colleagues used an Albertan sample of 1, 890 employees to ask questions pertaining to employment status, work environment, job factors, and demographics. The AUDIT was used to assess at-risk or harmful alcohol consumption. A standard cutoff score of 8 or greater was used to identify a hazardous level of alcohol use. The authors found that perceived work stress was not associated with alcohol problems; rather, workplace alcohol availability predicted general alcohol problems. Further, job responsibility and workplace norms predicted alcohol problems, but only among men (Hodgins, Williams & Munro, 2009).

Longitudinal studies:

There have been a few longitudinal studies on work stress and problematic alcohol consumption. Heikkila and colleagues recently conducted a meta-analysis using longitudinal data from four European studies (2012). Participants were categorized as follows: non-drinkers; moderate drinkers (women: 1-14 drinks/week, men: 1-21 drinks/week); intermediate drinkers (women: 15-20 drinks/week, men: 22-27 drinks/week); and heavy drinkers (women: $\geq$21 drinks/week, men: $\geq$ 28 drinks/week). Job strain was defined as having high demands and low control. There was no evidence for associations between either job strain at baseline, or changing job strain from baseline to follow-up, and taking up excessive drinking at follow-up. Those who were non-drinkers at baseline were more likely to have job strain at follow-up compared to those who were moderate drinkers at baseline (OR=1.14, 95% CI: 1.04-1.25) (Heikkila, et al. 2012). An additional longitudinal study used participants from the Whitehall II occupational cohort of London civil servants (Head, Stansfeld & Siegrist, 2004). Men who had either high effort or low reward at time 1 (OR=1.56, 95% CI: 1.10-2.20) or had both high effort and low reward at time 1 (OR=1.93, 95% CI: 1.4-2.7) had a greater odds

of alcohol dependence by time 3; this relationship was not observed among women (Head, Stansfeld & Siegrist, 2004).

Azagba and Sharaf used data from the NPHS to examine the relationship between job stress and alcohol and tobacco use in Canada (2011). The sample was restricted to those aged 18-65 years at baseline who were employed. In the NPHS, job strain was assessed as a ratio of psychological demands and decision latitude, where higher values indicate greater job strain. Individuals were stratified based on the distribution of scores to represent low, medium, and high levels of strain at each cycle. Alcohol consumption was defined as the average daily number of drinks consumed at each cycle.   Azagba and Sharaf found that the following variables were significantly related to daily alcohol consumption: being male ($\gamma=0.899$), being married ($\gamma= -0.186$), having a post secondary education ($\gamma= -0.241$), being in the age range of 30-44 years ($\gamma= -0.196$) or 45-65 years ($\gamma= -0.209$), immigrant status ($\gamma= -0.365$), and social support ($\gamma=0.027$).   Further, high levels of job strain increased drinking intensity for heavy drinkers (average of 2.1 drinks per day) (Azagba & Sharaf, 2011).

 A similar longitudinal study used the NPHS to examine the relationship between work and onset of alcohol misuse (10 or more drinks for females and 15 or more drinks for males in a week) (Marchand & Blanc, 2011). The sample was restricted to those ages 15-55 years, and working at baseline (1994/95) (n=7,338). To compute the onset of alcohol misuse, the authors identified participants at baseline who did not have alcohol misuse. The authors then counted the number of new cases of alcohol misuse that appeared over the study period. Onset of alcohol misuse was thus a measure of the incidence of alcohol misuse between 1996–1997 and 2002–2003. Work stress was measured using the Job Content Questionnaire.

The following variables were significantly related to onset of alcohol misuse: psychological demands (OR=0.92, 95%CI: 0.85-0.99), job insecurity (OR=0.90, 95% CI: 0.81-0.99), high social support outside work (OR=0.69, 95% CI: 0.49-0.97), being female (OR=0.70, 95% CI: 0.54-0.91), age (OR=0.96, 95% CI: 0.94-0.97), and smoking status (OR=1.04, 95% CI: 1.03-1.05). The authors note two surprising findings; first, it would appear that each one-point increment in the level of psychological demands decreases the

onset of alcohol misuse by 9%. Second, each one-point increase on the job insecurity scale reduces the risk of onset of alcohol misuse (Marchand & Blanc, 2011).

Although it is encouraging to see longitudinal studies on the work stress-alcohol relationship conducted in Canada, neither of these Canadian studies took major depression into account. As we will discuss in future sections, depression has been found to be associated with work stress and alcohol use; as such the observed associations could be biased due to a lack of control of the effect of major depression. Additionally, previous studies have not examined how changes in the work environment may affect the risk of problematic alcohol use. Most previous studies are cross-sectional in nature, and are unable to investigate the temporal relationship between work stress and alcohol use. Further, many previous studies have failed to consider important confounding variables. Based on the review of previous studies, we hypothesize that work stress may lead to increased risk of problematic drinking.

2.4 The Potential Role of Major Depression

A major depressive episode (MDE) is characterized in the Diagnostic and Statistical Manual of Mental Disorders-IV by the presence of at least five of nine depressive symptoms in the same two week period; one of the symptoms has to be either (1) depressed mood (sadness or emptiness) and/or (2) reduced interest in previously enjoyed activities (American Psychiatric Association, 2005). Other symptoms include (3) unintended significant changes in weight or appetite, (4) insomnia or hypersomnia, (5) feelings of restlessness or being slowed down, (6) fatigue, (7) feelings of worthlessness or guilt, (8) trouble concentrating or making decisions, and (9) recurrent thoughts of death including suicidal ideation. Additionally, the symptoms must "…cause clinically significant distress or impairment in social, occupational, or other important areas of functioning" (American Psychiatric Association, 2005: p.356). The questions used in the CIDI-SFMD are attached in Appendix A.

2.4.1 Depression and Work Stress

Several studies have shown that work stress is associated with major depression, using Canadian samples. A study using data from the longitudinal cohort of the NPHS examined the association between work stress and MDE. Participants who reported high levels of psychological demands had an elevated risk of MDE compared to those who

reported low psychological demands (prevalence ratio=2.22, 95% CI: 1.64-2.80) (Wang & Patten, 2001). A similar study categorized participants into the following: persistently low job strain; persistently high job strain; change from high to low strain; change from low to high strain (Wang, et al. 2009). Those who reported a change from high to low job strain (incidence proportion=4.4, 95% CI: 2.7-6.2) had a risk of MDE similar to those exposed to persistently low job strain (incidence proportion=4.0, 95% CI: 2.8-5.2) (Wang, et al., 2009). Other research using the NPHS classified participants into 4 groups based on quartile values of baseline work stress scores (Wang, 2005). Those who had a work stress score higher than the 75th percentile had an elevated odds of MDE (OR=2.98, 95%CI: 1.62–4.97) (Wang, 2005).   Similar research using the Canadian Community Health Survey, cycle 1.2 in 2002 has been conducted. Blackmore and colleagues found that high job strain was significantly associated with depression among men (OR=2.38, 95% CI: 1.29-4.37), and lack of social support at work was significantly associated with depression among men (OR=2.70, 95% CI: 1.55-4.71) and women (OR=2.37, 95% CI: 1.71-3.29). Further, women with low levels of decision authority were more likely to have depression (OR=1.59, 95% CI: 1.06-2.39) compared to women with high levels of decision authority (Blackmore, et al. 2007). Research consistently demonstrates that there is a relationship between work stress and depression. These findings suggest that it may be important to include depression when assessing the relationship between work-stress and alcohol.

2.4.2 Depression and Alcohol Use
A recent meta-analysis using 74 studies revealed that depression was associated with increased concurrent alcohol use and impairment; depression was also related to future alcohol use and impairment (Conner, et al., 2009).   Using data from the Canadian Community Health Survey-Mental Health and Wellbeing, Rush and colleagues found that the rate of mood and anxiety disorders among those reporting substance use problems was 15.9%; this is approximately double the rate among those with no substance use problems (7.5%) (Rush, et al. 2010). Further, a systematic literature review conducted by Sullivan and colleagues concluded that alcohol problems are more common among those with depression when compared to the general population (2005). Finally, Fergusson and colleagues examined the association between MDE and alcohol use

among a sample of 1,265 participants ages 18-25 years from New Zealand (2009). Individuals who fulfilled the criteria for alcohol dependence were 1.9 times the odds to also fulfill the criteria for MDE (95% CI, 1.53-2.37) (Fergusson, et al. 2009).

Research consistently demonstrates that there is a positive association between alcohol use and depression. Further, a number of studies have found that workplace environmental factors are associated with an increased risk of major depression, which is often comorbid with problem drinking. Given that major depression is associated with work stress and alcohol use, depression may be either an effect modifier or a confounder. Effect modification is defined as "variation in the selected effect measure for the factor under study across levels of another factor" (Porta, 2008 p 76). In this case the effect measure between work stress and alcohol may vary by depression status. Confounding is defined as "a mixing of effects between the exposure, the disease, and a third factor that is associated with the exposure and independently affects the risk of developing the disease" (Hennekens & Buring, 1987 p 35). In this case, the exposure is work stress, the 'disease' is problematic alcohol use, and the third factor is depression. Given the potential role of major depression, current literature may be presenting biased estimates of the relationship between work stress and alcohol use due to the absence of consideration of major depression.

2.5 Knowledge Gaps

Several knowledge gaps were identified through the literature review:

• The majority of previous studies were cross-sectional in nature, limiting the understanding of the temporal relationship between work stress and problematic alcohol use.

• Although there have been a few longitudinal studies on the work stress-alcohol relationship, these studies fail to take into account the possible role of major depression, which may confound or mediate the work stress-alcohol relationship.

• Previous Canadian studies have not examined how changes in work stress affect the risk of problematic alcohol use.

• A large portion of the current literature has been based on very specific working populations, such as police members, corporate head offices, specific manufacturing firms, etc. Studies have failed to examine a large sample of a wide range of employee types. Few studies have been based on representative samples of the workforce. Many studies were occupation and sometimes gender specific, making generalization problematic.

Given all of the literature reviewed thus far, a simple conclusion regarding the relationship between work stress and alcohol use is that the simplistic notion of "my job is driving me to drink" applies to a fairly small number of people. Rather the relationship between work stress and alcohol use is likely mediated by a number of factors, such as social support, job insecurity, and potentially the presence or absence of MDE.

Chapter 3: Objectives

The objectives are as follows: Among working Canadians aged 18-65 years -

1. To estimate the 12-month prevalence of problematic alcohol use at baseline, overall and by baseline levels of work stress.

2. To estimate and compare the 2-year incidence proportion and 14-year cumulative incidence of problematic alcohol use, overall and by levels of work stress at baseline.

3. To investigate the effect of changes in work stress on incidence of problematic drinking.

4. To investigate the role of major depression in the relationship between work stress and problematic alcohol use.

Chapter 4: Methods

To achieve the objectives specified above, a longitudinal study design was employed using data from the Canadian National Population Health Survey (NPHS).

4.1 Study Design

This study was a retrospective cohort design, using existing data from the NPHS. Participants were classified based on exposure status at baseline, and were followed until the end of the study time to compare incidence of the outcome. In this study, the longitudinal data was comprised of 8 cycles of data collection from 1994/95 to 2008/09.

4.1 The National Population Health Survey - Introduction

The National Population Health Survey (NPHS), initiated by Statistics Canada, was launched in 1994/1995, with the mandate of collecting health and related socio-demographic information on the Canadian population. The survey was planned to proceed through a total of 10 cycles of data collection, with one cycle being collected every two years. A total of eight cycles of data collection had been completed for the purposes of this study.

Information collected includes socio-demographic information, health status, health service use, chronic conditions and activity limitations, social environment, life at workplace, physical and mental health status, amidst others. A full list of variables and items to be analyzed can be found in Appendix E, while a full list of items collected in this survey is available from the reference listed (Statistics Canada, 2010).

4.2 National Population Health Survey – Methodology

4.2.1 Sampling

The target population was all household residents of Canadian provinces (Territories were excluded), excluding those who were full-time members of Canadian Forces Bases, institutionalized, from remote communities in Quebec and Ontario, or living on Indian Reserves and Crown Land. A multi-stage stratified sampling strategy was used. First, each province was split into three types of areas: major urban centers, urban towns, and rural areas. From these areas, different geographic and/or socio-economic strata were drawn. From each stratum, six clusters were selected. These clusters were usually census enumeration areas to ease data collection and make the

survey more cost effective. Clusters were selected using probability proportional to size (PPS) sampling. PPS sampling varies the probability with which a unit is selected according to its size; units do not have the same probability of selection. The PPS sampling would under represent individuals residing in large households, and over-represent individuals residing in small households. This was called the 'rejective' technique.

To enhance the representativeness of the sample, a "rejective" technique was applied (Tamblay & Catlin, 1995). Since only one member of each sample household was selected for in-depth interviewing and participation in the longitudinal panel, the chance of an individual being included in the panel would be inversely related to the number of persons in that household. The panel would tend to under represent people in large households, typically parents and dependent children, and over represent people in small households, who are often single or elderly. The rejective approach was applied by identifying a portion of the sample households for screening, and dropping households that did not have at least one member under age 25. Since apartment strata contain a high concentration of small households, their sample sizes were reduced instead of applying the rejective method. The rejective approach was not applied in remote regions because of the cost involved in contacting households (Tamblay & Catlin, 1995). The initial sample (cycle 1) consisted of 17, 276 individuals; this comprises the longitudinal sample. Table 4.1 shows the number of initial respondents who made up the longitudinal sample in 1994/95, compared to the number of respondents who provided full responses for all cycles in each province.

Table 4.1. Initial longitudinal respondents versus those who completed *all* cycles in each province. Source: Statistics Canada, 2010.

Province	Longitudinal Sample (n) Cycle 1 (1994/95)	Number of Respondents with Full Responses in Cycles 1-8
Newfoundland/Labrador	1082	657
Prince Edward Island	1037	643
Nova Scotia	1085	647
New Brunswick	1125	633
Quebec	3000	1766
Ontario	4307	2323
Manitoba	1205	728
Saskatchewan	1168	747
Alberta	1544	886
British Columbia	1723	952
Total	**17276**	**9982**

The overall response rate for each cycle is presented in Table 4.2. The Cycle 1 response rate is based on the 20,095 in-scope persons selected to form the longitudinal panel while the response rate for subsequent cycles is based on the 17,276 individuals who form the longitudinal panel. Partial response was considered non-response for the purpose of response rate calculations (Statistics Canada, 2010).

Table 4.2. Response rates of each cycle. Source: Statistics Canada, 2010.

Cycle - Year	Response Rate (%)
1 – 1994/95	83.6
2 – 1996/97	92.8
3 – 1998/99	88.3
4 – 2000/01	84.9
5 – 2002/03	80.8
6 – 2004/05	77.6
7 – 2006/07	77.0
8 – 2008/09	70.7

4.2.2 Data Collection

Trained Statistics Canada employees, through Statistics Canada calling centers, conducted all interviews. In Cycle 1, 75% of the interviews with the longitudinal respondents were conducted in person and the rest by telephone. Since Cycle 2, approximately 95% of the interviews have been conducted by telephone. Personal interviews were conducted if the respondent does not have a telephone, upon request of the respondent, or if the respondent lives in a health institution.

4.2.3 Follow-up, Non-Response, Refusal and Attrition

Participants were re-interviewed every two years. Non response was minimized through a number of strategies including frequent calling/visits at various times, pre-arranging interviews, multiple requests from various levels of seniority to minimize drop-out and refusal, and use of interviewers trained to trace respondents who cannot be contacted. Additionally, respondents were able to return to the survey even after missing cycles. Individuals who move out of Canada were not interviewed; however their contact information is kept on file and updated to allow for subsequent interviews on a return to Canadian residency.

While institutionalized individuals were excluded from the initial sample, individuals who became residents of medical institutions during the longitudinal component continued to be interviewed every two years, however receive the health care, not household component questionnaire. Individuals who died had cause of death checked with the Canadian Vital Statistics Database. Death is not considered a form of non-response or attrition in the NPHS.

Some non-response was inevitable, which may result in a loss of effective sample size and thus an increase in variance and biased estimates if non-respondents differ from respondents (Swain, Catlin & Beaudet, 1999). Swain and colleagues demonstrated that males accounted for more dropouts then females (53.5% compared to 46.7%), and more dropouts were from the middle age group. As such, adjustments were made by province, age group, and sex so that the weighted sample would correspond to the 1994/95 estimates. Information available from cycle 1 was used for non-response adjustment by forming weighting classes based on variables considered to be good predictors of non-

response. Twelve classes were created wherever the greatest differential non-response occurred and where there was sufficient sample size. Specific variables included income, age, sex, race, place of birth, dwelling owned/rented, presence of children/youths in the household, household size, and several geographic variables such as province and urban/rural designations. The variables used for creation of non-response adjustment classes differed from province to province (Swain, Catlin & Beaudet, 1999).

4.3 Data Access

The NPHS data is strictly controlled by the Social Sciences and Humanities Research Council (SSHRC) and Statistics Canada. The student obtained written permission, and signed the necessary documentation with the SSHRC and Statistics Canada to gain access to the NPHS data through the Prairie Regional Data Center (RDC) prior to beginning analysis. The Prairie RDC is a closed network, video monitored, secure facility for data storage and analysis and is located at the McKimmie Library on the University of Calgary Campus. All information released from the facility was done so at the discretion of the Senior Analyst, a Statistics Canada official, in accordance with Statistics Canada and Research Data Center policy. Additionally, all members of the research team must sign a binding contract of confidentiality and non-disclosure. Due to privacy and confidentiality concerns, no data that can risk identifying a participant may be published or released from the facility; as such, minimum cell count rules apply. Therefore, results to be released are vetted at the discretion of analysts at the RDC to ensure confidentiality.

In fulfilling the requirements of a Master's of Science degree in Community Health Sciences (Epidemiology) in the Faculty of Medicine at the University of Calgary, this study obtained approval from the Conjoint Health Research Ethics Board (CHREB) prior to study commencement.

4.4 Outcome – Problematic Alcohol Use

The primary outcome of interest in this study was problematic alcohol use. In the NPHS, alcohol use was assessed during each cycle by asking participants about their frequency and quantity of alcohol consumption both during the past week and the past month at the time of interview. The questions used in the NPHS to determine alcohol use

can be found in Appendix B. In this study, problematic alcohol consumption was defined and analyzed in three ways:

1. 5+ drinks on one occasion at least once per month in the past 12 months (Statistics Canada, 2009).

2. Weekly consumption of 15+ drinks for men and 10+ drinks for women (Butt, et al. 2011).

3. Problematic drinking as identified by a modified version of the AUDIT-C, which was derived from similar questions in the NPHS.

The Alcohol Use Disorders Identification Test - C (AUDIT-C) is a 3-item alcohol screen that can help identify persons who are hazardous drinkers or have active alcohol use disorders (Bush, et al., 1998). Detailed information regarding the sensitivity and specificity of this instrument can be found in Appendix C. The AUDIT-C contains the following three questions: How often do you have a drink containing alcohol; how many standard drinks containing alcohol do you have on a typical day; and how often do you have six or more drinks on one occasion? The NPHS contains questions that are almost identical to the first two AUDIT-C questions. However, the NPHS and AUDIT-C differ in the third question, while the AUDIT-C asks how often an individual has six or more drinks on one occasion, the NPHS inquires as to how often an individual has five or more drinks on one occasion. As such, we used 'five or more drinks' in substitute to identify hazardous drinking. These three sets of NPHS questions were combined and scored identically to the AUDIT-C scoring to determine hazardous drinking behaviors; detailed information regarding scoring procedures can be found in Appendix C.

4.5 Exposure – Work Stress

The primary exposure variable of interest in this study was work stress. Work stress in the NPHS is assessed using a brief version of the Job Content Questionnaire (JCQ), based on the demand-control model developed by Karasek and colleagues (1998). The JCQ is designed to measure social and psychological characteristics of a job. Twelve items in the JCQ are used to measure job control, psychological demands, job insecurity, and workplace social support. Each item is scored using a 5-point Likert scale from

strongly agree to strongly disagree. A copy of the brief JCQ used in the NPHS can be found in Appendix D. Karasek and colleagues assessed the reliability of the scales via the internal consistency of the JCQ across six different study populations from Canada, the US, the Netherlands, and Japan. The overall Cronbach's alpha coefficient is acceptable, at 0.73 for women and 0.74 for men (Karasek, et al. 1998). Data regarding work stress was collected in cycle 1, and cycles 4-8.

In this study, work stress was defined and analyzed in three ways:

1. Job strain ratio. Job strain is measured as a ratio of psychological demands and decision latitude, which includes skill discretion and decision authority. This score is calculated by dividing the score for psychological demands by decision latitude. A job strain ratio greater than 1 indicates that psychological demands were greater than decision control and was defined as high job strain (Statistics Canada, 2009). For objectives 1-3, job strain ratio was assessed as a binary variable, and for objective 4 change in job strain ratio was assessed as a continuous variable.

2. Four categories on the basis of quartiles of overall work stress scores from the JCQ: those who fall below the 25th percentile; those who fall between the 25th and 50th percentile; those who fall between the 50th and 75th percentile; and those who fall above the 75th percentile.

3. On the basis of NPHS questions and the demand-control model, job strain was analyzed as a categorical variable as: 'passive', 'high strain', 'low strain', or 'active' job, as shown previously in Figure 1.

4.6 Covariates

Results from the literature review indicate that several covariates are important in the relation between work stress and alcohol use. The following covariates were deemed relevant given the literature and were included in the analysis: Age, sex, education, part or full time work, shift type, average # of hours worked/week, income, marital status, immigration status, physical activity, smoking, rural/urban status, self-reported health status, job insecurity, and social support. Special consideration was given to the role of

MDE. Covariates were defined at baseline (Cycle 1). Variable names and coding are available in Appendix E.

Age was analyzed as a continuous variable, within the age range of 18-65 years. An age-squared term was included in analyses in order to assess for non-linear trends. The average number of hours worked per week was also assessed as a continuous variable, with the inclusion of a squared term. The inclusion of these squared terms enables the assessment of a relationship between work stress and problematic alcohol use that varies in a non-linear way by age and/or number of hours worked per week.

Part or full time working status was dichotomized into (1) full time, working more than 30 hours per week, and (2) part time, working less than 30 hours per week (Statistics Canada, 2009). Shift type was coded into the following four categories: (1) regular daytime, (2) regular evening/night, (3) rotating, split shift, or on call, and (4) irregular. Job insecurity indicates if the respondent felt that their job security was good in the past 12 months; job insecurity was categorized into (1) low/neutral insecurity (strongly agree, agree, or neither agree nor disagree that their job security was good) and (2) high insecurity (disagree or strongly disagree that their job security was good). Perceived social support in the workplace indicates the social support available to the respondent at their job in the past 12 months. Questions were asked about whether the supervisor and colleagues are helpful, and whether the respondent was exposed to hostility or conflict from the people they work with. Participants were dichotomized into (1) low social support (strongly disagree or disagree that there is social support in the workplace) and (2) neutral/high social support (strongly agree, agree, or neither agree nor disagree that there is social support in the workplace).

Income was measured in terms of total household income, and was categorized into the following: (1) ≥$80,000; (2) $60,000-<$80,000; (3) $30,000-<$60,000; (4) $15,000 - <$30,000; and (4) < $15,000. For objectives 2-4, income was further grouped into 3 categories for analyses: (1) ≥$80,000, (2) $30,000-<$80,000 and (3) <$30,000. Income was combined for two reasons, first, no significant differences were observed between the combined income groups, and second, combining income groups was necessary due to concerns regarding sample size. Education is comprised of four responses, based on the

highest level of education achieved: (1) college or university degree; (2) some post-secondary; (3) high school diploma; and (4) less than high school. For objectives 2-4, education was further grouped into 2 categories for analyses: (1) college/university degree or some post secondary and (2) high school or less; education was combined for two reasons, first, no significant differences were observed between the combined education groups, and second, combining education was necessary due to concerns regarding sample size. Marital status was coded into 4 categories: (1) married or living in common law, (2) separated, divorced, or widowed, and (3) single, never married. Immigration status was assessed by examining country of birth (Canadian born or other).

The physical activity variable available in the NPHS categorizes participants based on total daily expenditure values (kcal/kg/day) and is based on the same criteria used to categorize people in the Ontario Health Survey. Individuals are classified as active, moderately active, or inactive based on the frequency and duration in which they participate in a number of different physical activities. Smoking status was analyzed as one of four categories in the NPHS "type of smoker" derived variable: current daily smoker, current occasional smoker, previously smoked, never smoked. Self-reported health status is categorized into the following categories: (1) fair/poor health, and (2) good/very good/excellent health.

Rural and urban areas are provided as a dichotomous variable. Urban areas are those continuously built-up having a population concentration of 1000 or more and a population density of 400 or more per square kilometer based on the previous census. To be considered as continuous, the built-up area must not have a discontinuity exceeding 2 kilometers.

MDE is assessed using the Composite International Diagnostic Interview – Short Form (Major Depression) (CIDI-SFMD), developed and validated by the Survey Research Center at the University of Michigan (Kessler & Mroczek, 1994). The goal of the CIDI – SFMD was to provide a quick screen for a MDE; this tool takes approximately ten minutes to administer. The CIDI-SFMD is estimated to have a sensitivity of 89.6%, a specificity of 93.9%, a positive predictive value of 75.7% and a negative predictive value of 86.9% when compared to the CIDI and DSM-III-R (Kessler

et al, 1998). Responses to the CIDI-SFMD are scored on a scale and transformed into a probability estimate of a diagnosis of a major depressive episode, with predicted probability ranging from 0 to 1. According to validation data, a probability estimate of 0.90 indicates a 90% probability that the respondent has experienced a MDE in the preceding 12 months (Statistics Canada, 1995). This 90% predictive cut-point corresponds to reporting five of nine symptoms presented earlier, at least one of which must be depressed mood or loss of interest. As such, probabilities equal to or greater than 0.90 were defined as an MDE case.

4.7 Weighting

The sampling design of the NPHS affects the precision of estimates obtained in several ways. To account for the effect of a multi-stage sample selection, Statistics Canada has developed sampling weights, as well as bootstrap weights. If the effects of the complex design were not considered in analyses, the NPHS population would be incorrectly assumed as a simple random sample. Survey weights are used to account for the unequal probability of selection and non-response; by applying survey weights, the estimates will be representative of the entire target population.

Survey weights were developed based on census data and weighted by sex and age group for each province. As the first cycle of data was collected in 1994/95, census data from 1994/95 was used to develop survey weights. The weights were subsequently adjusted after each subsequent cycle to reflect response and non-response of study participants; the adjustment through weighting compensates for non-response. The survey weight includes only participants who have provided a full response (members who have a status of complete, deceased, or institutionalized) at each cycle. Individuals who are excluded from this subset are therefore non-respondents and their weight must be redistributed to compensate for this non-response. A different non-response adjustment is made for each cycle, and these adjustments are cumulative from one cycle to another. For instance, to obtain the cycle 8 weights, the non-response adjustments for cycles 2 through 8 are applied successively to the cycle 1 basic weights. A full description of survey weight calculations is available in the Statistics Canada NPHS documentation (Statistics Canada, 2010).

In addition to the sampling weights, the NPHS uses the bootstrap method to calculate valid variances when modeling. This method takes the complexities of the survey design into account. Statistics Canada recommends the use of bootstrap weighting to obtain valid estimates and correct standard errors when modeling. The bootstrap method consists of drawing several subsamples from the full longitudinal sample. The bootstrap files provided to users of the NPHS contain 500 bootstrap weights. The use of 500 weights was decided upon for several reasons: to maintain a reasonable file size for dissemination, to maintain a reasonable computation time for an average computer, and to ensure accuracy. To estimate the variance for a point estimate, it is sufficient to calculate this same point estimate 500 times using the 500 bootstrap weights. The variability among the 500 estimates provides the variance estimate for the point estimate. To clarify, here are the main steps carried out to calculate the bootstrap weighted variance of a given point estimate:

a) The point estimate (total, ratio, etc.) was calculated using the longitudinal sampling weight.
b) The same statistic was calculated using each of the 500 bootstrap weights on the bootstrap weights file; 500 bootstrap estimates (of the total, ratio, etc.) were thus obtained.
c) Finally, the variance of the 500 bootstrap estimates was calculated. This variance corresponds to the estimated variance of the point estimate calculated in step a).

In analyses, sampling weights were applied to all cross-tabulations. For regression modeling bootstrap weighting was used to ensure the correct variance of an estimate was obtained.

4.8 Analysis Plan

For all analyses, participants who were not within the age range of 18-65 and were not working at baseline (1994/95) were excluded. Initial analyses were completed to describe the characteristics of participants, and to assess the impact of non-response over the follow-up period. As the primary objective of this study was to assess the longitudinal relationship between work stress and problematic alcohol use, the demographic, socioeconomic, and health status characteristics were presented for the

longitudinal sample (those free of problematic drinking at baseline). The characteristics of respondents were compared through the use of chi-square statistics.

Participants who dropped out of the cohort and who did not have data about alcohol use over the follow-up period were considered "non-response" and were excluded from longitudinal analyses. Attrition, or loss to follow up, is a concern in longitudinal studies as those who remain in the study may differ from non-responders in regards to their work stress-alcohol relationship. As such, analyses were completed to compare those who completed all eight cycles (responders) versus those who did not (non-responders) on baseline characteristics and work stress at baseline through the use of chi-square statistics.

In the NPHS, the following categories were developed to indicate respondents who did not provide complete information for analysis: 'Refusal', 'Don't Know', and 'Not Stated'. Given that Statistics Canada personnel collected the data, the quality of the data is managed and controlled by Statistics Canada. There was no method of tracing back to the original questionnaires, or to contact respondents for information pertaining to questions that they provided invalid information for. As such, for the purpose of this study, the responses 'Refusal', 'Don't Know', and 'Not Stated' were excluded. Participants who provided these answers and those who dropped out of the cohort were considered 'non-responders'.

4.8.1 Objective 1 - To estimate the 12-month prevalence of problematic alcohol use at baseline, by baseline level of work stress.

Analyses for objective 1 involved only the baseline population; as such, the longitudinal exclusion requiring participants to be free of problematic drinking at baseline does not apply. The proportion of individuals with problematic alcohol use at baseline, by baseline level of work stress, was estimated. Chi-square tests were used to compare the differences in problematic drinking.

4.8.2 Objective 2.1 - To estimate the 2-year incidence proportion and 14-year cumulative incidence of problematic alcohol use, overall and by level of work stress at baseline.

As mentioned previously, those with problematic drinking at baseline was excluded, as the goal of the thesis research was to obtain incidence estimates regarding

the relationship between work stress and alcohol use. For two-year incidence estimates, we calculated the proportion of individuals who developed a problematic drinking indicator by cycle 2, stratified by demographics and work stress at baseline. The denominator consisted of all individuals who were free of problematic drinking at baseline; this comprised the at risk population.   The numerator consisted of all individuals from this at risk population who developed problematic drinking in cycle 2.

For 14-year cumulative incidence estimates, we calculated the proportion of individuals who developed a problematic drinking indicator between cycles 2 and 8. A cumulative incidence proportion requires a closed cohort; as such, only those who provide full response to all 8 cycles of the NPHS were included. This proportion was calculated overall, and stratified by demographics and work stress at baseline. The denominator was comprised of all those who were free of problematic drinking at baseline; the numerator consisted of those from the at risk population who developed a problematic drinking indicator between cycles 2 and 10.

Stratified proportions and corresponding chi-square tests are reported. Further, risk ratios (RR) and corresponding 95% CI were estimated.

4.8.3 Objective 2.2 – To investigate the longitudinal relationship between baseline work stress and problematic drinking using regression modeling.

In addition to the stratified analysis completed in Objective 2.1, regression modeling was employed to investigate the relationship between baseline work stress and problematic drinking for both 2 and 14 year time periods, accounting for the potential modifying and/or confounding role of the covariates. The crude association between each definition of work stress and problematic drinking was estimated using univariate regression. Models were then adjusted for age and assessed first for effect modification by each demographic and health status variable, then, if no modification was observed, for confounding through a comparison of the crude estimate to the covariate adjusted model.

Effect modification exists when the association between exposure (work stress) and outcome (problematic alcohol use) varies by levels of a third factor (Hennekens & Buring, 1987). The potential effect modification of the work stress-problematic drinking

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relationship by each demographic and health status variable was examined. This was done through the creation of an "interaction" term by generating a product term of work stress x the covariate; this interaction term was then included in the model. There was considered evidence of effect modification if the p-value associated with the interaction term was less than 0.05, or if the confidence interval associated with the estimate did not enclose the null value. Where effect modification was observed, results are described by the levels of the modifying variable. If there was no evidence of effect modification, confounding was assessed through a comparison of the crude and variable adjusted estimate. Confounding occurs when all or part of the apparent association between exposure and outcome is in fact accounted for by another variable that affects the outcome and is not itself affected by exposure (Porta, 2008). Any demographic or health status variable that was found to be an effect modifier, confounder, or strong independent risk factor for problematic drinking was included in initial multivariate models.

In multivariate models, terms were removed through step-wise backwards elimination. If an effect modification term was present in the model, this was the first term assessed. If it was non-significant on the basis of the p-value, it was removed from the model. After assessing each effect modification term present in the model, additional terms were removed one at a time on the basis of significance. After the removal of each term, the estimate associated with the work stress-problematic drinking relationship was compared to the earlier model. If the estimate was materially different then there was considered to be evidence of confounding and the term was replaced.

4.8.4 Objective 3 - To investigate the effect of changes in work stress on incidence of problematic drinking.

Work stress is a factor that is likely to change over time. The changes in work stress, or lack of change, may affect the development of problematic drinking. Therefore, it was necessary to evaluate the effects of persistent work stress and changing work stress on the incidence of problematic drinking from cycles 5-8.

Change in job strain was assessed as a continuous measure from cycles 1-4 to represent changes in work stress, e.g. baseline job strain score – cycle 4 job strain score. As a continuous measure, negative values would represent a change from low job strain

to high job strain and positive values would represent a change from high job strain to low job strain. Values of zero represent those individuals who did not experience a change in job strain from cycles 1 to 4.

Those who were identified as engaging in problematic drinking in cycles 1-4 were excluded from analyses to obtain incidence estimations. The denominator includes all individuals free of problematic drinking in cycles 1-4 (at-risk population) and the numerator consists of all individuals from this at risk population who develop problematic drinking in cycles 5-8. Effect modification and confounding were assessed as described in the previous section 4.8.3.

4.8.5 Objective 4 - To investigate the role of major depression in the relationship between work stress and problematic alcohol use.

Analyses related to Objectives 2 and 3 were re-completed with the inclusion of MDE status to assess if MDE plays a significant role in the relationship between work stress and alcohol use. MDE was first assessed as a potential modifier, and if no modification was present, then as a confounder of the work stress-problematic drinking relationship.

Chapter 5: Results

        The original sample size in cycle 1 of the NPHS was 17, 276 individuals. For the purposes of our study, we restricted this sample to those who were employed, within the age range of 18-65 years, and had complete data regarding the exposure, work stress, at baseline. The baseline sample was 5, 924. Additionally, as we are primarily interested in the longitudinal relationship between work stress and alcohol use, those with problematic drinking at baseline were excluded to enable incidence estimation for the longitudinal sample. The final sample size for longitudinal analysis was 4, 326.

Figure 5.1: Baseline and longitudinal sample size.
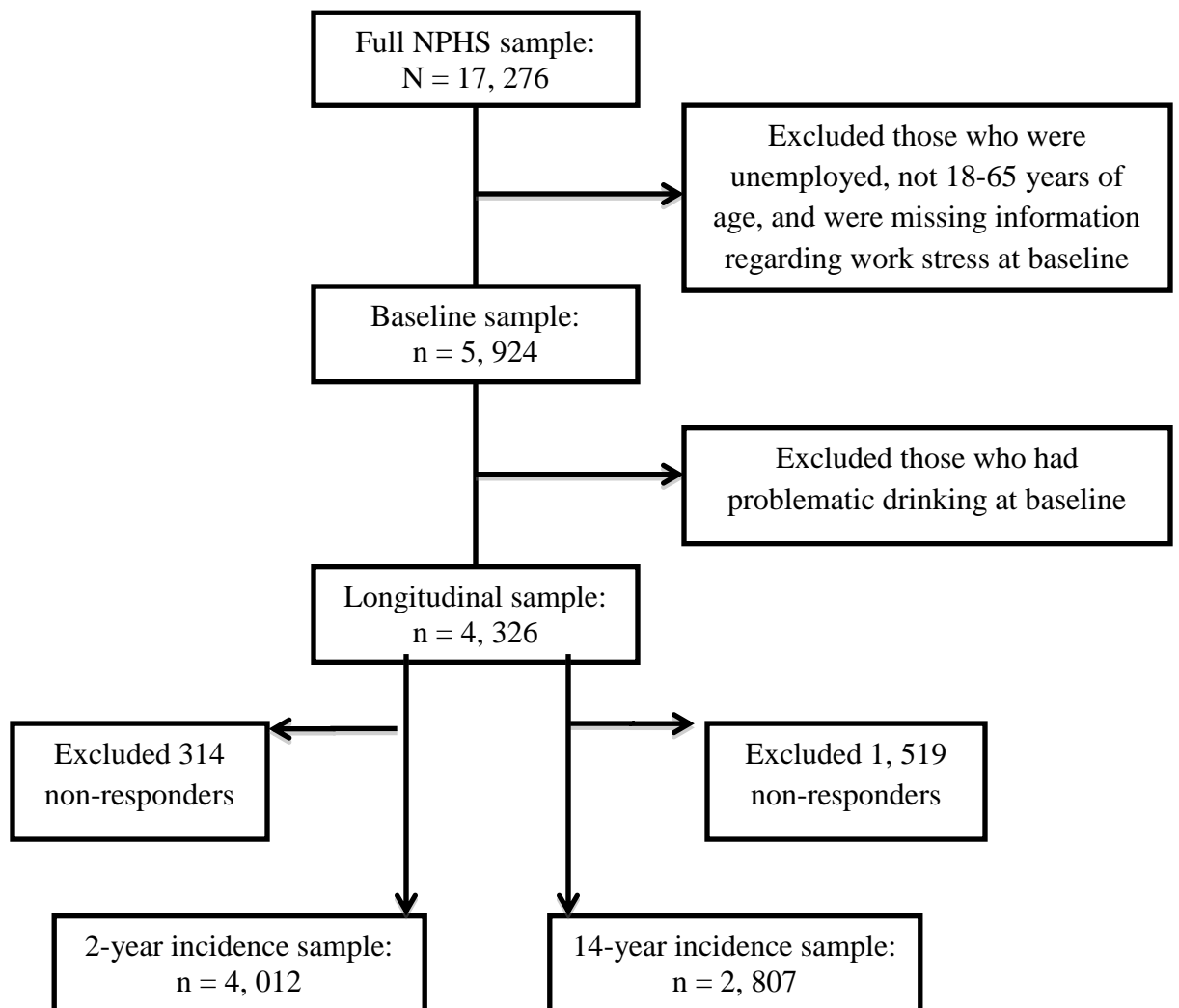
5.1 Demographic characteristics

The demographic characteristics of participants are presented overall, and in regards to exposure at baseline. Significant findings are presented in text; tables containing full demographic characteristics can be found in Appendix F.

As seen from Table 7.1 in Appendix F, among the longitudinal sample, the average age was 38.3 years, the majority had a college or university education, an annual income of $30,000-<$60,000, were married or living common-law, were Canadian born, were physically inactive, lived in an urban setting, had good/very good/excellent health, had low job insecurity, high or neutral social support at work, did not experience a MDE in the past 12 months, worked full time, had regular daytime shifts, and worked an average of 38.4 hours per week.

In regards to binary job strain, 56.6% had low job strain and 43.4% had high job strain. Regarding categorical job strain, 24.6% had high strain jobs, 20.2% had low strain jobs, 42.0% had passive jobs, and 13.3% had active jobs. Finally, regarding quartiles of work stress, 29.9% were in the lowest quartile, 29.3% were in the 25-50th quartile, 19.8% were in the 50-75th quartile, and 21.0% were in the highest quartile (Tables 7.1-7.3 in Appendix F).

The mean age of participants was higher among those with low job strain (t=-6.63, p<0.001), and those in the lower quartiles of work stress (t=-8.69, p<0.001). Significantly more females reported high job strain (χ^2=29.32 (df=1), p<0.001) and were in the upper quartiles of work stress (χ^2=36.90 (df=3), p<0.001). There was a greater proportion of single or never married participants with high job strain ratio (χ^2=21.37 (df=2), p<0.001), high strain or passive jobs (χ^2=52.52 (df=6, p<0.001), and in the upper quartiles of work stress (χ^2=54.36 (df=6, p<0.001). Those with MDE were more likely to experience high job strain ratio (χ^2=44.57 (df=1), p<0.001), have high strain jobs (χ^2=71.79 (df=3), p<0.001), and be in the upper quartiles of work stress (χ^2=45.15 (df=3), p<0.001). Individuals with high job insecurity were more likely to report high job strain ratio (χ^2=43.11 (df=1), p<0.001), have a high strain job (χ^2=44.14 (df=1),

p<0.001), and were in the upper quartiles of work stress (χ^2=502.04 (df=1), p<0.001) (Tables 7.1-7.3 in Appendix F).

5.2 Response and non-response

Of the longitudinal sample of 4, 326, 314 individuals were non-responders for the 2 year time period of cycle 1 to cycle 2, and 1, 519 individuals were non-responders for the 14 year time period of cycle 1 to cycle 8. Proportions of responders and non-responders were compared across each demographic variable at baseline, and level of work stress at baseline through chi-square statistics for both 2 and 14 year time periods. Significant findings are presented in text; tables containing a full description of responders and non-responders can be found in Appendix G.

Over the 2-year follow up time period, non-responders were younger (t=5.01, p<0.001), and more likely to be current daily smokers at baseline (χ^2=18.94 (df=3), p=0.0053). Over the 14-year follow up time period, non-responders were younger (t=4.73, p<0.001), more likely to be male (χ^2=9.22 (df=1), p=0.0195), have lower income (χ^2=40.00 (df=4), p=0.001), be single/never married (χ^2=47.16 (df=2), p<0.001), and be a current daily smoker at baseline (χ^2=25.91 (df=3), p=0.002). Levels of work stress were not associated with participant response for the 2 or 14-year time periods on the basis of chi-square statistics.

5.3 Objective 1: To estimate the 12-month prevalence of problematic alcohol use at baseline, by baseline levels of work stress.

The analysis for Objective 1 was concerned with prevalence of problematic alcohol use at baseline only; as such the longitudinal sample was not used for this analysis. Participants were included provided they had complete information regarding work stress and problematic drinking at baseline (N=5, 924). The following are the overall proportion of participants who had each problematic drinking indicator at baseline: 26.3% for 5+ drinks on one occasion at least once per month in the past year, 23.1% for the proxy AUDIT-C for men, 17.8% for the proxy AUDIT-C for women, 11.1% for 15+ drinks/week for men, and 8.9% for 10+ drinks/week for women. The prevalence of problematic drinking, stratified by level of work stress is presented in Tables 5.1-5.3.

The proportion of problematic drinking, as identified by the proxy AUDIT-C for women, in the high job strain group was greater than that in the low job strain group ($\chi^2 =$ 9.17 (df=1), p=0.016), and among those in the upper quartiles of work stress compared to the lower quartiles ($\chi^2 =16.21$ (df=3), p=0.016) (Table 5.3). No other significant differences between work stress and problematic drinking at baseline were observed.

Table 5.1: Prevalence of 5+ drinks on one occasion at least once per month at baseline, by levels of work stress.

Exposure	5+ drinks (0.2631)	Chi2 (df)	p
Binary job strain			
Low	0.1819	2.61 (1)	0.2013
High	0.1657		
Categorical jobs			
Low	0.1606	6.71 (3)	0.2303
High	0.1658		
Active	0.1648		
Passive	0.1895		
Quartile work stress			
$<25^{th}$	0.1588	6.34 (3)	0.2615
$25\text{-}50^{th}$	0.1745		
$50\text{-}75^{th}$	0.1752		
$>75^{th}$	0.1941		

Table 5.2: Prevalence of 10+ drinks/week for women and 15+ drinks/week for men at baseline, by levels of work stress.

Exposure	10+ drinks women (0.0892)	Chi2 (df)	p	15+ drinks men (0.1107)	Chi2 (df)	p
Binary job strain						
Low	0.0560	0.60 (1)	0.5499	0.1204	2.63 (1)	0.2467
High	0.0629			0.1014		
Categorical jobs						
Low	0.0749	6.86 (3)	0.2757	0.1125	5.05 (3)	0.3980
High	0.0553			0.1071		
Active	0.0797			0.0863		
Passive	0.0501			0.1248		
Quartile work stress						
$<25^{th}$	0.0736	7.58 (3)	0.1904	0.0854	12.30 (3)	0.0718
$25-50^{th}$	0.0443			0.1274		
$50-75^{th}$	0.0680			0.1076		
$>75^{th}$	0.0520			0.1353		

Table 5.3: Prevalence of the proxy AUDIT-C for women and men at baseline, by levels of work stress.

Exposure	Women (0.1783)	Chi2 (df)	p	Men (0.2309)	Chi2 (df)	p
Binary job strain						
Low	0.0921	9.17 (1)	0.0161	0.1684	0.30 (1)	0.6841
High	0.1453			0.1597		
Categorical jobs						
Low	0.1569	3.86 (3)	0.4781	0.1439	13.34 (3)	0.0585
High	0.1428			0.1564		
Active	0.1267			0.1233		
Passive	0.1395			0.1791		
Quartile work stress						
$<25^{th}$	0.2192	16.21 (3)	0.0162	0.1488	7.23 (3)	0.2593
$25-50^{th}$	0.2278			0.1542		
$50-75^{th}$	0.2439			0.1325		
$>75^{th}$	0.2795			0.1649		

5.4 Objective 2: To estimate and compare the 2-year incidence proportion and 14-year cumulative incidence of problematic alcohol use, overall and by level of work stress at baseline.

The overall estimates of incidence are presented in Table 5.4. Two and 14-year estimates are highest for the 5+ drinks on one occasion at least once per month and lowest for 10+ drinks/week for women and 15+ drinks/week for men (Table 5.4).

Table 5.4. Overall estimates of 2 and 14-year incidence proportions for each indicator of problematic drinking.

Outcome Variable	2-year incidence proportion (n=4012)	14-year cumulative incidence proportion (n=2807)
5+ drinks on one occasion	0.1047	0.2558
Proxy AUDIT-C for men	0.0866	0.1927
Proxy AUDIT-C for women	0.0465	0.1684
10+ drinks/week for women	0.0154	0.0826
15+ drinks/week for men	0.0215	0.0764

The crude associations for men are presented in Tables 5.5 and 5.6 for each indicator of problematic drinking and work stress. Among men, those with high job strain ratio were less likely to experience 2 and 14-year incidence of problematic drinking as identified by the proxy AUDIT-C compared to those with low job strain ratio (RR=0.69, 95% CI: 0.53-0.90; RR=0.72, 95% CI: 0.59 – 0.89, respectively) (Table 5.5). Further, 14-year incidence of the proxy AUDIT-C was lower among men with high strain jobs, compared to men with low strain jobs (RR=0.63, 95% CI: 0.47-0.85) (Table 5.5). Similarly, 2 and 14-year incidence of 15+ drinks/week for men is lower among those with high job strain ratio (RR=0.52, 95% CI: 0.30-0.91; RR=0.65, 95% CI: 0.46-0.91, respectively) (Table 5.6). The crude relationships for the outcome indicators specific to women or for 5+ drinks on one occasion at least once per month were non-significant and can be found in Appendix H.

Table 5.5: 2-year and 14-year incidence proportion of the proxy AUDIT-C for men by baseline work stress.

| | Problematic drinking by AUDIT-C for men | | | | | |
	2-year proportion (n=347)	RR (95% CI)	p	14-year proportion (n=541)	RR (95% CI)	p
Job Strain						
Low	0.1051	0.69 (0.53-0.90)	0.006	0.2435	0.72 (0.59-0.89)	0.003
High	0.0722			0.1765		
Categorical						
Low	0.1008	Ref		0.2489	Ref	
High	0.0703	0.70 (0.47-1.04)	0.075	0.1573	0.63 (0.47-0.85)	0.003
Active	0.0905	0.90 (0.59-1.36)	0.612	0.2426	0.97 (0.72-1.32)	0.871
Passive	0.0977	0.97 (0.69-1.36)	0.855	0.2208	0.89 (0.70-1.12)	0.319
Quartiles						
<25th	0.0970	Ref		0.2349	Ref	
25-50th	0.1020	1.05 (0.75-1.47)	0.771	0.2449	1.04 (0.82-1.32)	0.728
50-75th	0.0751	0.77 (0.54-1.11)	0.162	0.1996	0.85 (0.63-1.14)	0.276
>75th	0.0850	0.88 (0.60-1.30)	0.532	0.1638	0.70 (0.52-0.94)	0.017

Table 5.6: 2-year and 14-year incidence proportion of 15+ drinks/week for men by baseline work stress.

| | 15+ drinks/week for men | | | | | |
	2-year proportion (n=87)	RR (95% CI)	p	14-year proportion (n=215)	RR (95% CI)	p
Job Strain						
Low	0.0293	0.52 (0.30-0.91)	0.023	0.0994	0.65 (0.46-0.91)	0.013
High	0.0153			0.0646		
Categorical						
Low		Cell size too small		0.0961	Ref	
High				0.0541	0.56 (0.33-0.96)	0.034
Active				0.1029	1.07 (0.63-1.81)	0.798
Passive				0.0898	0.93 (0.59-1.48)	0.773
Quartiles						
<25th	0.0232	Ref		0.1012	Ref	
25-50th	0.0274	1.18 (0.64-2.18)	0.591	0.0973	0.96 (0.63-1.46)	0.854
50-75th	0.0226	0.97 (0.41-2.32)	0.953	0.0728	0.71 (0.43-1.19)	0.192
>75th	0.0233	1.01 (0.49-2.07)	0.987	0.0614	0.61 (0.38-0.96)	0.032

The longitudinal modeling results are of most interest, and will be discussed for the remainder of this section. However, stratified analyses were completed for all definitions of work stress and problematic drinking for both 2 and 14-year time periods, by each covariate; stratified tables and a brief description can be found in Appendix H. Regression modeling was used to identify potential modifiers and/or confounders of the work stress-alcohol use relationship. All regression models were age adjusted. The final regression model results are presented on the basis of the classification of work stress used.

5.4.1 Job Strain Ratio

Men with high job strain were at a lower risk of 14-year incidence of problematic drinking, as defined by the proxy AUDIT-C, adjusted for age (RR=0.70, 95% CI: 0.57-0.87) (Table 5.7); there was no evidence of effect modification or confounding.

With the 2-year proxy AUDIT-C among men as the dependent variable, there was a significant interaction between job strain ratio and shift type (z=2.28, p=0.022). Given that there is evidence of modification, it is necessary to report estimates stratified by shift type (Table 5.8). When stratified by shift type, there is a significant relationship among men with regular day shifts only; among those with regular day shifts, men with high job strain were less likely to have had problematic drinking over 2 years based on the AUDIT-C compared to men with low job strain, adjusted for age (RR=0.30, 95% CI: 0.14-0.63).

Table 5.7: 14-year RR of the proxy AUDIT-C for men, by binary job strain ratio

	Problematic drinking by the AUDIT-C for men				
	RR	z	p	95% CI LU	95% CI UU
Job strain	0.70	-3.21	0.001	0.57	0.87

*adjusted for age

Table 5.8: The association between binary job strain and 2-year proxy AUDIT-C for men, stratified by shift type.

	Problematic drinking by the AUDIT-C for men				
Shift Type	RR	z	p	95% CI LU	95% CI UU
Regular daytime	0.30	-3.18	0.001	0.14	0.63
Regular evening/night	0.29	-0.74	0.459	0.10	7.71
Rotating/split/on call	0.31	-1.91	0.066	0.09	1.03
Irregular	1.16	0.37	0.713	0.52	2.59

*adjusted for age

A significant interaction was also observed by age for 2-year incidence of the proxy AUDIT-C among men (z=2.90, p=0.004). Given that there was modification by age, it is also necessary to report estimates at different ages. Men with high job strain were less likely to have had problematic drinking over 2 years based on AUDIT-C compared to those with low job strain at ages younger than 55 years. At age 20 the RR=0.32 (95% CI: 0.18-0.71). However, at age of approximately 55 years, the

relationship reverses, such that those with high job strain have a higher risk of problematic drinking. At age 65 the RR=1.57 (95% CI: 1.03-1.78).

Similar to the proxy AUDIT-C for men, a significant relationship was observed between binary job strain and incidence of 15+ drinks/week for men (Table 5.9). Men with high job strain were at lower risk of 2 and 14-year incidence of 15+ drinks/week, adjusted for age (RR=0.50, 95% CI: 0.28-0.88; RR=0.63, 95% CI: 0.45-0.90, respectively); there was no evidence of effect modification or confounding.

Table 5.9: 2 and 14-year RR of 15+ drinks/week for men, by binary job strain ratio.

	15+ drinks per week for men				
	RR	z	p	95% CI LU	95% CI UU
Job strain – 14 year	0.63	-2.58	0.010	0.45	0.90
Job strain – 2 year	0.50	-2.39	0.017	0.28	0.88

*adjusted for age

There was no significant relationship between binary job strain ratio and 5+ drinks on one occasion at least once per month, or for indicators of problematic drinking specific to women (Appendix I).

5.4.2 Categorical Job Strain

When the associations between categorical job strain (low strain, passive, active, high strain) and problematic alcohol use were examined, there was evidence of effect modification by rural/urban status for the indicator of 5+ drinks on one occasion over the 2-year time period (z=-2.06, p=0.039); estimates stratified by rural/urban status are presented in Table 5.10. Among those who reside in urban settings, those with passive jobs are at a higher risk of 2-year incidence of 5+ drinks on one occasion at least once per month, compared to those with low strain jobs (RR=2.01, 95% CI: 1.27 – 3.18) after adjusting for age and gender. Among those who reside in rural settings, those with active jobs are at a lower risk of 2-year incidence compared to those with low strain jobs (RR=0.26, 95% CI: 0.13 – 0.53) after adjusting for age and gender (Table 5.10). There

were no significant findings for 5+ drinks on one occasion over the 14-year time period (Appendix I).

Table 5.10. The association between categorical job strain and 2-year risk of 5+ drinks on one occasion at least once per month, stratified by rural/urban status

| | 5+ drinks on one occasion at least once per month | | | | |
	RR	z	p	95% CI LU	95% CI UU
Urban					
High strain	1.61	1.69	0.090	0.93	2.78
Active	1.62	1.55	0.120	0.88	2.96
Passive	2.01	2.97	0.003	1.27	3.18
Rural					
High strain	0.69	-1.51	0.132	0.43	1.12
Active	0.26	-3.71	<0.001	0.13	0.53
Passive	0.91	-0.45	0.654	0.59	1.39

*adjusted for age and gender, low strain jobs represent the reference group

Rural/urban status also served as an effective modifier in the relation between the proxy AUDIT-C for women and categorical job strain over the 2-year time period (z=-3.24, p=0.001); rural/urban stratified estimates are presented in Table 5.11. Among women residing in urban areas, those with high strain or passive jobs are at a higher risk of 2-year incidence of problematic drinking compared to women with low strain jobs after adjusting for age (RR=2.55, 95% CI: 1.28-5.10; RR=2.50, 95% CI: 1.28-4.88, respectively) (Table 5.11). There is no significant relationship between any strata of categorical job strain and the AUDIT-C for women residing in rural areas. Additionally, there were no significant findings for the proxy AUDIT-C among women over the 14-year time period (Appendix I).

Table 5.11. The association between categorical job strain and 2-year risk of proxy AUDIT-C for women, stratified by rural/urban status

		RR	**z**	**p**	**95% CI LU**	**95% CI UU**
		Problematic drinking by the AUDIT-C for women				
Urban						
	High strain	2.55	2.65	0.008	1.28	5.10
	Active	1.77	1.41	0.158	0.80	3.89
	Passive	2.50	2.69	0.007	1.28	4.88
Rural						
	High strain	1.37	0.50	0.617	0.40	4.66
	Active	0.73	-0.22	0.828	0.04	12.75
	Passive	1.22	0.19	0.851	0.15	9.96

*adjusted for age and gender, low strain jobs represent the reference group

Men with high strain jobs were less likely to experience 14-year incidence of the proxy AUDIT-C compared to men with low strain jobs, after adjusting for age (RR=0.61, 95% CI: 0.45 – 0.83) (Table 5.12); there was no evidence of effect modification or confounding. Similar findings are observed for the outcome of 15+ drinks/week among men. Men with high strain jobs were less likely to experience 14-year incidence of 15+ drinks/week compared to men with low strain jobs, after adjusting for age (RR=0.54, 95% CI: 0.32-0.94) (Table 5.13); there was no evidence of effect modification or confounding. No significance was observed for the 2-year time period (Appendix I).

Table 5.12. 14-year RR for the proxy AUDIT-C for men, by categorical job strain.

	Problematic drinking by the AUDIT-C for men				
	RR	**z**	**p**	**95% CI LU**	**95% CI UU**
High strain	0.61	-3.17	0.002	0.45	0.83
Active jobs	0.97	-0.21	0.830	0.71	1.31
Passive jobs	0.87	-1.14	0.254	0.69	1.10

*adjusted for age, low strain jobs represent the reference group

Table 5.13. 14-year RR for 15+ drinks/week for men, by categorical job strain.

	15+ drinks per week for men				
	RR	**z**	**p**	**95% CI LU**	**95% CI UU**
High strain	0.54	-2.19	0.029	0.32	0.94
Active jobs	1.06	0.22	0.829	0.63	1.79
Passive jobs	0.92	-0.36	0.719	0.58	1.46

*adjusted for age, low strain jobs represent the reference group

5.4.3 Quartiles of Work Stress

When quartiles of work stress are modeled as the exposure, it was found that men in the highest quartile of work stress had a lower risk of 14-year incidence of the proxy AUDIT-C compared to men in the lowest quartile of work stress, after adjusting for age (RR=0.66, 95% CI: 0.49-0.90) (Table 5.14); there was no evidence of effect modification or confounding. Similar results are observed for the outcome of 15+ drinks/week for men; men in the highest quartile of work stress have a lower risk of 14-year incidence of problematic drinking compared to men in the lowest quartile of work stress, after adjusting for age (RR=0.57, 95% CI: 0.35-0.91) (Table 5.15); there was no evidence of effect modification or confounding. No significant relationships between quartiles of work stress and other problematic drinking measures were observed (Appendix I).

Table 5.14: 14-year RR for the proxy AUDIT-C for men, by quartiles of work stress.

	Problematic drinking by the AUDIT-C for men				
	RR	**z**	**p**	**95% CI LU**	**95% CI UU**
25-50th	1.03	0.25	0.799	0.81	1.31
50-75th	0.82	-1.36	0.172	0.61	1.09
>75th	0.66	-2.66	0.008	0.49	0.90

*adjusted for age, <25th quartile represent the reference group

Table 5.15: 14-year RR for 15+ drinks/week for men, by quartiles of work stress.

	15+ drinks per week for men				
	RR	**z**	**p**	**95% CI LU**	**95% CI UU**
25-50th	0.95	-0.25	0.799	0.62	1.44
50-75th	0.68	-1.46	0.145	0.40	1.14
>75th	0.57	-2.34	0.019	0.35	0.91

*adjusted for age, <25th quartile represent the reference group

5.5 Objective 3: To investigate the effect of changes in work stress on incidence of problematic drinking.

As described in the Methods section, to investigate the effect of changes in work stress on the risk of problematic alcohol use, job strain score in cycle 4 was subtracted from baseline job strain score. The values of continuous changes in job strain ratio scores were normally distributed. Those with a positive change score (>0) represent individuals who had positive change and went from high to low job strain. Those with a negative change score (<0) represent individuals who had a negative change, from low to high job strain. Those with a score of zero represent individuals who did not experience a change in work stress from cycles 1-4.

The crude association between changes in work stress score and the proxy AUDIT-C for men was non-significant (p=0.418). However, there was evidence that job insecurity acted as an effect modifier (z=2.24, p=0.025). Among men with high job

insecurity, the risk of incidence of the proxy AUDIT-C increased by 2.38 times per unit increase in job strain change score (z=1.98, p=0.037). There is no significant relationship between incidence of the proxy AUDIT-C and change in work stress among those with low job insecurity (Figure 5.2).

Figure 5.2: Risk of the proxy AUDIT-C for men by continuous change in work stress, stratified by job security.
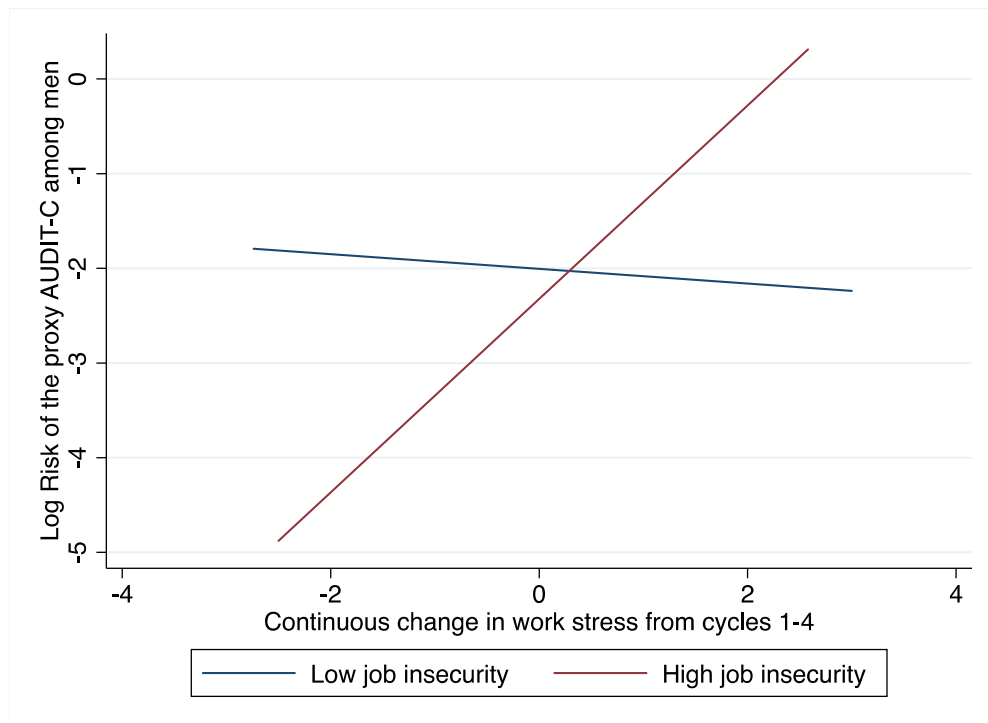
A similar relationship is observed when examining 15+ drinks/week for men as the outcome. The crude association between changes in work stress score and 15+ drinks/week for men was non-significant (p=0.471). However, this time there is evidence of modification by work support (z=2.29, p=0.022); as such, it is necessary to report stratified estimates. Among men with low work support, the risk of 15+ drinks/week increases by 4.70 times per unit increase in job strain change score (z=2.09, p=0.036). There is no relationship between incidence of 15+ drinks/week and change in job strain among those with high work support (Figure 5.3)

Figure 5.3: Risk of 15+ drinks/week for men by continuous change in work stress, stratified by work support.
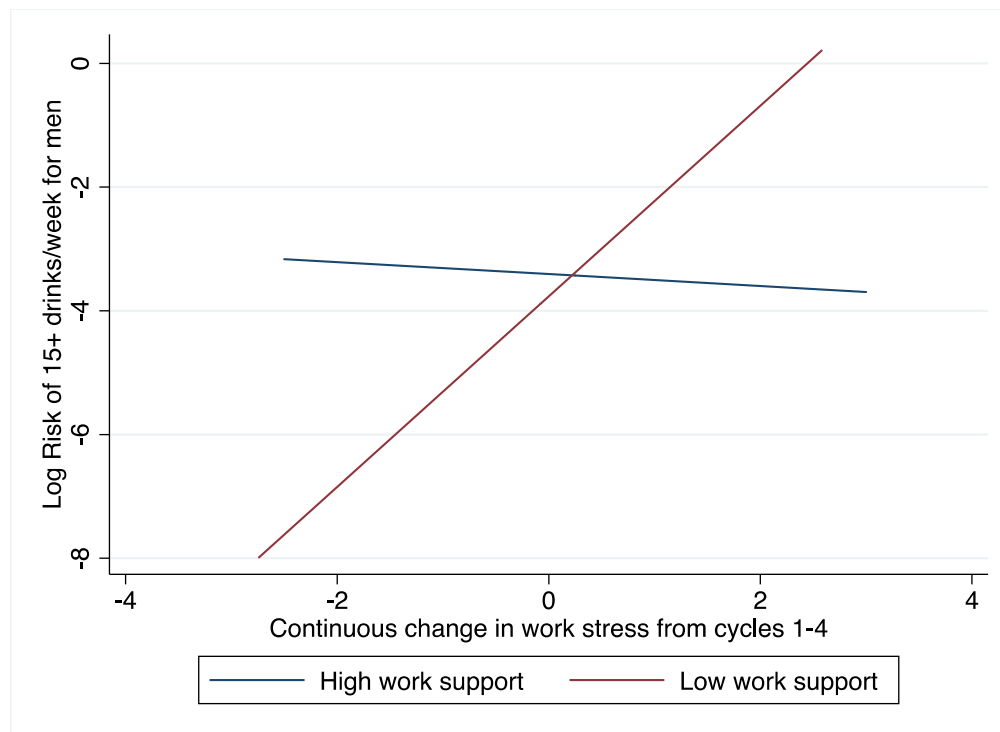
There was no significant relationship between changes in job strain from cycles 1-4 and incidence of problematic drinking from cycles 5-8 as defined by 5+ drinks on one occasion at least once/month, 10+ drinks/week for women, or the proxy AUDIT-C for women (Appendix J).

5.6 Objective 4 - To investigate the role of major depression in the relationship between work stress and problematic alcohol use.

Estimates stratified by MDE are presented in tables 5.16 – 5.18. Cell sizes were too small to report estimates for problematic drinking indicators over the 2-year time period, estimates specific to men, and estimates for categorical job strain and quartiles of work stress at baseline. Among those with MDE, individuals with high job strain appear to be at a higher risk of 5+ drinks on one occasion compared to those with low job strain over the 14 year time period, however this relationship is non-significant (Table 5.16). This same trend is not observed among women (Tables 5.17 – 5.18).

Table 5.16: 14-year incidence of 5+ drinks on one occasion by MDE.

	14-year proportion (n=718)	RR (95% CI)	p
No MDE			
Low job strain	0.1615	1.02 (0.86-1.19)	0.846
High job strain	0.1147		
Presence MDE			
Low job strain	0.1009	1.47 (0.72-2.99)	0.286
High job strain	0.1863		

*includes both men and women

Table 5.17: 14-year incidence of the proxy AUDIT-C among women by MDE.

	14-year proportion (n=473)	RR (95% CI)	p
No MDE			
Low job strain	0.0932	1.19 (0.95-1.48)	0.123
High job strain	0.0774		
Presence MDE			
Low job strain	0.1198	1.28 (0.68-2.40)	0.439
High job strain	0.1925		

Table 5.18: 14-year incidence of 10+ drinks/week among women by MDE.

	14-year proportion (n=282)	RR (95% CI)	p
No MDE			
Low job strain	0.0476	1.22 (0.89-1.69)	0.216
High job strain	0.0407		
Presence MDE			
Low job strain	0.0706	1.14 (0.45-2.92)	0.783
High job strain	0.1010		

There was no evidence of modification or confounding by MDE for the relationship between problematic drinking and work stress in regression modeling. Modification by MDE was examined by assessing if the p-value associated with the interaction term 'MDE*work stress' was significant (<0.05). Confounding was assessed by examining if the removal of the MDE term resulted in a material change in the coefficient associated with work stress.

Chapter 6: Discussion

6.1 Review of key findings

The purpose of this study was to examine the relationship between work stress and problematic drinking. Work stress was defined in three ways: (1) binary job strain (high job strain vs. low job strain), (2) categorically based on the demand-control model (high strain job, active job, passive job, and low strain job) and (3) based on quartiles of work stress. Problematic drinking was also defined and analyzed in three ways: (1) 5+ drinks on one occasion at least once per month in the past 12 months, (2) 10+ drinks/week for female and 15+ drinks/week for males, and (3) a proxy of the AUDIT-C for women and for men.

The prevalence of problematic alcohol use at baseline differed by work stress only among women; women who reported low job strain and who were in the lower quartiles of work stress were less likely to have had problematic alcohol use at baseline. The prevalence of problematic alcohol use did not differ by levels of work stress in men.

The estimates of incidence of problematic alcohol use varied, depending on how problematic alcohol use was defined. Estimates were highest for the outcome indicator of 5+ drinks on one occasion at least once per month, with 10.5% experiencing problematic alcohol use over the 2-year period and 25.6% over the 14-year period. Estimates of incidence were lowest for the outcomes of 10+ drinks/week for women and 15+ drinks/week for men. Over the 2-year period, 1.5% of women experienced problematic drinking compared to 2.2% of men. Over the 14-year period, 8.3% of women and 7.6% of men experienced problematic drinking.

In the longitudinal analysis, among women residing in urban areas, those with high strain or passive jobs were at a higher risk of problematic drinking. Among men, it was consistently observed that baseline work stress was associated with a lowered risk of problematic alcohol consumption. Men with high job strain were less likely to experience 14-year incidence for both the proxy AUDIT-C and 15+ drinks/week compared to men with low job strain. There was evidence of effect modification by shift type for the 2-year relationship between the proxy AUDIT-C and binary job strain;

among men with regular day shifts, those with high job strain were at a lower risk of problematic drinking compared to those with low job strain. When men were categorized based on the demand-control model, those with high strain jobs were less likely to experience 14-year incidence of problematic drinking compared to men with low strain jobs for both outcome indicators of the proxy AUDIT-C and 15+ drinks/week. Similarly, when men were categorized according to quartiles of work stress, those in the highest quartile of work stress were less likely to experience 14-year incidence of problematic drinking compared to men in the lowest quartile of work stress for both outcome indicators of the proxy AUDIT-C and 15+ drinks/week.

When changes in job strain and incidence of problematic alcohol use were assessed, job insecurity and social support at work appeared to act as effect modifiers in the associations between work stress and problematic alcohol use among men. Changes in job strain were not associated with incidence of problematic drinking among women. There was no evidence that MDE acted as an effect modifier or confounder in the relationship between work stress and problematic alcohol use.

6.1.1 Comparison to existing literature

Cross-Sectional Results:

The overall prevalence of problematic drinking for 5+ drinks on one occasion at least once per month in the past year was 26.3%. This estimate is similar to findings from the Canadian Addiction Survey, which reported that 25.5% of Canadians in 2005 engaged in heavy drinking, defined as having 5+ drinks on one occasion for men, and 4+ drinks on one occasion for women, at least once per month in the past year (Adalf, Being & Sawka, 2005). Further, a greater proportion of men in our sample reported problematic drinking (23.1% for the proxy AUDIT-C, 11.1% for 15+ drinks/week) compared to women (17.8% for the proxy AUDIT-C, and 8.9% for 10+ drinks/week); this is also consistent with the Canadian Addiction Survey where 30.2% of men exceeded the low-risk guidelines compared to 15.1% of women (Adalf, Being & Sawka, 2005). According to the Canadian guidelines for low-risk drinking, weekly alcohol intake should

not exceed 14 standard drinks for males and 9 drinks for females, and daily consumption should not exceed 2 drinks, among males or females (Adalf, Being & Sawka, 2005).

The prevalence of problematic alcohol use at baseline differed by work stress only for the proxy AUDIT-C among women. Women who reported low job strain and who were in the lower quartile of work stress were more likely to have engaged in problematic drinking than others. These findings are consistent with a cross-sectional study conducted by Ahola and colleagues, where it was estimated that the odds of alcohol dependence among women who met the criteria for burnout was 1.8 times the odds among those who did not experience burnout at work (95% CI: 1.35-2.40) (2006). An estimated OR of 1.8 is comparable to the estimated ORs achieved in our study of 1.6 for high compared to low job strain, and 2.0 for upper quartile compared to the lowest quartile.

The statistical significance of these crude relationships may be irrelevant in circumstances where the crude association is not an estimate of a true association in the population, for example in the presence of effect modification or confounding. Further, the baseline relationship between work stress and problematic alcohol use does not provide an understanding of the potential temporal relationship. The longitudinal results are of most interest for this study and will be the focus of the remaining discussion.

Longitudinal Results:

No significant findings were observed when binary job strain and quartiles were used to indicate work stress among women; these finding are consistent with previous literature. Heikkila and colleagues conducted a meta-analysis using data from four longitudinal studies in Europe. They did not find an association between job strain, measured using the JCQ, and incidence of excessive drinking for women (14+ drinks/week for women) (2012). Additionally, Head and colleagues conducted a longitudinal analysis using data from the Whitehall II occupational cohort of London; the authors found no relationship between effort-reward imbalance at work and odds of alcohol dependence among women (2004).

Among men, baseline work stress was consistently associated with a lowered risk of problematic alcohol use. This finding is consistent with a number of previous studies

that have demonstrated an inverse relationship between work stress and alcohol consumption among men using an array of sample populations and methods (Helzer et al, 2006; Dorrain & Skinner, 2012; Heikkila, et al. 2012; Marchand & Blanc, 2011). However, inconsistent with these results, several studies have also found a positive relationship between work stress and alcohol use among men (Ahola, et al. 2006; Head, Stansfel & Siegrist, 2004; Bobak, et al. 2005). These inconsistent findings may be a result of small sample sizes, different populations, and differing definitions of problematic alcohol use. These contradictory findings suggest that the work stress-alcohol relationship among men is likely complex, and requires consideration of a number of workplace and individual factors.

The anticipation of stress at work, in addition to a high workload and responsibility in high strain jobs may impose constraints on alcohol consumption among men (Helzer, et al. 2006; Dorrain & Skinner, 2012). Additionally, jobs that are not demanding enough may reduce stimulation and motivation to a level where problematic drinking may be used as a buffer against work monotony among men. Research has found that the negative impact of stress on health and wellbeing is reduced when individuals have high levels of mastery, self-esteem and/or social support (Thoits, 2010). The impacts of mastery, self-esteem and social support outside of work were not examined; it is possible that men in with high work stress also had high levels of mastery, self-esteem and social support outside of the work environment that buffered them against the negative effects of work stress.

The negative associations between work stress and problematic alcohol use in men may be partly explained by the stress-response curve and cognitive transactional model. The reduced risk of problematic drinking among men with high work stress may be the result of a stress-response curve; some stress may be beneficial, and even necessary for work performance and health. In addition, some previous research suggests that positive stress, or eustress, can be energizing and stimulating, resulting in positive health outcomes. Eustress has been defined as a positive psychological response to a stressor as indicated by the presence of positive psychological states (McGowan, Gardner & Fletcher, 2006). While a substantial amount of literature has investigated the negative

implications of work stress, eustress has been neglected as a concept. Eustress at work has been associated with task engagement and satisfaction, meaning that individuals are enthusiastically involved in and occupied by the demands of work at hand (McGowan, Gardner & Fletcher, 2006). The cognitive transactional model has been used to conceptualize the stress process in regards to eustress (McGowan, Gardner & Fletcher, 2006).

The transactional model considers stress to be a process involving appraisals of challenges and demands, coping, and reappraisal (McGowan, Gardner & Fletcher, 2006). If an individual appraises the demand as both stressful and relevant, then a secondary appraisal occurs to assess if the demand is a threat (exceeds resources available) or a challenge (resources are high and there is the potential for mastery and personal growth). Challenge-focused appraisal has been associated with the use of problem-focused coping, whereas threat-focused appraisals have been linked to emotion-focused coping. People who use emotion-focused coping may be more likely to engage in substance use, including drugs and/or alcohol to deal with stress (Staiger, et al. 2009). Coping literature suggests that men may be more likely to use problem-solving coping strategies; on the other hand, women may be more likely to use emotion-focused coping strategies (Melendez, et al. 2012; Chitra & Mahalakshmi, 2012; Wang & Patten, 2002).

The use of problem-focused coping has been associated with eustress and satisfaction with the outcomes of the stress process (McGowan, Gardner & Fletcher, 2006). Further, research has suggested that eustress is associated with positive perceptions of health and improvements in health (McGowan, Gardner & Fletcher, 2006; Simmons & Nelson, 2001). Men experiencing high work stress in our sample may not be experiencing negative distress, but rather eustress; this represents an avenue for future research.

Unexpectedly, there was no evidence of effect modification or confounding by MDE in the relationships between work stress and problematic alcohol use. However, the estimates stratified by MDE are limited by the small cell size among those with MDE, high work stress, and problematic drinking. As such, there was a lack of statistical power to accurately assess the potential modification and confounding role of MDE in the work

stress-alcohol relationship. No evidence of effect modification or confounding by MDE suggests that MDE may not be part of the causal chain involving the relationship between work stress and problematic alcohol use. It is also possible that both MDE and work stress are independent risk factors for problematic drinking. However, the possibilities that MDE acts as an effect modifier or confounder in the relationship between work stress and problematic alcohol use cannot be entirely excluded due to limited statistical power. Future research is necessary to further clarify the role of MDE in the work stress-alcohol relationship.

6.2 Effect modification

6.2.1 Rural/Urban status

When examining the relationship between categories of job strain at baseline and incidence of problematic drinking, rural/urban status played a significant role for the outcome of 5+ drinks on one occasion at least once per month. Among those who reside in urban settings, those with passive jobs were at a higher risk of 2-year incidence of 5+ drinks on one occasion at least once per month, compared to those with low strain jobs. From the stratified proportion estimates, 4.7% of incident cases were among those with passive jobs, compared to 1.3% among those with low strain jobs in urban settings. Consistent with the findings, research focused on the demand-control model has found that those who had a passive job had increased odds (OR=1.29, 95% CI: 1.02-1.64) of heavy drinking (>5 drinks in any 1 day in the past 12 months for men, and >4 drinks in any 1 day for women) (Gimeno, et al 2009). Passive jobs are characterized by underutilization of skills and decision making capabilities with few task requirements and limited meaningful content that may result in risky behaviors, such as heavy drinking. Fewer task requirements and underutilization of skills could be a source of lack of self-achievement and social identity and may contribute to a lack of motivation (Knippenberg, 2000); this may, to a certain extent contribute to problematic drinking as a way of coping with these feelings. These findings suggest that passive jobs, not just high strain jobs, should be explored as a source of unhealthy drinking behaviors.

Among those who resided in rural settings, those with active jobs were at a lower risk of 2-year incidence of 5+ drinks (0.5%) compared to those with low strain jobs

(3.3%) in rural settings. Gimeno and colleagues similarly found that workers in active jobs had lower odds of frequent and heavy drinking (2009). Additionally, using a sample of 8,499 men from the Finnish public sector, Kouvenen and colleagues found that men with active jobs were less likely to engage in heavy drinking, compared to men with low strain jobs (OR=0.75, 95% CI: 0.57-0.98) (2005). Some research has argued that active jobs are conducive to learning opportunities and enables employees to develop new skills that allow them to deal more effectively with strain-inducing situations at their jobs (de Lange, et al. 2003). However, it is unclear as to why active jobs were a protective factor for problematic drinking in rural settings only; the same relationship was not observed among those in urban areas. Previous research examining the role of rural/urban status on the work stress-alcohol relationship is virtually non-existent

Previous research in the Canadian population has demonstrated that employment in rural areas is more likely to be self-employment in 'unskilled' occupations, such as farming. On the other hand, managerial and service occupations are higher in urban areas (Alasia & Magnusson, 2004). It is conceivable that active jobs in rural settings, jobs with high demand and high decision latitude, are quite different from jobs considered active in urban settings. Active jobs in rural settings may involve occupations such as farming, where often the demand is high but individuals also have high decision latitude as they are typically self-employed. However, farming is a time-consuming occupation that simply may not leave individuals with time to engage in problematic drinking. On the other hand, active jobs in urban settings, such as managerial positions, may require the individual to work a typical 40 hour work week; as such, individuals in active jobs in urban settings may have time to engage in problematic drinking.

Rural/urban status was also found to act as an effect modifier in the relationship between categorical job strain and problematic drinking among women. Among women residing in urban areas, those with high strain jobs or passive jobs were at a higher risk of 2-year incidence of the proxy AUDIT-C compared to women with low strain jobs. A study conducted by Kouvonen and colleagues using a Finnish sample of 32, 352 women found increased odds of heavy drinking among women in passive jobs (OR=1.33, 95% CI: 1.05-1.68) (2005). However, inconsistent with our findings, Kouvenen and colleagues

found lower odds of heavy drinking among women with high strain jobs compared to those in low strain jobs (OR=0.83, 95% CI: 0.60-0.90). Women with passive or high strain jobs may use heavy drinking as a response to their unsatisfactory work conditions. No significant relationships were observed among women in rural settings; it is possible that women in rural areas differ from women in urban settings in terms of the nature of work, lifestyles and beliefs by which they cope differently with job strain and passive jobs (Thomlinson, et al. 2004). These findings should be interpreted with caution as the cell size was too small to report incidence proportion estimates for the categories of work stress for 2-year incidence of the proxy AUDIT-C for women, stratified by rural-urban status; due to the small cell size, type one error is a possibility. A lack of sufficient number of participants poses a limitation to accurately investigating differences by rural/urban status among women.

Unfortunately, previous research examining the role of rural/urban status on the work stress-alcohol relationship is virtually non-existent. As such, these findings cannot be directly compared to specific urban or rural sub-populations. An Australian study examined the relationship between occupational stress and problematic drinking among a sample of dentists; rural/urban status was examined as a potential covariate. The authors found that levels of hazardous drinking were significantly higher among rural dentists; however this relationship was not significantly related to any occupational stress variables (Winwood, et al. 2003). Rural/urban status may be a contributor to the relationship between work stress and alcohol related behavior and warrants additional research with sufficient sample size.

6.2.2 Shift type
Shift type was an effect modifier in the relationship between categorical job strain and problematic drinking among men. Among men with a regular day shift, those with high job strain had a lower risk of problematic drinking compared to men with low job strain. Despite the significant interaction term indicating modification by shift type, the cell size was too small to report incidence proportion estimates stratified by shift type for the proxy AUDIT-C for men. These findings should be interpreted with caution due to the small cell size.

Dorrian and Skinner examined the relationship between alcohol consumption and shift work using data from the 2006 wave of the Household Income and Labour Dynamics Survey (2012). Being a shift worker increased the odds of harmful drinking (OR=2.10, 95% CI: 1.08-4.12), but decreased odds of consuming alcohol "daily" (OR=0.20, 95% CI: 0.09-0.45). The results from Dorrain and Skinner suggest that shift workers may be more likely to consume alcohol at levels considered to be risky for health in the short term. In contrast, they appear less likely to drink alcohol daily. This pattern is suggestive of "binge drinking" behavior. Even if the overall amount of alcohol consumption is comparable among shift-workers and non shift-workers, the negative effects of alcohol may be more pronounced among those who work shift-work. Given the available data, the potential relationship between work stress and binge drinking could not be examined; this represents an avenue for future research.

Among selected participants in the longitudinal analysis, approximately 72% worked regular day shifts, 6% worked regular evenings/nights, 12% worked rotating or split shifts, and 11% had some other form of irregular shift work. Given the small number of respondents who worked something other than regular day shifts, there was a lack of sufficient numbers in each group to accurately investigate differences by shift type. Shift type may be a contributor to alcohol related behavior and warrants additional research.

6.2.3 Job insecurity

In addition to shift type playing a potential role in the work stress-alcohol relationship for men, there was also evidence that job insecurity modified the relationship for the proxy AUDIT-C for men. Among men with high job insecurity, the risk of incidence of the proxy AUDIT-C increased with the per unit increase in job strain. There was no relationship among men with low job insecurity.

Men that were insecure in their jobs had a lower risk of problematic drinking when work stress increased over time, and an increased risk of problematic drinking when work stress decreased over time. When men who are insecure in their job experience increased work stress over time, they may not only be concerned about their job security, but also experiencing changes from low to high work stress. Perhaps this

group of men is so concerned about their performance and security at work that they refrain from problematic drinking due to concerns of alcohol use negatively impacting an already precarious work environment. On the other hand, job insecurity alone may not be enough of a workplace concern to reduce drinking; when men who are insecure in their job experience positive changes in work stress, the risk of problematic drinking increases.

A study conducted by Marchand and Blanc examined the longitudinal relationship between job strain and problematic drinking (10+ drinks/week for women and 15+ drinks/week for men) using the NPHS from cycles 1-5 (2011). The authors found that increased job insecurity was significantly related to onset of problematic drinking, such that increased job insecurity reduces the risk of onset (OR=0.90, 95% CI: 0.81-0.99) (Marchand & Blanc, 2011). The authors hypothesize that perceived job insecurity may place individuals in positions that constrain the financial resources available for buying alcohol, or that individuals may consider problematic drinking to have a negative influence on their performance at work, which may increase the chance of losing their job (Marchand & Blanc, 2011).

6.2.4 Work support

Findings suggest that work support modifies the relationship between change in work stress and incidence of 15+ drinks/week for men. A previous study examining the longitudinal relationship between work conditions and alcohol misuse using data from the NPHS found that each one-point increase in social support at work reduced the risk of recurrent alcohol misuse by 4% (Marchand & Blanc, 2011). While our findings show no significant relationship between changes in work stress and problematic drinking among men with high social support at work, there is evidence of a significant relationship among men with low social support at work. Among men with low social support at work, the risk of incidence of 15+ drinks/week increased per unit increase in job strain. It must be noted that this finding is conceptually difficult to interpret and, due to the large number of statistical tests, may be the result of type one error.

A study by Bacharach and colleagues examined the moderating effect of social support at work on the relationship between heavy drinking (5+ drinks on one occasion at least once per month) and absenteeism among a sample of urban transit workers in the

United States (2010). The authors found virtually no relationship between heavy drinking and absenteeism under conditions of greater coworker support, and a positive relationship between heavy drinking and absenteeism under conditions of low peer support at work (Bacharach, Bamberger & Biron, 2010). Similarly, in this study there was no relationship between risk of problematic drinking and work stress among men with high social support. Bacharach and colleagues speculate that the lack of drinking-absenteeism relationship among those with high coworker social support is consistent with the notion that employees value the peer-based advice, positive feedback, and assistance that they receive by attending work (2010). These findings suggest that supportive peer relationships in the workplace should be encouraged.

6.3 Effect of bias due to missing data

Selection bias may occur if respondents who provided full response for the longitudinal period have a different exposure-outcome relationship than those who failed to respond. Analysis revealed that responders and non-responders for the 2 and 14-year time period did not differ in exposure, work stress, at baseline, regardless of the conceptualization of work stress used. Additionally, longitudinal weights were used in all estimations; therefore, the impact of selection bias on the observed results was minimized.

When stratified by demographic characteristics at baseline several differences between responders and non-responders were observed. For both 2 and 14-year time periods, non-responders were typically younger and current daily smokers at baseline. In addition, for the 14-year time period non-responders were also typically male, in the lower income categories, and were single/never married. In order for any of these differences to introduce a selection bias, the significant demographic characteristics must be associated with both exposure (work stress) and outcome (problematic drinking) (Rothman, Greenland & Lash, 2008).

A description of the distribution of participants at baseline by exposure status showed that those with indications of low work stress were older compared to those with high work stress, suggesting that younger age is associated with exposure to work stress in our sample. Findings from the longitudinal regression modeling suggest that younger

age is also associated with increased risk of most problematic drinking indicators. Further, research has found that younger age groups are more likely to engage in problematic drinking behavior (Grant & Dawson, 1997). Given that younger age is associated with higher work stress and also associated with increased risk of problematic drinking, the estimates presented may be an underestimate of the association between work stress and problematic drinking due to younger aged individuals being less likely to provide complete follow-up information.

A greater proportion of individuals within the higher income categories had lower work stress at baseline. Non-responders were more likely to be in the lower income categories; if those with low income were more likely to have work stress and were more likely to engage in problematic drinking, then the presented estimates may be an underestimate of the association between work stress and problematic drinking. Research has demonstrated that those in lower income groups may be more likely to develop alcohol dependence compared to wealthier groups (Grant, 1997; Hasin, et al., 2007). Additionally, those with low SES (low income and low education) have higher levels of cortisol and epinephrine, hormones associated with stress (Cohen, et al., 2006).

Analysis of responders versus non-responders demonstrated that not only were responders more likely to be married or living common-law, but non-responders were more likely to be single, and never married. A greater proportion of those who were married/common-law at baseline were in the low work stress categories. On the other hand, an increased proportion of those who were single or never married had indications of greater work stress. If those who were single or never married were more likely to have high work stress and were more likely to engage in problematic drinking, then the presented estimates may be an underestimate of the association between work stress and problematic drinking as those who were single or never married at baseline were less likely to provide follow-up information. Research findings suggest that high rates of heavy drinking are more common for never married men and women compared to those who are married (Power, et al. 1999). Further, research has demonstrated that several different stress sources have a substantially less damaging emotional effect on married people compared to those who are not married (Kessler & Essex, 1982).

Given the possible selection bias mechanisms that may be present in this study, it is conceivable that the estimates presented may represent an underestimate toward the null value of the association between work stress and problematic drinking. However, all analyses used the longitudinal weights available in the NPHS. The longitudinal weights account for attrition and compensate for non-response. As such, to a certain extent, selection bias due to attrition may be reduced. Future analyses may wish to consider two hypothetically extreme situations:

1. All respondents who were lost to follow-up engaged in problematic drinking
2. All respondents who were lost to follow-up did not engage in problematic drinking

6.4 Effects of misclassification bias

Misclassification is "the erroneous classification of an individual, a value, or an attribute into a category other than that to which is should be assigned" (Porta, p.157, 2008). The probability of misclassification could be the same in all study groups, called non-differential misclassification bias, which would bias the estimate towards the null value. On the other hand, the probability of misclassification could be different in all study groups, differential misclassification, which could result in either an under or over-estimation. Both work stress and problematic drinking have the potential of being misclassified. Misclassification may introduce systematic bias into the estimation of risk in our study.

6.4.1 Misclassification of work stress

The Job Content Questionnaire (JCQ) is a self-administered instrument designed to measure social and psychological characteristics of a job. If misclassification of work stress in the NPHS exists, and does not depend on alcohol consumption, non-differential misclassification would be occurring. If misclassification of work stress does depend on alcohol consumption, differential misclassification would be occurring resulting in either an over or under-estimation of risk of problematic drinking. There are no previous studies investigating whether or not the misclassification of work stress would depend on alcohol consumption using the JCQ. It is unlikely that the participants intended to report experiencing work stress because they engaged in problematic drinking. Further, in the longitudinal analysis, baseline participants with problematic drinking were excluded. As such, it is unlikely that misclassification in work stress depended on alcohol use.

Therefore, if misclassification of work stress is occurring in this study, it is likely to be non-differential and biased the association between work stress and problematic drinking toward the null value.

It is worth noting that Marchand and colleagues demonstrated that several of the subscales within the brief JCQ in the NPHS have a low to moderate internal consistency compared to the original JCQ scales (Marchand, Demers & Durand, 2005). The authors suggest that as a result, the effects of the JCQ used in the NPHS may have been underestimated. However, a moderate internal consistency does not necessarily mean that the version of the JCQ used in the NPHS is insensitive. A moderate internal consistency may indicate that there is no redundancy in the measurement and that each new item adds new information to the measure (McDowell & Newell, 1996). The JCQ covers 6 dimensions of work stress; as such it may be reasonable to expect a moderate internal consistency.

6.4.2 Misclassification of alcohol consumption

Inaccurate recall of alcohol consumption in the 12 months preceding interview could result in misclassification. There are no previous studies examining whether or not the accuracy or completeness of information regarding drinking behavior could be related to work stress. However, there is evidence that chronic stress is related to memory impairment (Marko & Benno, 2001). As such, it is possible that those suffering from chronic work stress have impaired memory, and may not have accurately recalled their alcohol consumption in the past 12 months at time of interview. For instance, some respondents who experienced high work stress may have been incorrectly classified as non-problematic drinkers because they forgot that they had a substantial number of alcoholic drinks in the past 12 months.

Misclassification in alcohol consumption could also be a result of participant response. Some research has shown that heavier drinkers and problematic drinkers tend to under report the amount of alcohol they actually consume (Lee, et al. 1990; Grunberg et al. 1999). In the NPHS, if some participants who actually engaged in problematic drinking tended to under report their consumption, they would incorrectly be classified as a non-problematic drinker. The non-significant associations observed for the problematic

drinking indicators of 5+ drinks on one occasion at least once per month and problematic drinking indicators specific to women may be partially explained by this reporting bias.

6.5 Strengths and limitations

The main strength of this study is related to the study design and nationally representative sample, enhancing the generalizability of our findings. Using a follow-up study design, the temporal relationship between work stress and problematic drinking could be assessed. However, there are several limitations of this study that must be acknowledged.

The response to stress and impact on health is a complex pathway, and there are many potentially important factors that were not considered. The NPHS does not include workplace factors related to the physical environment – dust, noise, cold, heat, toxicity, etc. – management styles, health and safety resources, or other elements in the work contract that allow employees to better balance work and family responsibilities; these elements could be strong determinants of well-being in the workplace. Additionally, other measures of non-job stressors were not examined, such as family conflict, which may have a 'spill-over' effect into the workplace setting resulting in increased workplace stress. Information regarding drinking norms and alcohol availability at the workplace were not available, as well as co-worker drinking behaviors, which may influence one's decision to use alcohol. Due to small cell size, analyses by occupational code could not be completed; work stress and alcohol consumption may vary greatly depending on the occupation one is employed in.

Although social support available within the workplace was assessed, social support outside of the workplace was not included due to small cell sizes; it is possible that good social support networks outside of the work environment can act as a buffer against the negative effects of work stress. There is an array of different coping mechanisms regarding stress that were not considered, such as food consumption. Correctly understanding the specific role of work conditions on alcohol misuse may require simultaneous consideration of the social environment in which workers are imbedded, such as family, neighborhood, social networks, economic/political/cultural aspect of society, as well as their individual characteristics, such as self esteem, locus of

control, stressful childhood events, etc. Finally, alcohol dependence, as diagnosed by the short form Composite International Diagnostic Interview, was not included due to small cell sizes; these individuals may be the subset of drinkers for who coping-related drinking is most common.

The temporal relationship between work stress and problematic drinking could not be completely clarified in this study due to the timing of interviews. The NPHS interviews were conducted every two years, and each cycle assessed only the past 12-months, not the past 24. Although participants with problematic drinking at baseline were excluded from this study, problematic drinking could precede work stress in the 12 month interval prior to data collection. Further, "incidence" in this study is not entirely the same as the one defined in classic epidemiology, as some participants may have experienced problematic drinking in the 12-month gap immediately following a cycle but prior to the 12-month period assessed at the next cycle. As such, the estimates presented may be an underestimation of problematic drinking. Additionally, some participants may have experienced problematic drinking prior to baseline, and incident cases in this study may not actually be incidence but recurrence.

All of the data in this study was obtained via self-report, which poses several limitations. Those who engage in problematic drinking may under-report alcohol consumption due to the social desirability bias. Some research has suggested that self-reports consistently under-report alcohol use compared with other assessment forms, such as personal interviews (Strunin, 2001; Sobell, et al. 1992). However, other research suggests that self-reports are surprisingly honest and accurate (Adair, et al. 1996; Babor, et al. 2000). Social desirability bias may have resulted in an underestimation of problematic alcohol use in our sample. However, it is unlikely that the social desirability bias would have depending on work stress status; as such, if social desirability bias is present, the estimates presented are likely biased towards the null value as a result. There is little doubt that over-reporting is unlikely to be a problem.

Recall error is a possibility, as participants are asked to remember the past 12 months; individuals may not accurately recall drinking behaviors or work stress over the past 12 months. Additionally, self-reported work stress may be subject to biased

reporting as negative events may be more likely to be recalled and described as more salient. Corroborating self-report information with biological indicators may help overcome these limitations; however, such a task would not be feasible in a long-term population based study. Despite the limitations of self-report measures of stress, they succeed in capturing how individuals respond to, cope with, and adapt to stressful experiences.

A final limitation relates to the multiple comparisons made in this study. There were a total of 3 exposure, and 3 outcome variables, in addition to a range of covariates; due to the problem of multiple comparisons, some results that were deemed significant based on p-values may be the result of type one error. As a result, there is the possibility of incorrectly rejecting the null hypothesis based on a p-value of 0.05 in some instances. Several findings were deemed significant based on p-values >0.01, such as the modification by rural/urban status, job insecurity, and work support as well as several of the significant associations among men. In these instances, the null hypothesis may have incorrectly been rejected when the null hypothesis was actually true. Future research could consider applying corrective methods such as the Bonferonni method or the Benjamini Hochberg False Discovery Rate Procedure.

6.6 Future Research

One single study cannot fully determine the relationship between work stress and problematic drinking in the Canadian working population. Additional studies using community-based samples are necessary to further clarify the mechanisms by which work stress may impact drinking behaviors. Future studies should further encompass components of the social environment in which workers are embedded and a broad range of work conditions by taking into account variables that were not controlled for, discussed in the previous section. Furthermore, several characteristics of participants are likely to change over the course of follow-up, such as income, marital status, MDE, etc. Future analyses should consider the inclusion of time-varying covariates.

Future studies should also examine the relationship between work stress and recurrent problematic drinking. Alcohol use may be initiated at younger ages prior to entering the job market and recurrent alcohol misuse may be more influenced by

occupation and work organization conditions (Marchand & Blanc, 2011). Additionally, patterns of alcohol consumption may be an important behavior to examine in relation to work stress (i.e. binge drinking). Future research should consider the role of the workplace in recurrent misuse and binge drinking.

While the longitudinal sample represents the 1994-95 Canadian population, the current workforce is aging, in addition to an increasing number of women participating in traditional male dominated occupations and more work-family conflicts among younger workers (Duxbury & Higgins, 2003). Also, changes in recent years may have produced more stressful work conditions. As such, additional research is needed on the basis of the cohort of workers initiated in the next decade of the 21st century.

6.7 Implications and significance

Based the review of previous literature, it was initially hypothesized that work stress would lead to increased risk of problematic drinking. However, the results have demonstrated that the relationship is more complicated that what was shown in previous studies, and may depend on gender. Developing problematic drinking behavior was not consistently associated with work stress among women in this study. Among men, high work stress was associated with a decreased risk of problematic drinking. The findings from this study suggest that the theoretical paradigm that associates work stress with having a negative impact on an individual's life may be an inaccurate simplification.

Some work stress is normal, and often is necessary to provide the energy and motivation needed to meet daily challenges in the workplace. Optimal levels of work stress may represent a level of maximum activity and can help individuals rise to a challenge and meet goals such as deadlines, sales or production targets, or finding new clients. However, too much stress can have a negative impact when feelings of satisfaction turn into exhaustion, frustration or dissatisfaction, or when the challenges at work become too demanding. Future research regarding work stress and problematic drinking should examine the potential stress response curve and the concept of eustress. Some work stress may have positive effects on an individual's health behaviors, whereas at a certain point the work stress may become overwhelming, exceeding an individual's resources, and result in problematic drinking.

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Appendix A: Major Depressive Episode (MDE)

University of Michigan – Composite International Diagnostic Interview (Short Form) used in the National Population Health Survey, Statistics Canada.

During the past 12 months, was there ever a time when you felt sad, blue, or depressed for two weeks or more in a row?
- Yes
- No

For the next questions, please think of the two-week period during the past 12 months when these feelings were worst and you had the most complete loss of interest in things.
During that time how long did these feelings usually last?
- All day long
- Most of the day
- About half of the day
- Less than half of the day

How often did you feel this way during those two weeks?
- Everyday
- Almost every day
- Less often

a. During those two weeks did you lose interest in most things?
- Yes
- No

b. Did you feel tired out or low on energy all of the time?
- Yes
- No

c. Did you gain weight, lose weight, or stay about the same?
- Gained weight
- Lost weight
- Stayed about the same
- Was on a diet

d. About how much weight did you gain/lose?

e. Did you have more trouble falling asleep than you usually do?
- Yes
- No

How often did that happen?
- Every night
- Nearly every night
- Less often

f. Did you have a lot more trouble concentrating than usual?
- Yes
- No

g. At these times, people sometimes feel down on themselves, no good, or worthless. Did you feel this way?
- Yes
- No

      h. Did you think a lot about death – either your own, someone else's, or death in general?
- Yes
- No

During the past 12 months, was there ever a time lasting two weeks or more when you lost interest in most things like hobbies, work, or activities that usually give you pleasure?
- Yes
- No

For the next few questions, please think of the two week period during the past 12 months when you had the most complete loss of interest in things
During that two week period, how long did the loss of interest usually last?
- All day
- Most of the day
- About half of the day
- Less than half of the day

How often did you feel this way during those 2 weeks?
- Everyday
- Almost everyday
- Less often

Appendix B: National Population Health Survey – Alcohol Use

Now, some questions about your alcohol consumption.
When we use the word drink it means: one bottle or can of beer or a glass of draft, one glass of wine or a wine cooler, one drink or cocktail with 1 and a 1/2 ounces of liquor.

Since our interview in [month and year of last response interview], have you had a drink of beer, wine, liquor or any other alcoholic beverage?
1 Yes
2 No

During the past 12 months, that is, from [date one year ago] to yesterday, have you had a drink of beer, wine, liquor or any other alcoholic beverage?
1 Yes
2 No

During the past 12 months, how often did you drink alcoholic beverages?
1 Less than once a month
2 Once a month
3 2 to 3 times a month
4 Once a week
5 2 to 3 times a week
6 4 to 6 times a week
7 Every day

How often in the past 12 months have you had 5 or more drinks on one occasion?
1 Never
2 Less than once a month
3 Once a month
4 2 to 3 times a month
5 Once a week
6 More than once a week

Thinking back over the past week, that is, from [date last week] to yesterday, did you have a drink of beer, wine, liquor or any other alcoholic beverage?
1 Yes
2 No (Go to next section)

Starting with yesterday, that is [day name], how many drinks did you have:
... on Sunday?
... on Monday?
... on Tuesday?
... on Wednesday?
... on Thursday?
... on Friday?
... on Saturday?

Did you ever regularly drink more than 12 drinks a week?
1 Yes
2 No (Go to next section)

Appendix C: Alcohol Use Disorders Identification Test (AUDIT-C)

Source: http://www.thenationalcouncil.org/galleries/business-practice%20files/tool_auditc.pdf

The AUDIT-C is a 3-item alcohol screen that can help identify persons who are hazardous drinkers or have active alcohol use disorders. The AUDIT-C is a modified version of the 10-question AUDIT instrument.

1. How often do you have a drink containing alcohol?
    a) Never
    b) Monthly or less
    c) 2-4 times a month
    d) 2-3 times a week
    e) 4 or more times a week

2. How many standard drinks containing alcohol do you have on a typical day?
    a) 1 or 2
    b) 3 or 4
    c) 5 or 6
    d) 7 to 9
    e) 10 or more

3. How often do you have six or more drinks on one occasion?
    a) Never
    b) Less than monthly
    c) Monthly
    d) Weekly
    e) Daily or almost daily

Scoring:
The AUDIT-C is scored on a scale of 0-12. Each question has 5 answer choices. Points allotted are:

     a=0 points   b=1 point   c=2 points   d=3 points   e=4points

In men a score of 4 or more, and in women a score of 3 or more, is considered optimal for identifying hazardous drinking or active alcohol use disorders. However, when all points are from Question 1 alone (Questions 2 & 3=0), it can be assumed that the participant is drinking within recommended limits. Generally, the higher the score, the more likely it is that the participants drinking is problematic

Psychometric Properties (for identifying participants with heavy/hazardous drinking):

	Men	Women
≥3	Sens: 0.95/Spec: 0.60	Sens: 0.66/Spec: 0.94
≥4	Sens: 0.86/Spec: 0.72	Sens: 0.48/Spec: 0.99

Appendix D: National Population Health Survey - Work stress and the JCQ

Now I'm going to read you a series of statements that might describe your job situation. Please tell me if you strongly agree, agree, neither agree nor disagree, disagree, or strongly disagree. If you have more than one job, just think about the main one.

Your job requires that you learn new things.
1 Strongly agree
2 Agree
3 Neither agree nor disagree
4 Disagree
5 Strongly disagree

Your job requires a high level of skill.
1 Strongly agree
2 Agree
3 Neither agree nor disagree
4 Disagree
5 Strongly disagree

Your job allows you freedom to decide how you do your job.
1 Strongly agree
2 Agree
3 Neither agree nor disagree
4 Disagree
5 Strongly disagree

Your job requires that you do things over and over.
1 Strongly agree
2 Agree
3 Neither agree nor disagree
4 Disagree
5 Strongly disagree

Your job is very hectic.
1 Strongly agree
2 Agree
3 Neither agree nor disagree
4 Disagree
5 Strongly disagree

You are free from conflicting demands that others make.
INTERVIEWER: If necessary, explain that the question refers to conflicting demands on the job.
1 Strongly agree
2 Agree
3 Neither agree nor disagree
4 Disagree
5 Strongly disagree

Your job security is good.
1 Strongly agree
2 Agree
3 Neither agree nor disagree
4 Disagree
5 Strongly disagree

Your job requires a lot of physical effort.
1 Strongly agree
2 Agree
3 Neither agree nor disagree
4 Disagree
5 Strongly disagree

You have a lot to say about what happens in your job.
1 Strongly agree
2 Agree
3 Neither agree nor disagree
4 Disagree
5 Strongly disagree

You are exposed to hostility or conflict from the people you work with.
1 Strongly agree
2 Agree
3 Neither agree nor disagree
4 Disagree
5 Strongly disagree

Your supervisor is helpful in getting the job done.
1 Strongly agree
2 Agree
3 Neither agree nor disagree
4 Disagree
5 Strongly disagree

The people you work with are helpful in getting the job done.
1 Strongly agree
2 Agree
3 Neither agree nor disagree
4 Disagree
5 Strongly disagree

How satisfied are you with your job?

1 Very satisfied
2 Somewhat satisfied
3 Not too satisfied
4 Not at all satisfied

Appendix E: Variables for Analysis

Item	Description	Coding
Outcome – Problematic Alcohol Use	5+ drinks on one occasion at least once per month	1 = yes 0 = no
	15+ drinks/week for men or 10+ drinks/week for women	1 = yes 0 = no
	Hazardous drinking identified by AUDIT-C Proxy	1 = yes 0 = no
Exposure – Work Stress	Job strain ratio	1 = high job strain 0 = low job strain
	Quartiles of work stress	0 = <25th percentile 1 = 25-50th percentile 2 = 50-75th percentile 3 = >75th percentile
	Demand-Control model	0 = low demand 1 = high demand 2 = active 3 = passive
Covariates	Full or part time work	0 = full time 1 = part time
	Shift type	0 = regular daytime 1 = regular evening/night 2 = rotating/split/on call shift 3 = irregular
	Average # of working hours/week	Continuous
	Age	Continuous
	Gender	0 = male 1 = female
	Education	0 = college/university degree 1 = some post-secondary 2 = high school 3 = <high school
	Income	0 = ≥$80,000 1 = $60,000-<$80,000 2 = $30,000-<60,000 3 = $15,000-<30,000 4 = <$15,000
	Marital status	0 = married/common-law 1 = separated/divorced/widowed 2 = single (never married)
	Immigration status	0 = non-immigrant 1 = immigrant
	Physical activity	0 = active 1 = moderate 2 = inactive
	Smoking status	0 = never smoked 1 = previously smoked 2 = current occasional 3 = current daily
	Rural/Urban status	0 = urban

		1 = rural
	Self-reported health	0 = good/very good/excellent
		1 = fair/poor
	Job insecurity	0 = low insecurity
		1 = high insecurity
	Social support at work	0 = neutral/high support
		1 = low support
	Major depression	0 = no MDE
		1 = MDE

Appendix F: Demographic tables

Table 7.1: Demographic characteristics of participants at baseline, overall and by level of baseline work stress according to the Job Strain Ratio for those working, aged 18-65 years, without problematic drinking at baseline (n=4326).

Demographic Variable	Total	Job Strain Ratio		Chi2 (df)	P
		High (0.4339)	Low (0.5661)		
Age (mean, 95% CI)	38.34 (37.97-38.71)	36.74 (36.16-37.31)	39.38 (38.85-39.91)	t=-6.63	<0.0001
Gender					
Male	0.5117	0.4472	0.5268	29.32 (1)	<0.0001
Female	0.4883	0.5528	0.4732		
Education					
College/University	0.4340	0.4057	0.4466	8.67 (3)	0.1600
Some post-sec	0.2593	0.2827	0.2541		
High school	0.1609	0.1696	0.1614		
<High school	0.1458	0.1420	0.1378		
Income					
≥$80,000	0.1731	0.1679	0.1790	12.40 (4)	0.0970
$60,000-<80,000	0.1756	0.1677	0.1952		
$30,000-<60,000	0.4447	0.4516	0.4291		
$15,000-<30,000	0.1464	0.1464	0.1473		
<$15,000	0.0602	0.0664	0.0494		
Marital Status					
Married/common-law	0.7190	0.6809	0.7404	21.37 (2)	0.0006
Separated/divorced	0.0833	0.0921	0.0822		
Single, never married	0.1977	0.2270	0.1774		
Immigration					
Non-immigrant	0.8173	0.8186	0.8080	0.85 (1)	0.5108
Immigrant	0.1827	0.1814	0.1920		
Physical Activity					
Active	0.1678	0.1712	0.1719	2.61 (2)	0.4408
Moderate	0.2186	0.2040	0.2227		
Inactive	0.6136	0.6248	0.6054		

Smoking Status					
Never smoked	0.3765	0.3654	0.3850	7.14 (3)	0.2407
Previously smoked	0.3162	0.3159	0.3288		
Current occasional	0.0588	0.0566	0.0575		
Current daily	0.2485	0.2622	0.2287		
Rural/Urban Status					
Rural	0.3682	0.3639	0.3742	0.51 (1)	0.5701
Urban	0.6318	0.6361	0.6258		
Health					
Excellent/good	0.9550	0.9474	0.9587	3.37 (1)	0.1332
Fair/poor	0.0450	0.0526	0.0413		
Job Insecurity					
Low insecurity	0.7887	0.7449	0.8236	43.11 (1)	<0.0001
High insecurity	0.2113	0.2551	0.1764		
Work Support					
Low support	0.2089	0.2809	0.1546	111.43 (1)	<0.0001
Neutral/high support	0.7911	0.7191	0.8454		
MDE					
No	0.9478	0.9252	0.9682	44.57 (1)	<0.0001
Yes	0.0522	0.0748	0.0318		
Part/Full time					
Part time	0.1798	0.1909	0.1858	0.20 (1)	0.7322
Full time	0.8202	0.8091	0.8142		
Shift Type					
Regular daytime	0.7204	0.6833	0.7479	47.48 (3)	<0.0001
Regular evening/night	0.0566	0.0689	0.0471		
Rotating/split/on call	0.1171	0.1476	0.0930		
Irregular shifts	0.1059	0.1001	0.1119		
Working Hours (mean, 95% CI)	38.41 (37.91-38.91)	38.05 (37.34-38.77)	38.18 (37.45-38.91)	t=-0.25	0.8060

Table 7.2: Demographic characteristics of participants at baseline, by level of baseline work stress according to the categorical job groups for those working, aged 18-65 years, without problematic drinking at baseline(n=4326).

Demographic Variable	Categorical job groups				Chi2 (df)	p
	High Strain (0.2456)	Low Strain (0.2021)	Passive (0.4197)	Active (0.1326)		
Age (mean, 95% CI)	36.56 (35.82-37.30)	39.98 (39.11-40.85)	38.17 (37.52-38.82)	38.83 (37.98-39.68)	t=-1.32	0.1860
Gender						
Male	0.4528	0.5589	0.4672	0.5480	36.90 (3)	0.0001
Female	0.5472	0.4411	0.5328	0.4520		
Education						
College/university	0.4151	0.5605	0.3017	0.6615	441.42 (9)	<0.0001
Some post-sec	0.2829	0.2560	0.2695	0.2399		
High school	0.1785	0.1085	0.2157	0.0641		
<High school	0.1235	0.0750	0.2132	0.0345		
Income						
≥$80,000	0.1635	0.2548	0.1050	0.2863	279.06 (12)	<0.0001
$60,000-<80,000	0.1729	0.1924	0.1667	0.2367		
$30,000-<60,000	0.4730	0.4130	0.4435	0.3962		
$15,000-<30,000	0.1347	0.1057	0.2046	0.0524		
<$15,000	0.0560	0.0342	0.0801	0.0284		
Marital Status						
Married/com-law	0.6905	0.7683	0.6856	0.7702	52.52 (6)	<0.0001
Sep/divorce/widow	0.0895	0.0888	0.0811	0.0931		
Single, never mar	0.2200	0.1428	0.2332	0.1366		
Immigration						
Non-immigrant	0.8288	0.8014	0.8240	0.8027	4.52 (3)	0.5124
Immigrant	0.1712	0.1986	0.1760	0.1973		
Physical Activity						
Active	0.1938	0.1703	0.1587	0.1717	17.60 (6)	0.0887
Moderate	0.1972	0.2337	0.2055	0.2546		
Inactive	0.6090	0.5960	0.6358	0.5737		
Smoking Status						
Never smoked	0.3446	0.3889	0.3621	0.4602	39.36 (9)	0.0062

Previously smoked	0.3273	0.3412	0.3155	0.3091		
Current occasional	0.0577	0.0467	0.0629	0.0528		
Current daily	0.2704	0.2232	0.2595	0.1779		
Rural/Urban						
Rural	0.3529	0.3566	0.3986	0.3292	13.27 (3)	0.0439
Urban	0.6471	0.6434	0.6014	0.6708		
Health						
Excellent/good	0.9495	0.9709	0.9448	0.9644	12.01 (3)	0.0524
Fair/poor	0.0505	0.0291	0.0552	0.0356		
Job Insecurity						
Low insecurity	0.7297	0.8451	0.7920	0.8090	44.14 (3)	<0.0001
High insecurity	0.2703	0.1549	0.2080	0.1910		
Work Support						
Low	0.3596	0.1097	0.1795	0.1775	229.13 (3)	<0.0001
Neutral/high	0.6404	0.8903	0.8205	0.8225		
MDE						
No	0.9068	0.9823	0.9613	0.9424	71.79 (3)	<0.0001
Yes	0.0932	0.0177	0.0387	0.0576		
Part/Full time						
Part time	0.1676	0.1368	0.2582	0.0798	131.02 (3)	<0.0001
Full time	0.8324	0.8632	0.7418	0.9202		
Shift Type						
Regular day	0.6697	0.8016	0.6841	0.8043	153.88 (9)	<0.0001
Regular eve/night	0.0576	0.0227	0.0846	0.0170		
Rotate/split/on call	0.1720	0.0705	0.1242	0.0601		
Irregular	0.1007	0.1052	0.1070	0.1186		
Working Hours (mean, 95% CI)	39.21 (38.24-40.18)	39.98 (38.76-41.20)	35.12 (34.29-35.95)	43.35 (41.97-44.72)	t=-6.92	<0.0001

Table 7.3: Demographic characteristics of participants at baseline, by level of baseline work stress according to Quartiles of Work Stress for those working, aged 18-65 years, without problematic drinking at baseline(n=4326).

Demographic Variable	Quartile of Work Stress				Chi2 (df)	p
	<25th (0.2993)	25th–50th (0.2932)	50th – 75th (0.1978)	>75th (0.2097)		
Age (mean, 95% CI)	40.04 (39.34-40.74)	38.99 (38.26-39.73)	37.27 (36.36-38.17)	35.48 (34.65-36.31)	t=-8.69	<0.0001
Gender						
Male	0.5284	0.5216	0.4740	0.4227	32.58 (3)	0.0002
Female	0.4716	0.4784	0.5260	0.5773		
Education						
College/university	0.5505	0.4257	0.3736	0.3165	188.47 (9)	<0.0001
Some post-sec	0.2562	0.2481	0.2633	0.3031		
High school	0.1163	0.1765	0.1749	0.2056		
<High school	0.0769	0.1497	0.1883	0.1748		
Income						
≥$80,000	0.2364	0.1893	0.1289	0.1053	173.90 (12)	<0.0001
$60,000-<80,000	0.2272	0.1733	0.1588	0.1536		
$30,000-<60,000	0.4059	0.4358	0.4696	0.4533		
$15,000-<30,000	0.0982	0.1460	0.1671	0.2083		
<$15,000	0.0322	0.0557	0.0756	0.0795		
Marital Status						
Married/com-law	0.7618	0.7312	0.6862	0.6551	54.36 (6)	<0.0001
Sep/divorce/widow	0.0830	0.0941	0.0833	0.0833		
Single, never mar	0.1553	0.1747	0.2306	0.2617		
Immigration						
Non-immigrant	0.7902	0.8181	0.8465	0.8012	12.80 (3)	0.0920
Immigrant	0.2098	0.1819	0.1535	0.1988		
Physical Activity						
Active	0.1875	0.1532	0.1820	0.1671	19.87 (6)	0.0537
Moderate	0.2329	0.2326	0.1829	0.1964		
Inactive	0.5796	0.6142	0.6351	0.6365		
Smoking Status						
Never smoked	0.4165	0.3864	0.3358	0.3385	62.93 (9)	<0.0001

Previously smoked	0.3428	0.3186	0.3336	0.2850		
Current occasional	0.0519	0.0567	0.0610	0.0607		
Current daily	0.1888	0.2383	0.2695	0.3158		
Rural/Urban						
Rural	0.3321	0.3952	0.3904	0.3640	13.99 (3)	0.0317
Urban	0.6679	0.6048	0.6096	0.6360		
Health						
Excellent/good	0.9688	0.9606	0.9403	0.9368	19.12 (3)	0.0056
Fair/poor	0.0312	0.0394	0.0597	0.0632		
Job Insecurity						
Low insecurity	0.9277	0.8338	0.7544	0.5584	502.04 (3)	<0.0001
High insecurity	0.0723	0.1662	0.2456	0.4416		
Work Support						
Low	0.0435	0.1354	0.2607	0.4998	800.34 (3)	<0.0001
Neutral/high	0.9565	0.8646	0.7393	0.5002		
MDE						
No	0.9737	0.9597	0.9295	0.9209	45.15 (3)	<0.0001
Yes	0.0263	0.0403	0.0705	0.0791		
Part/Full time						
Part time	0.1458	0.1828	0.2239	0.2162	29.77 (3)	0.0006
Full time	0.8542	0.8172	0.7761	0.7838		
Shift Type						
Regular day	0.7990	0.7458	0.6646	0.6162	178.24 (9)	<0.0001
Regular eve/night	0.0262	0.0434	0.0727	0.1025		
Rotate/split/on call	0.0678	0.1014	0.1564	0.1799		
Irregular	0.1070	0.1094	0.1064	0.1014		
Working Hours (mean, 95% CI)	39.91 (38.88-40.94)	38.41 (37.49-39.34)	37.02 (35.72-38.33)	36.60 (35.57-37.62)	t=-4.81	<0.0001

Appendix G: Response and non-response tables

Table 8.1: Baseline characteristics of completers and non-completers for 2-year follow up time period (n=4326).

Variable at Baseline	Responders (n=4012)	Non-Responders (n=314)	Chi2 (df)	p
Age (mean, 95% CI)	37.74 (36.63-38.02)	33.42 (32.86-35.07)	t=5.01	<0.0001
Gender				
Male	0.5073	0.5713	5.51 (1)	0.0531
Female	0.4927	0.4287		
Education				
College/university	0.4334	0.4422	4.43 (3)	0.3919
Some post-sec	0.2620	0.2215		
High school	0.1609	0.1614		
<High school	0.1436	0.1748		
Income				
≥$80,000	0.1749	0.1483	12.41 (4)	0.0826
$60,000-<80,000	0.1774	0.1503		
$30,000-<60,000	0.4454	0.4349		
$15,000-<30,000	0.1447	0.1695		
<$15,000	0.0575	0.0969		
Marital Status				
Married/common-law	0.7224	0.6735	4.08 (2)	0.1966
Separated/divorced	0.0826	0.0928		
Single, never married	0.1951	0.2337		
Immigration Status				
Non-immigrant	0.8227	0.8434	3.26 (1)	0.2918
Immigrant	0.1773	0.1566		
Physical Activity				
Active	0.1656	0.1988	2.81 (2)	0.3857
Moderate	0.2183	0.2223		
Inactive	0.6161	0.5789		
Smoking Status				
Never smoked	0.3805	0.3215	18.94 (3)	0.0053
Previously smoked	0.3197	0.2691		
Current occasional	0.0574	0.0779		
Current daily	0.2424	0.3315		
Rural/Urban Status				

Urban	0.6224	0.6346	2.74 (1)	0.5164
Rural	0.3756	0.3654		
Self-Reported Health Excellent/good	0.9555	0.9485	0.39 (1)	0.5670
Fair/poor	0.0445	0.0515		
Job Insecurity				
Low insecurity	0.7891	0.7821	0.09 (1)	0.7994
High insecurity	0.2109	0.2179		
Social Support at Work				
Low support	0.2096	0.1992	0.20 (1)	0.7220
Neutral/high support	0.7904	0.8008		
MDE				
No	0.9494	0.9256	3.60 (1)	0.1642
Yes	0.0506	0.0744		
Part/Full time				
Full time	0.8219	0.7963	1.47 (1)	0.3289
Part time	0.1781	0.2037		
Shift Type				
Regular daytime	0.7207	0.7164	1.43 (3)	0.7937
Regular evening/night	0.0565	0.0576		
Rotating/split/on call	0.1180	0.1044		
Irregular shifts	0.1047	0.1216		
Work hours/week (mean, 95% CI)	39.13 (38.95-41.37)	38.77 (37.09-40.28)	t=1.56	0.1581
Job Strain Ratio				
Low	0.5298	0.5467	1.54 (1)	0.3475
High	0.4702	0.4533		
Categorical				
Low	0.2145	0.1792	9.37 (3)	0.0864
High	0.2389	0.2575		
Active	0.1190	0.0921		
Passive	0.4276	0.4712		
Quartiles				
<25th	0.2875	0.2735	7.43 (3)	0.1587
25-50th	0.2934	0.2948		
50-75th	0.2390	0.2048		
>75th	0.1801	0.2269		

Table 8.2: Baseline characteristics of completers and non-completers for 14-year follow up time period (n=4326).

Variable at Baseline	Responders (n=2807)	Non-Responders (n=1519)	Chi2 (df)	p
Age (mean, 95% CI)	36.69 (35.82-37.55)	33.17 (31.99-34.34)	t=4.73	<0.0001
Gender				
Male	0.6563	0.7341	9.22 (1)	0.0195
Female	0.3437	0.2659		
Education				
College/university	0.4562	0.3634	6.32 (3)	0.2348
Some post-sec	0.2115	0.3228		
High school	0.1574	0.1444		
<high school	0.1749	0.1694		
Income				
≥$80,000	0.2032	0.0991	40.00 (4)	0.0001
$60,000-<80,000	0.1982	0.1572		
$30,000-<60,000	0.4406	0.4955		
$15,000-<30,000	0.1198	0.1744		
<$15,000	0.0382	0.0738		
Marital Status				
Married/common-law	0.7400	0.5713	47.16 (2)	<0.0001
Separated/divorced	0.0634	0.0696		
Single, never married	0.1966	0.3591		
Immigration Status				
Non-immigrant	0.8545	0.8597	0.07 (1)	0.8460
Immigrant	0.1455	0.1403		
Physical Activity				
Active	0.1869	0.2194	3.42 (2)	0.3700
Moderate	0.2358	0.1999		
Inactive	0.5773	0.5806		
Smoking Status				
Never smoked	0.3027	0.2646	25.91 (3)	0.0020
Previously smoked	0.3296	0.2341		
Current occasional	0.0669	0.0865		
Current daily	0.3007	0.4148		
Rural/Urban Status				
Urban	0.5935	0.6445	0.78 (1)	0.5160

Rural	0.4065	0.3555		
Self-Reported Health				
Excellent/good	0.9599	0.9589	0.01 (1)	0.9372
Fair/poor	0.0401	0.0411		
Job Insecurity				
Low insecurity	0.7818	0.7729	0.13 (1)	0.7770
High insecurity	0.2182	0.2271		
Social Support at Work				
Low support	0.2063	0.2242	0.55 (1)	0.5623
Neutral/high support	0.7937	0.7758		
MDE				
No	0.9418	0.9193	2.49 (1)	0.2320
Yes	0.0582	0.0807		
Part/Full time				
Full time	0.8564	0.8214	2.94 (1)	0.2111
Part time	0.1436	0.1786		
Shift Type				
Regular daytime	0.7002	0.6339	6.89 (3)	0.2704
Regular evening/night	0.0662	0.0711		
Rotating/split/on call	0.1406	0.1792		
Irregular shifts	0.0930	0.1157		
Work hours/week (mean, 95% CI)	40.12 (38.90-41.35)	38.56 (36.89-40.23)	t=1.48	0.1390
Job Strain Ratio				
Low	0.5735	0.5506	0.62 (1)	0.5475
High	0.4265	0.4494		
Categorical Job Groups				
Low	0.2122	0.1634	12.30 (3)	0.0762
High	0.2324	0.2764		
Active	0.1326	0.0882		
Passive	0.4229	0.4720		
Quartiles				
<25th	0.2933	0.2350	10.35 (3)	0.1109
25-50th	0.2947	0.3125		
50-75th	0.2129	0.1878		
>75th	0.1990	0.2646		

Appendix H: Stratified estimates for 2 and 14-year incidence

Non-significant crude associations for 5+ drinks on one occasion at least once per month and the outcome indicators specific to women can be found in tables 9.1-9.3. When stratified by income (Table 9.5), men with high job strain were less likely to experience 14-year incidence of the proxy AUDIT-C in both middle (RR=0.71, 95% CI: 0.55-0.91) and low-income (RR=0.50, 95% CI: 0.30-0.84) categories.

When stratified by education (Table 9.6), men with high job strain were less likely to experience 2 and 14-year incidence of the proxy AUDIT-C if they had completed, or were in progress of, post-secondary education (RR=0.64, 95% CI: 0.47-0.88; RR=0.71, 95% CI: 0.55-0.90, respectively). The opposite relationship is observed among women; women with high job strain were more likely to experience 2 and 14-year incidence of the proxy AUDIT-C if they had completed, or were in progress of, post-secondary education (RR=1.67, 95%CI: 1.14-2.45; RR=1.32, 95% CI: 1.04-1.68, respectively).

When stratified by marital status (Table 9.7), women with high job strain were more likely to experience 2 and 14-year incidence of the proxy AUDIT-C if they were single, or never married (RR=2.25, 95% CI: 1.23-4.12; RR=1.57, 95% CI: 1.04-2.38, respectively).

When stratified by immigration status (Table 9.8), men with high job strain were less likely to experience 2 and 14-year incidence of the proxy AUDIT-C if they were Canadian born (RR=0.62, 95% CI: 0.48-0.81; RR=0.68, 95% CI: 0.55-0.85, respectively).

When stratified by physical activity (Table 9.9), individuals who were moderately active in the highest quartile of work stress were more likely to experience 2 and 14-year incidence of problematic drinking compared to those in the lowest quartile, as identified by 5+ drinks on one occasion at least once per month (RR=2.36, 95% CI: 1.29-4.32; RR=1.72, 95% CI: 1.12-2.64, respectively). Among men, those with high job strain were less likely to experience 2 and 14-year incidence of the proxy AUDIT-C if they were physically inactive (RR=0.68, 95% CI: 0.48-0.95; RR=0.68, 95% CI: 0.52-0.89). A similar relationship is observed for categorical job groups; among men, those with high demand jobs are less likely to experience 14-year incidence of the proxy AUDIT-C compared to those with low demand jobs, if they were moderately active (RR=0.43, 95% CI: 0.23-0.80) or inactive (RR=0.56, 95% CI: 0.38-0.84). Among women, those with high job strain were more likely to

experience 2 and 14-year incidence of the proxy AUDIT-C if they were physically active (RR=3.40, 95% CI: 1.71-6.76; RR=1.80, 95% CI: 1.11-2.92, respectively).

When stratified by smoking status (Table 9.10), women with high job strain were more likely to experience 2-year incidence of problematic drinking, as identified by the proxy AUDIT-C, compared to women with low job strain among those who have never smoked (RR=2.71, 95% CI: 1.34-5.45).

When stratified by rural/urban status (Table 9.11), those with passive jobs are more likely to experience 2-year incidence of problematic drinking, as identified by 5+ drinks on one occasion at least once per month, compared to those with low demand jobs among those living in urban settings (RR=1.89, 95% CI: 0.17-3.04). Among individuals residing in rural settings, those with active jobs are less likely to experience incidence of 5+ drinks on one occasion at least once per month compared to those with low demand jobs (RR=0.26, 95% CI: 0.14-0.50). Among men, those residing in rural areas with high job strain are less likely to experience 2 and 14-year incidence of the proxy AUDIT-C compared to those with low job strain (RR=0.62, 95% CI: 0.44-0.89; RR=0.71, 95% CI: 0.54-0.94, respectively). Among men residing in urban areas, those with high job strain are less likely to experience 2 and 14-year incidence of 15+ drinks/week compared to those with low job strain (RR=0.38, 95% CI: 0.17-0.87; RR=0.50, 95% CI: 0.31-0.80, respectively).

When stratified by job insecurity (Table 9.12), men with low job insecurity and a high job strain ratio were less likely to experience 2 and 14-year incidence of the proxy AUDIT-C compared to men with a low job strain ratio (RR=0.65, 95% CI: 0.49-0.86; RR=0.73, 95% CI: 0.58-0.91, respectively).

When stratified by social support at work (Table 9.13), among men with high social support at work, those with a high job strain ratio were less likely to experience 2 and 14-year incidence of the proxy AUDIT-C compared to men with a low job strain (RR=0.66, 95% CI: 0.49 – 0.87; RR=0.77, 95% CI: 0.62-0.97, respectively).

Table 9.1: 2 and 14-year incidence proportion for 5+ drinks on one occasion at least once per month, by baseline work stress.

	5+ drinks on one occasion at least once per month					
	2-year proportion (n=420)	RR (95% CI)	p	14-year proportion (n=718)	RR (95% CI)	p
Job Strain						
Low	0.1145	0.93 (0.75-1.15)	0.502	0.2729	1.03 (0.88-1.21)	0.686
High	0.1064			0.2821		
Categorical						
Low	0.0993	Ref		0.2675	Ref	
High	0.1054	1.06 (0.75-1.50)	0.739	0.2770	1.04 (0.80-1.33)	0.787
Active	0.0797	0.80 (0.51-1.25)	0.335	0.2500	0.93 (0.71-1.23)	0.631
Passive	0.1294	1.30 (0.96-1.77)	0.089	0.2914	1.09 (0.88-1.35)	0.429
Quartiles						
<25th	0.1054	Ref		0.2559	Ref	
25-50th	0.1132	1.07 (0.81-1.43)	0.623	0.2755	1.08 (0.88-1.33)	0.480
50-75th	0.1102	1.05 (0.77-1.42)	0.776	0.3109	1.21 (0.95-1.56)	0.127
>75th	0.1200	1.14 (0.83-1.57)	0.429	0.2887	1.13 (0.89-1.43)	0.314

Table 9.2: 2 and 14-year incidence proportion for the proxy AUDIT-C for women by baseline work stress.

	Problematic drinking by AUDIT-C for women					
	2-year proportion (n=187)	RR (95% CI)	p	14-year proportion (n=473)	RR (95% CI)	p
Job Strain						
Low	0.0438	1.47 (1.03-2.09)	0.032	0.1619	1.22 (0.99-1.50)	0.059
High	0.0644			0.1975		
Categorical						
Low	0.0440	Ref		0.1622	Ref	
High	0.0718	1.63 (0.85-3.12)	0.140	0.1890	1.16 (0.81-1.68)	0.411
Active	0.0383	0.87 (0.40-1.88)	0.722	0.1574	0.97 (0.65-1.45)	0.883
Passive	0.0504	1.14 (0.61-2.16)	0.678	0.1848	1.14 (0.81-1.60)	0.460
Quartiles						
<25th	0.0450	Ref		0.1574	Ref	
25-50th	0.0472	1.05 (0.61-1.80)	0.864	0.1723	1.09 (0.81-1.49)	0.562
50-75th	0.0587	1.30 (0.77-2.20)	0.324	0.2075	1.32 (0.96-1.81)	0.085
>75th	0.0651	1.45 (0.87-2.40)	0.154	0.1829	1.16 (0.84-1.61)	0.369

Table 9.3: 2-year and 14-year incidence proportion for 10+ drinks/week for women by baseline work stress.

| | 10+ drinks/week for women | | | | | |
	2-year proportion (n=62)	RR (95% CI)	p	14-year proportion (n=232)	RR (95% CI)	p
Job Strain						
Low	0.0167	1.16 (0.66-2.05)	0.613	0.0833	1.25 (0.94-1.78)	0.127
High	0.0194			0.1045		
Categorical						
Low				0.0989	Ref	
High		Cell size too small		0.1303	1.32 (0.84-2.05)	0.222
Active				0.0682	0.69 (0.39-1.23)	0.211
Passive				0.0752	0.76 (0.48-1.21)	0.247
Quartiles						
<25th	0.0209	Ref		0.0888	Ref	
25-50th	0.0110	0.53 (0.24-1.17)	0.117	0.0771	0.87 (0.57-1.33)	0.513
50-75th	0.0239	1.15 (0.49-2.68)	0.754	0.1152	1.30 (0.84-2.00)	0.235
>75th	0.0182	0.87 (0.36-2.13)	0.763	0.0974	1.10 (0.70-1.72)	0.690

Table 9.4: 2-year and 14-year incidence proportion for for 5+ drinks on one occasion at least once per month, by baseline work stress and gender.

| Stratified Variables | 5+ drinks on one occasion at least once per month | | | | | |
	2-year proportion (n=420)	RR (95% CI)	p	14-year proportion (n=718)	RR (95% CI)	p
Job Strain						
Men						
Low	0.1027	0.89 (0.69-1.15)	0.370	0.2351	1.01 (0.83-1.22)	0.939
High	0.0572			0.1435		
Women						
Low	0.0294	1.32 (0.88-1.98)	0.174	0.0932	1.24 (0.95-1.63)	0.117
High	0.0351			0.0962		
Categorical						
Men						
Low	0.0313	Ref		0.0845	Ref	
High	0.0315	1.10 (0.72-1.68)	0.665	0.0746	1.08 (0.79-1.46)	0.634
Active	0.0163	0.84 (0.49-1.44)	0.523	0.0563	1.00 (0.72-1.38)	0.991
Passive	0.0805	1.51 (1.07-2.12)	0.018	0.1632	1.30 (1.03-1.65)	0.021

Women						
Low	0.0098	Ref		0.0366	Ref	
High	0.0194	1.31 (0.58-2.97)	0.515	0.0555	1.14 (0.72-1.82)	0.572
Active	0.0054	0.78 (0.30-2.05)	0.619	0.0198	0.81 (0.47-1.39)	0.441
Passive	0.0299	1.21 (0.57-2.56)	0.623	0.0774	0.95 (0.61-1.49)	0.828
Quartiles						
Men						
<25th	0.0497	Ref		0.1213	Ref	
25-50th	0.0487	1.03 (0.74-1.42)	0.879	0.1241	1.13 (0.90-1.43)	0.282
50-75th	0.0290	0.98 (0.68-1.42)	0.932	0.0746	1.14 (0.86-1.52)	0.368
>75th	0.0339	1.25 (0.86-1.83)	0.246	0.0625	1.16 (0.87-1.54)	0.314
Women						
<25th	0.0144	Ref		0.0476	Ref	
25-50th	0.0182	1.27 (0.67-2.40)	0.456	0.0459	1.00 (0.65-1.55)	0.998
50-75th	0.0152	1.43 (0.71-2.87)	0.320	0.0462	1.48 (0.95-2.30)	0.085
>75th	0.0165	1.33 (0.69-2.57)	0.387	0.0494	1.37 (0.88-2.12)	0.162

Table 9.5: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and income.

	5+ drinks on one occasion at least once per month					
Stratified Variables	**2-year proportion (n=420)**	**RR (95% CI)**	**p**	**14-year proportion (n=718)**	**RR (95% CI)**	**p**
Job Strain						
High						
Low	0.0489	1.02 (0.56-1.82)	0.949	0.1630	1.03 (0.69-1.55)	0.880
High	0.0379			0.1171		
Middle						
Low	0.0694	0.88 (0.67-1.16)	0.376	0.1597	1.02 (0.83-1.24)	0.877
High	0.0468			0.1161		
Low						
Low	0.0642	0.89 (0.57-1.39)	0.611	0.1431	1.02 (0.72-1.43)	0.927
High	0.0472			0.1204		

Quartiles						
High						
<25th				0.1220	Reference	
25-50th				0.1000	1.14 (0.72-1.80)	0.583
50-75th				0.0347	0.89 (0.46-1.75)	0.741
>75th				0.0239	0.70 (0.35-1.38)	0.301
Middle						
<25th		Cell size too small		0.0761	Reference	
25-50th				0.0840	1.11 (0.85-1.45)	0.427
50-75th				0.0594	1.22 (0.91-1.63)	0.186
>75th				0.0568	1.24 (0.93-1.64)	0.142
Low						
<25th				0.0403	Reference	
25-50th				0.0614	1.18 (0.67-2.08)	0.577
50-75th				0.0777	1.75 (1.02-2.98)	0.041
>75th				0.0835	1.41 (0.82-2.41)	0.209

	Problematic drinking by AUDIT-C for men					
Stratified Variables	**2-year proportion (n=381)**	**RR (95% CI)**	**p**	**14-year proportion (n=618)**	**RR (95% CI)**	**p**
Job Strain						
High						
Low	0.0679	0.65 (0.37-1.13)	0.125	0.1366	0.99 (0.64-1.53)	0.959
High	0.0334			0.0945		
Middle						
Low	0.0580	0.76 (0.58-1.05)	0.097	0.1448	0.71 (0.55-0.91)	0.008
High	0.0339			0.0735		
Low						
Low	0.0443	0.54 (0.28-1.06)	0.073	0.1266	0.50 (0.30-0.84)	0.008
High	0.0199			0.0529		

	Problematic drinking by AUDIT-C for women					
Stratified Variables	**2-year proportion (n=205)**	**RR (95% CI)**	**p**	**14-year proportion (n=540)**	**RR (95% CI)**	**p**
Job Strain						
High						
Low	0.0290	0.96 (0.43-2.16)	0.922	0.1189	1.10 (0.67-1.81)	0.715

	0.0212			0.0914		
Middle						
Low	0.0223	1.69 (1.03-2.76)	0.038	0.0890	1.30 (1.00-1.70)	0.053
High	0.0287			0.0828		
Low						
Low	0.0274	1.42 (0.75-2.68)	0.283	0.0785	1.26 (0.80-1.98)	0.313
High	0.0321			0.0820		

	10+ drinks/week for women					
Stratified Variables	**2-year proportion (n=68)**	**RR (95% CI)**	**p**	**14-year proportion (n=260)**	**RR (95% CI)**	**p**
<u>**Job Strain**</u>						
High						
Low				0.0509	1.76 (0.94-3.28)	0.077
High				0.0627		
Middle		Cell size too small				
Low				0.0497	1.17 (0.78-1.75)	0.440
High				0.0416		
Low						
Low				0.0324	1.26 (0.62-2.56)	0.516
High				0.0339		

	15+ drinks/week for men					
Stratified Variables	**2-year proportion (n=95)**	**RR (95% CI)**	**p**	**14-year proportion (n=245)**	**RR (95% CI)**	**p**
<u>**Job Strain**</u>						
High						
Low				0.0620	0.74 (0.35-1.59)	0.443
High				0.0323		
Middle		Cell size too small				
Low				0.0529	0.74 (0.49-1.12)	0.159
High				0.0282		
Low						
Low				0.0684	0.35 (0.16-0.80)	0.012
High				0.0199		

Note: Cell size was too small to present estimates stratified by categorical work stress.

Table 9.6: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and education.

| Stratified Variables | 5+ drinks on one occasion at least once per month | | | | | |
	2-year proportion (n=462)	RR (95% CI)	p	14-year proportion (n=829)	RR (95% CI)	p
Job Strain						
College/uni						
Low	0.0570	0.88 (0.66-1.16)	0.352	0.1450	1.08 (0.89-1.31)	0.442
High	0.0377			0.1150		
High school						
Low	0.0840	1.01 (0.73-1.40)	0.947	0.1930	0.96 (0.74-1.25)	0.748
High	0.0648			0.1260		
Quartiles						
College/uni						
<25th	0.0365			0.0896	Reference	
25-50th	0.0221	0.75 (0.52-1.07)	0.112	0.0724	1.03 (0.79-1.34)	0.822
50-75th	0.0172	0.90 (0.60-1.35)	0.611	0.0496	1.16 (0.87-1.54)	0.309
>75th	0.0205	1.04 (0.71-1.53)	0.826	0.0504	1.16 (0.88-1.53)	0.288
High school						
<25th	0.0205			0.0605	Reference	
25-50th	0.0583	1.72 (1.03-2.85)	0.037	0.1073	1.09 (0.74-1.60)	0.652
50-75th	0.0331	1.27 (0.74-2.20)	0.386	0.0843	1.22 (0.82-1.81)	0.335
>75th	0.0355	1.28 (0.75-2.20)	0.371	0.0684	0.99 (0.66-1.48)	0.968
Stratified Variables	Problematic drinking by AUDIT-C for men					
	2-year proportion (n=381)	RR (95% CI)	p	14-year proportion (n=618)	RR (95% CI)	p
Job Strain						
College/uni						
Low	0.0533	0.64 (0.47-0.88)	0.006	0.1296	0.71 (0.55-0.90)	0.005
High	0.0258			0.0671		
High school						
Low	0.0749	0.76 (0.51-1.13);	0.181	0.1726	0.77 (0.55-1.08)	
High	0.0436			0.0912		0.134
Quartiles						
College/uni						
<25th	0.0323			0.0845	Reference	

	2-year proportion	RR (95% CI)	p	14-year proportion	RR (95% CI)	p
25-50th	0.0228	0.87 (0.60-1.27)	0.468	0.0595	0.90 (0.68-1.18)	0.438
50-75th	0.0126	0.75 (0.47-1.19)	0.221	0.0282	0.70 (0.48-1.01)	0.055
>75th	0.0129	0.74 (0.48-1.15)	0.181	0.0269	0.66 (0.46-0.94)	0.022
High school						
<25th	0.0218			0.0509	Reference	
25-50th	0.0458	1.27 (0.74-2.18)	0.388	0.1078	1.31(0.84-2.02)	0.233
50-75th	0.0204	0.74 (0.40-1.37)	0.339	0.0635	1.09 (0.67-1.78)	0.727
>75th	0.0295	1.00 (0.56-1.79)	0.996	0.0432	0.74 (0.45-1.24)	0.253

	Problematic drinking by AUDIT-C for women					
Stratified Variables	**2-year proportion (n=205)**	**RR (95% CI)**	**p**	**14-year proportion (n=540)**	**RR (95% CI)**	**p**
Job Strain						
College/uni						
Low	0.0232	1.67 (1.14-2.45)	0.009	0.0914	1.32 (1.04-1.68)	0.023
High	0.0293			0.0886		
High school						
Low	0.0289	1.10 (0.55-2.20)	0.780	0.1014	0.97 (0.64-1.49)	0.905
High	0.0243			0.0674		
Quartiles						
College/uni						
<25th				0.0588	Reference	
25-50th				0.0492	1.07 (0.77-1.47)	0.692
50-75th		Cell size too small		0.0392	1.39 (1.00-1.95)	0.053
>75th				0.0324	1.14 (0.80-1.62)	0.480
High school						
<25th				0.0285	Reference	
25-50th				0.0570	1.23 (0.53-2.86)	0.625
50-75th				0.0407	1.25 (0.54-2.89)	0.605
>75th				0.0422	1.30 (0.56-3.00)	0.540

	10+ drinks/week for women					
Stratified Variables	**2-year proportion (n=68)**	**RR (95% CI)**	**p**	**14-year proportion (n=260)**	**RR (95% CI)**	**p**
Job Strain						
College/uni						
Low	0.0106	1.06 (0.56-2.04)	0.854	0.0464	1.36 (0.97-1.91)	0.071

High	0.0085			0.0465		
High school						
Low	0.0070	1.49 (0.57-3.93)	0.419	0.0539	1.00 (0.52-1.91)	0.999
High	0.0080			0.0367		
Quartiles						
College/uni						
<25th				0.0314	Reference	
25-50th				0.0243	0.99 (0.63-1.55)	0.957
50-75th				0.0210	1.40 (0.89-2.20)	0.144
>75th		Cell size too small		0.0159	1.05 (0.64-1.70)	0.856
High school						
<25th				0.0205	Reference	
25-50th				0.0195	0.58 (0.18-1.95)	0.382
50-75th				0.0245	1.04 (0.33-3.30)	0.942
>75th				0.0258	1.10 (0.34-3.55)	0.871

Stratified Variables	2-year proportion (n=95)	RR (95% CI)	p	14-year proportion (n=245)	RR (95% CI)	p
			15+ drinks/week for men			
Job Strain						
College/uni						
Low				0.0517	0.61 (0.41-0.92)	0.017
High				0.0233		
High school						
Low				0.0736	0.73 (0.43-1.26)	0.259
High				0.0367		
Quartiles						
College/uni		Cell size too small				
<25th				0.0367	Reference	
25-50th				0.0223	0.77 (0.48-1.25)	0.299
50-75th				0.0101	0.58 (0.30-1.09)	0.091
>75th				0.0087	0.49 (0.28-0.86)	0.013
High school						
<25th				0.0211	Reference	
25-50th				0.0463	1.35 (0.66-2.76)	0.409
50-75th				0.0230	0.95 (0.42-2.16)	0.909
>75th				0.0197	0.82 (0.37-1.81)	0.621

Table 9.7: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and marital status.

Stratified Variables	5+ drinks on one occasion at least once per month					
	2-year proportion (n=462)	RR (95% CI)	p	14-year proportion (n=829)	RR (95% CI)	p
Job Strain						
Mar/cm-law						
Low	0.0569	1.01 (0.76-1.33)	0.969	0.1567	1.05 (0.87-1.27)	0.620
High	0.0399			0.1076		
Sep/div/wid						
Low	0.0508	0.63 (0.33-1.22)	0.172	0.1208	0.87 (0.51-1.50)	0.625
High	0.0289			0.1021		
Single						
Low	0.1018	0.78 (0.55-1.12)	0.187	0.1900	0.98 (0.72-1.32)	0.878
High	0.0751			0.1782		
Quartiles						
Mar/cm-law						
$<25^{th}$				0.0848	Reference	
$25-50^{th}$				0.0807	1.07 (0.83-1.37)	0.592
$50-75^{th}$				0.0536	1.16 (0.88-1.54)	0.287
$>75^{th}$				0.0478	1.08 (0.82-1.43)	0.581
Sep/div/wid						
$<25^{th}$				0.0402	Reference	
$25-50^{th}$				0.0853	1.52 (0.69-3.36)	0.303
$50-75^{th}$				0.0526	2.02 (0.95-4.30)	0.066
$>75^{th}$				0.0434	1.39 (0.63-3.06)	0.407
Single						
$<25^{th}$				0.0896	Reference	
$25-50^{th}$				0.0869	1.02 (0.64-1.60)	0.944
$50-75^{th}$				0.0912	1.10 (0.71-1.69)	0.675
$>75^{th}$				0.0999	1.08 (0.71-1.64)	0.708
	Problematic drinking by AUDIT-C for men					
Stratified Variables	2-year proportion (n=381)	RR (95% CI)	p	14-year proportion (n=618)	RR (95% CI)	p

Job Strain						
Mar/cm-law						
Low	0.0601	0.73 (0.54-0.99)	0.041	0.1437	0.79 (0.63-1.00)	0.047
High	0.0307			0.0747		
Sep/div/wid						
Low	0.0507	0.48 (0.22-1.06)	0.069	0.0833	0.50 (0.23-1.09)	0.083
High	0.0220			0.0401		
Single						
Low	0.0629	0.62 (0.37-1.05)	0.076	0.1638	0.56 (0.36-0.89)	0.013
High	0.0367			0.0885		

	Problematic drinking by AUDIT-C for women					
Stratified Variables	**2-year proportion (n=205)**	**RR (95% CI)**	**p**	**14-year proportion (n=540)**	**RR (95% CI)**	**p**
Job Strain						
Mar/cm-law						
Low	0.0260	1.11 (0.71-1.74)	0.641	0.0942	1.14 (0.88-1.48)	0.327
High	0.0202			0.0702		
Sep/div/wid						
Low	0.0230	2.40 (1.12-5.14)	0.024	0.1118	1.04 (0.60-1.81)	0.883
High	0.0495			0.1128		
Single						
Low	0.0217	2.25 (1.23-4.12)	0.009	0.0841	1.57 (1.04-2.38)	0.032
High	0.0459			0.1270		
Quartiles						
Mar/cm-law						
<25th				0.0510	Reference	
25-50th				0.0489	1.08 (0.75-1.55)	0.686
50-75th				0.0314	1.14 (0.77-1.68)	0.525
>75th				0.0323	1.22 (0.82-1.80)	0.322
Sep/div/wid	Cell size too small					
<25th				0.0533	Reference	
25-50th				0.0910	1.22 (0.59-2.52)	0.587
50-75th				0.0608	1.77 (0.89-3.51)	0.103
>75th				0.0182	0.44 (0.18-1.05);	0.065
Single						
<25th				0.0448	Reference	

25-50th				0.0411	0.96 (0.52-1.78)	0.900
50-75th				0.0679	1.63 (0.93-2.88)	0.089
>75th				0.0583	1.26 (0.70-2.28)	0.435

	10+ drinks/week for women					
Stratified Variables	**2-year proportion (n=68)**	**RR (95% CI)**	**p**	**14-year proportion (n=260)**	**RR (95% CI)**	**p**
Job Strain						
Mar/cm-law						
Low				0.0509	1.18 (0.82-1.70)	0.384
High				0.0392		
Sep/div/wid		Cell size too small				
Low				0.0597	1.19 (0.50-2.80)	0.693
High				0.0687		
Single						
Low				0.0304	1.78 (0.94-3.39)	0.076
High				0.0521		

Note: Cell size too small to report estimates by categorical job groups, and for 15+ drinks/week for men.

Table 9.8: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and immigration status.

	5+ drinks on one occasion at least once per month					
Stratified Variables	**2-year proportion (n=462)**	**RR (95% CI)**	**p**	**14-year proportion (n=829)**	**RR (95% CI)**	**p**
Job Strain						
Canadian						
Low	0.0706	0.88 (0.70-1.10)	0.264	0.1595	1.02 (0.87-1.21)	0.781
High	0.0480			0.1208		
Immigrant						
Low	0.0405	1.29 (0.64-2.59)	0.474	0.1548	1.08 (0.69-1.67)	0.743
High	0.0364			0.1039		
	Problematic drinking by AUDIT-C for men					
Stratified Variables	**2-year proportion (n=381)**	**RR (95% CI)**	**p**	**14-year proportion (n=618)**	**RR (95% CI)**	**p**
Job Strain						
Canadian						
Low	0.0643	0.62 (0.48-0.81)	0.001	0.1420	0.68 (0.55-0.85)	0.001

High	0.0309			0.0719		
Immigrant						
Low	0.0396	0.17 (0.59-2.31)	0.658	0.1398	0.96 (0.57-1.59)	0.863
High	0.0322			0.0834		

	Problematic drinking by AUDIT-C for women					
Stratified Variables	**2-year proportion (n=205)**	**RR (95% CI)**	**p**	**14-year proportion (n=540)**	**RR (95% CI)**	**p**
Job Strain						
Canadian						
Low				0.0990	1.26 (1.01-1.57)	0.039
High		Cell size too small		0.0922		
Immigrant						
Low				0.0701	0.80 (0.37-1.70)	0.557
High				0.0348		

Note: Cell sizes for estimates stratified by categorical job groups and quartiles of work stress were too small to report, as were results for 10+ drinks/week women and 15+ drinks/week men.

Table 9.9: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and physical activity.

	5+ drinks on one occasion at least once per month					
Stratified Variables	**2-year proportion (n=462)**	**RR (95% CI)**	**p**	**14-year proportion (n=829)**	**RR (95% CI)**	**p**
Job Strain						
Active						
Low	0.0606	1.15 (0.71-1.86)	0.573	0.1609	1.27 (0.90-1.80)	0.176
High	0.0525			0.1497		
Moderate						
Low	0.0632	0.96 (0.62-1.51)	0.871	0.1607	1.10 (0.81-1.51)	0.535
High	0.0434			0.1181		
Inactive						
Low	0.0670	0.86 (0.65-1.14)	0.304	0.1574	0.95 (0.77-1.17)	0.605
High	0.0449			0.1096		
Categorical						
Active		Cell size too small				
Low				0.0571	Reference	
High				0.0957	1.35 (0.82-1.23)	0.242

Stratified Variables	2-year proportion	RR (95% CI)	p	14-year proportion	RR (95% CI)	p
Active				0.0374	0.91 (0.49-1.69)	0.758
Passive				0.1205	1.24 (0.76-2.02)	0.384
Moderate						
Low				0.0653	Reference	
High				0.0526	0.98 (0.59-1.62)	0.939
Active				0.0419	0.94 (0.55-1.61)	0.822
Passive				0.1191	1.26 (0.83-1.91)	0.279
Inactive						
Low				0.0568	Reference	
High				0.0602	0.95 (0.68-1.34)	0.790
Active				0.0346	0.94 (0.63-1.40)	0.764
Passive				0.1154	1.00 (0.74-1.36)	0.998
Quartiles						
Active						
<25th	0.0403	Reference		0.1142	Reference	
25-50th	0.0232	0.72 (0.34-1.54)	0.397	0.0577	0.77 (0.46-1.28)	0.314
50-75th	0.0264	1.02 (0.51-2.04)	0.964	0.0870	1.37 (0.88-2.13)	0.166
>75th	0.0305	1.15 (0.59-2.26)	0.683	0.0616	0.94 (0.57-1.54)	0.795
Moderate						
<25th	0.0220	Reference		0.0706	Reference	
25-50th	0.0345	1.54 (0.83-2.86)	0.172	0.1024	1.50 (0.99-2.29)	0.057
50-75th	0.0166	1.40 (0.72-2.72)	0.325	0.0420	1.28 (0.79-2.10)	0.317
>75th	0.0325	2.36 (1.29-4.32)	0.005	0.0650	1.72 (1.12-2.64)	0.013
Inactive						
<25th	0.0326	Reference		0.0770	Reference	
25-50th	0.0353	1.07 (0.75-1.54)	0.708	0.0814	1.05 (0.79-1.40)	0.751
50-75th	0.0226	0.97 (0.64-1.46)	0.871	0.0581	1.14 (0.83-1.55)	0.419
>75th	0.0209	0.87 (0.58-1.32)	0.525	0.0503	1.03 (0.75-1.40)	0.865

	Problematic drinking by AUDIT-C for men					
Stratified Variables	**2-year proportion (n=381)**	**RR (95% CI)**	**p**	**14-year proportion (n=618)**	**RR (95% CI)**	**p**
Job Strain						
Active						
Low	0.0664	0.64 (0.37-1.13)	0.127	0.1579	0.92 (0.60-1.41)	0.701
High	0.0323			0.1062		
Moderate						

Low	0.0643	0.75 (0.47-1.22)	0.252	0.1459	0.69 (0.46-1.01)	0.058
High	0.0346			0.0665		
Inactive						
Low	0.0564	0.68 (0.48-0.95)	0.023	0.1358	0.68 (0.52-0.89)	0.005
High	0.0296			0.0679		
<u>Categorical</u>						
Active						
Low				0.0387	Reference	
High				0.0623	1.30 (0.65-2.58)	0.456
Active				0.0569	2.04 (1.04-4.02)	0.039
Passive				0.1062	1.62 (0.88-2.95)	0.118
Moderate						
Low				0.0646	Reference	
High		Cell size too small		0.0230	0.43 (0.23-0.80)	0.008
Active				0.0427	0.97 (0.57-1.63)	0.900
Passive				0.0820	0.88 (0.56-1.38)	0.567
Inactive						
Low				0.0553	Reference	
High				0.0345	0.56 (0.38-0.84)	0.005
Active				0.0274	0.77 (0.50-1.17)	0.218
Passive				0.0864	0.77 (0.56-1.06)	0.105
<u>Quartiles</u>						
Active						
<25th	0.0443	Reference		0.1023	Reference	
25-50th	0.0235	0.67 (0.32-1.41)	0.286	0.0691	1.03 (0.59-1.79)	0.922
50-75th	0.0199	0.70 (0.32-1.52)	0.365	0.0532	0.93 (0.51-1.71)	0.822
>75th	0.0184	0.63 (0.30-1.34)	0.234	0.0500	0.85 (0.47-1.52)	0.579
Moderate						
<25th	0.0244	Reference		0.0798	Reference	
25-50th	0.0341	1.37 (0.75-2.49)	0.301	0.0782	1.02 (0.66-1.57)	0.939
50-75th	0.0149	1.13 (0.56-2.26)	0.734	0.0218	0.59 (0.33-1.07)	0.082
>75th	0.0247	1.62 (0.86-3.05)	0.138	0.0341	0.80 (0.47-1.34)	0.393
Inactive						
<25th	0.0266	Reference		0.0659	Reference	
25-50th	0.0300	1.12 (0.75-1.66)	0.583	0.0721	1.08 (0.80-1.47)	0.601
50-75th	0.0137	0.72 (0.43-1.18)	0.186	0.0399	0.91 (0.63-1.32)	0.620

Stratified Variables	2-year proportion (n=205)	RR (95% CI)	p	14-year proportion (n=540)	RR (95% CI)	p
>75th	0.0154	0.79 (0.49-1.27)	0.329	0.0255	0.61 (0.40-0.92)	0.017
Problematic drinking by AUDIT-C for women						
Job Strain						
Active						
Low	0.0149	3.40 (1.71-6.76)	<0.001	0.0659	1.80 (1.11-2.92)	0.018
High	0.0382			0.0868		
Moderate						
Low	0.0237	1.32 (0.67-2.56)	0.417	0.0901	1.28 (0.85-1.93)	0.231
High	0.0223			0.0770		
Inactive						
Low	0.0281	1.23 (0.78-1.94)	0.369	0.1031	1.10 (0.84-1.44)	0.485
High	0.0268			0.0835		
Categorical						
Active						
Low				0.0331	Reference	
High				0.0566	1.37 (0.72-2.62)	0.332
Active				0.0186	0.78 (0.34-1.79)	0.554
Passive				0.0443	0.79 (0.40-1.55)	0.490
Moderate						
Low				0.0376	Reference	
High				0.0322	1.04 (0.55-1.96)	0.901
Active				0.0261	1.01 (0.53-1.94)	0.968
Passive	Cell size too small			0.0712	1.31 (0.75-2.29)	0.350
Inactive						
Low				0.0355	Reference	
High				0.0447	1.13 (0.69-1.86)	0.624
Active				0.0232	1.01 (0.58-1.75)	0.977
Passive				0.0832	1.15 (0.72-1.85)	0.558
Quartiles						
Active						
<25th				0.0394	Reference	
25-50th				0.0347	1.34 (0.69-2.62)	0.392
50-75th				0.0439	2.00 (1.04-3.83)	0.037
>75th				0.0325	1.43 (0.69-2.95)	0.331

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Moderate			
<25th	0.0445	Reference	
25-50th	0.0494	1.15 (0.67-1.98)	0.608
50-75th	0.0307	1.49 (0.79-2.82)	0.217
>75th	0.0426	1.79 (1.02-3.15)	0.043
Inactive			
<25th	0.0552	Reference	
25-50th	0.0565	1.01 (0.69-1.50)	0.945
50-75th	0.0416	1.13 (0.76-1.69)	0.534
>75th	0.0331	0.94 (0.62-1.43)	0.784

	10+ drinks/week for women					
Stratified Variables	**2-year proportion (n=68)**	**RR (95% CI)**	**p**	**14-year proportion (n=260)**	**RR (95% CI)**	**p**
<u>**Job Strain**</u>						
Active						
Low				0.0311	2.24 (1.13-4.43)	0.021
High				0.0510		
Moderate		Cell size too small				
Low				0.0457	1.22 (0.66-2.26)	0.532
High				0.0370		
Inactive						
Low				0.0541	1.11 (0.75-1.64)	0.603
High				0.0442		

	15+ drinks/week for men					
Stratified Variables	**2-year proportion (n=95)**	**RR (95% CI)**	**p**	**14-year proportion (n=245)**	**RR (95% CI)**	**p**
<u>**Job Strain**</u>						
Active						
Low				0.0692	0.59 (0.30-1.17)	0.129
High				0.0298		
Moderate		Cell size too small				
Low				0.0667	0.46 (0.24-0.90)	0.022
High				0.0205		
Inactive						
Low				0.0516	0.75 (0.49-1.17)	0.204

High		0.0286	

Table 9.10: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and smoking status.

Stratified Variables	5+ drinks on one occasion at least once per month					
	2-year proportion (n=462)	RR (95% CI)	p	14-year proportion (n=829)	RR (95% CI)	p
Job Strain						
Never						
Low	0.0469	1.04 (0.69-1.57)	0.845	0.1268	1.03 (0.76-1.40)	0.843
High	0.0356			0.0861		
Previously						
Low	0.0662	0.71 (0.47-1.06)	0.090	0.1438	1.17 (0.89-1.53)	0.253
High	0.0344			0.1247		
Occasionally						
Low	0.0846	0.91 (0.43-1.94)	0.803	0.2326	0.58 (0.30-1.10)	0.096
High	0.0542			0.0904		
Daily						
Low	0.0882	1.01 (0.72-1.42)	0.938	0.2251	0.95 (0.73-1.23)	0.691
High	0.0761			0.1744		
Quartiles						
Never						
<25th				0.0576	Reference	
25-50th				0.0759	1.47 (0.99-2.19)	0.056
50-75th				0.0392	1.35 (0.86-2.12)	0.186
>75th				0.0397	1.37 (0.90-2.09)	0.140
Previously						
<25th		Cell size too small		0.0854	Reference	
25-50th				0.0750	1.00 (0.71-1.41)	0.993
50-75th				0.0494	1.05 (0.70-1.59)	0.816
>75th				0.0597	1.30 (0.91-1.86)	0.156
Occasionally						
<25th				0.0798	Reference	
25-50th				0.1358	1.56 (0.77-3.15)	0.215
50-75th				0.0619	1.12 (0.45-2.76)	0.803
>75th				0.0455	0.84 (0.31-2.29)	0.731

	2-year proportion	RR (95% CI)	p	14-year proportion	RR (95% CI)	p
Daily						
<25th				0.1213	Reference	
25-50th				0.0915	0.68 (0.47-0.98)	0.036
50-75th				0.1131	1.01 (0.72-1.42)	0.938
>75th				0.0804	0.68 (0.46-0.98)	0.041

	Problematic drinking by AUDIT-C for women					
Stratified Variables	**2-year proportion (n=205)**	**RR (95% CI)**	**p**	**14-year proportion (n=540)**	**RR (95% CI)**	**p**
Job Strain						
Never						
Low	0.0087	2.71 (1.34-5.45)	0.005	0.0786	1.18 (0.82-1.70)	0.376
High	0.0171			0.0611		
Previously						
Low	0.0309	1.00 (0.53-1.87)	0.999	0.0774	1.59 (1.09-2.31)	0.016
High	0.0228			0.0913		
Occasionally						
Low	0.0653	1.00 (0.38-2.68)	0.994	0.1839	0.66 (0.32-1.36)	0.257
High	0.0462			0.0818		
Daily						
Low	0.0331	1.68 (1.00-2.81)	0.049	0.1286	1.04 (0.70-1.54)	0.856
High	0.0473			0.1089		

Note: Cell sizes were too small to report estimates for 10+ drinks women, 15+ drinks men, and the proxy AUDIT-C men. Cell sizes stratified by categorical job groups were also too small to report.

Table 9.11: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and rural/urban status.

	5+ drinks on one occasion at least once per month					
Stratified Variables	**2-year proportion (n=462)**	**RR (95% CI)**	**p**	**14-year proportion (n=829)**	**RR (95% CI)**	**p**
Job Strain						
Urban						
Low	0.0545	1.07 (0.79-1.45)	0.655	0.1491	1.03 (0.82-1.29)	0.804
High	0.0444			0.1128		
Rural						
Low	0.0803	0.81 (0.60-1.10)	0.177	0.1734	1.00 (0.81-1.25)	0.967
High	0.0489			0.1234		
Categorical						

	2-year proportion	RR (95% CI)	p	14-year proportion	RR (95% CI)	p
Urban						
Low	0.0130	Reference		0.0570	Reference	
High	0.0243	1.58 (0.93-2.68)	0.088	0.0595	1.02 (0.71-1.46)	0.935
Active	0.0143	1.58 (0.89-2.81)	0.120	0.0467	1.18 (0.80-1.72)	0.403
Passive	0.0472	1.89 (0.17-3.04)	0.009	0.0987	1.11 (0.79-1.55)	0.547
Rural						
Low	0.0331	Reference		0.0595	Reference	
High	0.0259	0.66 (0.42-1.05)	0.077	0.0699	1.03 (0.73-1.46)	0.865
Active	0.0051	0.26 (0.14-0.50)	<0.001	0.0242	0.66 (0.42-1.04)	0.070
Passive	0.0650	0.87 (0.58-1.30)	0.483	0.1432	1.04 (0.78-1.40)	0.776
Quartiles						
Urban						
<25th	0.0292	Reference		0.0847	Reference	
25-50th	0.0293	1.13 (0.75-1.69)	0.570	0.0756	1.11 (0.81-1.51)	0.513
50-75th	0.0202	1.15 (0.74-1.79)	0.547	0.0574	1.30 (0.95-1.79)	0.101
>75th	0.0219	1.15 (0.74-1.77)	0.530	0.0471	0.99 (0.71-1.38)	0.948
Rural						
<25th	0.0351	Reference		0.0751	Reference	
25-50th	0.0381	0.93 (0.61-1.43)	0.755	0.0930	1.04 (0.77-1.39)	0.809
50-75th	0.0253	0.93 (0.59-1.49)	0.773	0.0612	1.08 (0.77-1.50)	0.655
>75th	0.0302	1.10 (0.71-1.72)	0.661	0.0678	1.29 (0.95-1.76)	0.108

	Problematic drinking by AUDIT-C for men					
Stratified Variables	**2-year proportion (n=381)**	**RR (95% CI)**	**p**	**14-year proportion (n=618)**	**RR (95% CI)**	**p**
Job Strain						
Urban						
Low	0.0546	0.73 (0.51-1.03)	0.072	0.1348	0.72 (0.54-0.95)	0.019
High	0.0301			0.0710		
Rural						
Low	0.0697	0.62 (0.44-0.89)	0.009	0.1534	0.71 (0.54-0.94)	0.017
High	0.0325			0.0770		
Categorical						
Urban						
Low	0.0189	Reference		0.0505	Reference	
High	0.0168	0.76 (0.44-1.32)	0.327	0.0333	0.64 (0.41-1.00)	0.048
Active	0.0135	1.03 (0.61-1.75)	0.913	0.0393	1.12 (0.75-1.67)	0.587

	2-year proportion	RR (95% CI)	p	14-year proportion	RR (95% CI)	p
Passive	0.0354	0.98 (0.61-1.56)	0.932	0.0829	1.05 (0.74-1.49)	0.775
Rural						
Low	0.0249	Reference		0.0613	Reference	
High	0.0160	0.54 (0.32-0.93)	0.027	0.0424	0.61 (0.40-0.92)	0.019
Active	0.0100	0.68 (0.35-1.32)	0.254	0.0302	0.80 (0.49-1.29)	0.359
Passive	0.0513	0.91 (0.58-1.42)	0.672	0.0965	0.68 (0.50-0.94)	0.020
Quartiles						
Urban						
$<25^{th}$	0.0292	Reference		0.0741	Reference	
$25-50^{th}$	0.0271	1.04 (0.68-1.60)	0.851	0.0737	1.23 (0.90-1.69)	0.186
$50-75^{th}$	0.0136	0.77 (0.46-1.30)	0.325	0.0356	0.93 (0.62-1.39)	0.706
$>75^{th}$	0.0166	0.87 (0.54-1.40)	0.572	0.0256	0.62 (0.40-0.96)	0.032
Rural						
$<25^{th}$	0.0300	Reference		0.0748	Reference	
$25-50^{th}$	0.0350	1.00 (0.65-1.54)	0.984	0.0723	0.81 (0.58-1.13)	0.214
$50-75^{th}$	0.0147	0.75 (0.45-1.24)	0.262	0.0437	0.77 (0.52-1.14)	0.194
$>75^{th}$	0.1018	0.83 (0.51-1.36)	0.459	0.0403	0.77 (0.53-1.12)	0.167

Stratified Variables	Problematic drinking by AUDIT- C for women					
	2-year proportion (n=205)	RR (95% CI)	p	14-year proportion (n=540)	RR (95% CI)	p
Job Strain						
Urban						
Low	0.0248	1.69 (1.14-2.52)	0.010	0.0920	1.26 (0.95-1.67)	0.105
High	0.0319			0.0853		
Rural						
Low	0.0266	1.10 (0.59-2.06)	0.757	0.0981	1.14 (0.83-1.57)	0.417
High	0.0220			0.0794		
Categorical						
Urban						
Low				0.0371	Reference	
High				0.0440	1.15 (0.73-1.82)	0.536
Active		Cell size too small		0.0283	1.10 (0.67-1.80)	0.720
Passive				0.0680	1.18 (0.75-1.84)	0.482
Rural						
Low				0.0320	Reference	
High				0.0423	1.16 (0.64-2.13)	0.624

Stratified Variables	2-year proportion	RR (95% CI)	p	14-year proportion	RR (95% CI)	p
Active				0.0168	0.85 (0.44-1.65)	0.635
Passive				0.0864	1.17 (0.68-2.04)	0.569
Quartiles						
Urban						
<25th	0.0119	Reference		0.0532	Reference	
25-50th	0.0150	1.41 (0.80-2.49)	0.238	0.0463	1.08 (0.72-1.63)	0.710
50-75th	0.0144	2.00 (1.15-3.47)	0.014	0.0417	1.51 (1.02-2.23)	0.040
>75th	0.0151	1.93 (1.11-3.35)	0.019	0.0357	1.19 (0.79-1.80)	0.396
Rural						
<25th	0.0169	Reference		0.0461	Reference	
25-50th	0.0128	0.65 (0.27-1.56)	0.335	0.0607	1.10 (0.70-1.74)	0.678
50-75th	0.0074	0.56 (0.22-1.43)	0.226	0.0353	1.01 (0.60-1.70)	0.960
>75th	0.0121	0.92 (0.37-2.25)	0.849	0.0347	1.07 (0.64-1.80)	0.785
10+ drinks/week for women						
Stratified Variables	**2-year proportion (n=68)**	**RR (95% CI)**	**p**	**14-year proportion (n=260)**	**RR (95% CI)**	**p**
Job Strain						
Urban						
Low	0.0085	1.39 (0.72-2.70)	0.325	0.0471	1.36 (0.93-2.00)	0.109
High	0.0090			0.0472		
Rural						
Low	0.0119	0.88 (0.36-2.17)	0.784	0.0528	1.06 (0.64-1.75)	0.818
High	0.0078			0.0396		
Quartiles						
Urban						
<25th				0.0282	Reference	
25-50th				0.0199	0.88 (0.49-1.56)	0.653
50-75th				0.0260	1.77 (1.09-2.89)	0.022
>75th				0.0202	1.27 (0.75-2.15)	0.370
Rural						
<25th				0.0298	Reference	
25-50th				0.0286	0.80 (0.40-1.60)	0.532
50-75th				0.0161	0.71 (0.33-1.53)	0.385
>75th				0.0175	0.84 (0.39-1.83)	0.663
15+ drinks/week for men						
Stratified Variables	**2-year**	**RR (95% CI)**	**p**	**14-year**	**RR (95% CI)**	**p**

	proportion (n=95)			proportion (n=245)		
Job Strain						
Urban						
Low	0.0170	0.38 (0.17-0.87)	0.021	0.0618	0.50 (0.31-0.80)	0.004
High	0.0049			0.0227		
Rural						
Low	0.0174	0.73 (0.34-1.48)	0.384	0.0547	0.87 (0.56-1.36)	0.544
High	0.0095			0.0337		
Categorical						
Urban						
Low				0.0236	Reference	
High				0.0116	0.48 (0.24-0.95)	0.034
Active				0.0180	1.09 (0.57-2.09)	0.791
Passive				0.0313	0.85 (0.48-1.50)	0.572
Rural						
Low				0.0184	Reference	
High				0.0139	0.66 (0.31-1.44)	0.298
Active				0.0118	1.03 (0.47-2.28)	0.937
Passive		Cell size too small		0.0442	1.04 (0.55-1.98)	0.902
Quartiles						
Urban						
<25th				0.0366	Reference	
25-50th				0.0291	0.99 (0.58-1.67)	0.962
50-75th				0.0139	0.73 (0.37-1.44)	0.366
>75th				0.0084	0.41 (0.21-0.81)	0.011
Rural						
<25th				0.0277	Reference	
25-50th				0.0297	0.89 (0.51-1.57)	0.700
50-75th				0.0142	0.68 (0.35-1.31)	0.247
>75th				0.0165	0.85 (0.46-1.56)	0.600

Table 9.12: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and job insecurity.

Stratified Variables	5+ drinks on one occasion at least once per month					
	2-year proportion (n=462)	RR (95% CI)	p	14-year proportion (n=829)	RR (95% CI)	p

	2-year proportion	RR (95% CI)	p	14-year proportion	RR (95% CI)	p
Job Strain						
Low						
Low	0.0690	0.89 (0.70-1.12)	0.320	0.1620	1.06 (0.88-1.26)	0.546
High	0.0417			0.1131		
High						
Low	0.0511	1.09 (0.67-1.79)	0.725	0.1482	0.94 (0.68-1.31)	0.720
High	0.0616			0.1344		
Categorical						
Low						
Low	0.0212	Reference		0.0615	Reference	
High	0.0238	1.11 (0.76-1.64)	0.572	0.0615	1.08 (0.81-1.43)	0.605
Active	0.0102	0.77 (0.48-1.23)	0.269	0.0371	0.92 (0.67-1.27)	0.629
Passive	0.0552	1.35 (0.96-1.90)	0.083	0.1150	1.08 (0.84-1.39)	0.535
High						
Low	0.0170	Reference		0.0492	Reference	
High	0.0308	0.88 (0.39-1.97)	0.749	0.0726	0.90 (0.53-1.51)	0.681
Active	0.0126	0.91 (0.33-2.49)	0.853	0.0355	0.97 (0.51-1.86)	0.930
Passive	0.0523	1.10 (0.58-2.31)	0.782	0.1252	1.10 (0.68-1.80)	0.690
Quartiles						
Low						
<25th				0.0957	Reference	
25-50th				0.0867	1.08 (0.86-1.36)	0.486
50-75th				0.0598	1.26 (0.99-1.62)	0.065
>75th		Cell size too small		0.0352	1.05 (0.79-1.40)	0.715
High						
<25th				0.0315	Reference	
25-50th				0.0658	1.07 (0.54-2.13)	0.843
50-75th				0.0554	1.05 (0.53-2.09)	0.890
>75th				0.1296	1.25 (0.68-2.32)	0.477

	Problematic drinking by AUDIT-C for men					
Stratified Variables	**2-year proportion (n=381)**	**RR (95% CI)**	**p**	**14-year proportion (n=618)**	**RR (95% CI)**	**p**
Job Strain						
Low						
Low	0.0610	0.65 (0.49-0.86)	0.003	0.1481	0.73 (0.58-0.91)	0.006
High	0.0271			0.0713		

Stratified Variables	2-year proportion	RR (95% CI)	p	14-year proportion	RR (95% CI)	p
High						
Low	0.0556	0.76 (0.45-1.30)	0.316	0.1193	0.73 (0.48-1.11)	0.145
High	0.0467			0.0838		
<u>**Categorical**</u>						
Low						
Low				0.0576	Reference	
High				0.0350	0.65 (0.47-0.92)	0.015
Active				0.0383	1.02 (0.73-1.41)	0.915
Passive				0.0885	0.89 (0.69-1.16)	0.382
High						
Low				0.0444	Reference	
High				0.0425	0.58 (0.29-1.15)	0.117
Active				0.0262	0.79 (0.38-1.68)	0.546
Passive		Cell size too small		0.0899	0.88 (0.49-1.59)	0.667
<u>**Quartiles**</u>						
Low						
<25th				0.0867	Reference	
25-50th				0.0761	1.05 (0.82-1.34)	0.699
50-75th				0.0396	0.92 (0.68-1.25)	0.603
>75th				0.0197	0.65 (0.44-0.95)	0.027
High						
<25th				0.0330	Reference	
25-50th				0.0622	0.97 (0.49-1.89)	0.921
50-75th				0.0329	0.60 (0.28-1.28)	0.186
>75th				0.0747	0.69 (0.37-1.28)	0.240

	Problematic drinking by AUDIT-C for women					
Stratified Variables	**2-year proportion (n=205)**	**RR (95% CI)**	**p**	**14-year proportion (n=540)**	**RR (95% CI)**	**p**
<u>**Job Strain**</u>						
Low						
Low	0.0264	1.56 (1.07-2.29)	0.021	0.0924	1.35 (1.06-1.72)	0.016
High	0.0282			0.0823		
High						
Low	0.0194	1.22 (0.56-2.68)	0.616	0.1015	0.84 (0.56-1.27)	0.403
High	0.0262			0.0821		
<u>**Categorical**</u>		Cell size too small				

	2-year proportion	RR (95% CI)	p	14-year proportion	RR (95% CI)	p
Low						
Low				0.0359	Reference	
High				0.0430	1.29 (0.85-1.96)	0.231
Active				0.0252	1.07 (0.68-1.69)	0.757
Passive				0.0705	1.14 (0.76-1.70)	0.529
High						
Low				0.0349	Reference	
High				0.0448	0.78 (0.42-1.44)	0.423
Active				0.0157	0.61 (0.27-1.37)	0.230
Passive				0.0882	1.10 (0.62-1.93)	0.750
<u>Quartiles</u>						
Low						
<25th				0.0596	Reference	
25-50th				0.0521	1.04 (0.76-1.44)	0.792
50-75th				0.0373	1.26 (0.90-1.77)	0.173
>75th				0.0248	1.19 (0.81-1.74)	0.373
High						
<25th				0.0166	Reference	
25-50th				0.0491	1.52 (0.71-3.23)	0.278
50-75th				0.0456	1.64 (0.79-3.42)	0.185
>75th				0.0732	1.34 (0.68-2.65)	0.398

	10+ drinks/week for women					
Stratified Variables	**2-year proportion (n=68)**	**RR (95% CI)**	**p**	**14-year proportion (n=260)**	**RR (95% CI)**	**p**
<u>Job Strain</u>						
Low						
Low				0.0472	1.35 (0.95-1.91)	0.096
High	Cell size too small			0.0420		
High						
Low				0.0533	0.93 (0.50-1.73)	0.810
High				0.0476		

	15+ drinks/week for men					
Stratified Variables	**2-year proportion (n=95)**	**RR (95% CI)**	**p**	**14-year proportion (n=245)**	**RR (95% CI)**	**p**
<u>Job Strain</u>	Cell size too small					

Low						
Low			0.0610	0.69 (0.48-0.99)	0.044	
High			0.0278			
High						
Low			0.0465	0.55 (0.27-1.12)	0.099	
High			0.0245			

Table 9.13: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and social support at work.

Stratified Variables	5+ drinks on one occasion at least once per month					
	2-year proportion (n=462)	RR (95% CI)	p	14-year proportion (n=829)	RR (95% CI)	p
Job Strain						
High						
Low	0.0724	0.81 (0.64-1.04)	0.099	0.1656	1.06 (0.88-1.27)	0.533
High	0.0378			0.1076		
Low						
Low	0.0384	1.43 (0.91-2.25)	0.125	0.1209	0.98 (0.71-1.37)	0.928
High	0.0766			0.1610		
Categorical						
High						
Low				0.0655	Reference	
High				0.0549	1.08 (0.81-1.43)	0.601
Active				0.0347	0.84 (0.61-1.16)	0.290
Passive		Cell size too small		0.1180	1.07 (0.83-1.36)	0.610
Low						
Low				0.0278	Reference	
High				0.1025	1.10 (0.59-2.04)	0.770
Active				0.0371	1.41 (0.68-2.93)	0.351
Passive				0.1144	1.36 (0.74-2.50)	0.319
Stratified Variables	Problematic drinking by AUDIT-C for men					
	2-year proportion (n=381)	RR (95% CI)	p	14-year proportion (n=618)	RR (95% CI)	p
Job Strain						
High						

Stratified Variables	2-year proportion (n=205)	RR (95% CI)	p	14-year proportion (n=540)	RR (95% CI)	p
Low	0.0635	0.66 (0.49-0.87)	0.004	0.1486	0.77 (0.62-0.97)	0.024
High	0.0267			0.0704		
Low						
Low	0.0465	0.74 (0.45-1.21)	0.231	0.1077	0.61 (0.40-0.93)	
High	0.0480			0.0884		0.021
Categorical						
High						
Low				0.0624	Reference	
High				0.0319	0.66 (0.47-0.93)	0.017
Active				0.0335	0.85 (0.61-1.19)	0.356
Passive	Cell size too small			0.0912	0.86 (0.67-1.12)	0.268
Low						
Low				0.0246	Reference	
High				0.0552	0.67 (0.31-1.42)	0.293
Active				0.0364	1.57 (0.71-3.45)	0.263
Passive				0.0798	1.07 (0.54-2.14)	0.843

	Problematic drinking by AUDIT-C for women					
Stratified Variables	**2-year proportion (n=205)**	**RR (95% CI)**	**p**	**14-year proportion (n=540)**	**RR (95% CI)**	**p**
Job Strain						
High						
Low	0.0254	1.49 (1.00-2.23)	0.050	0.0987	1.28 (1.01-1.63)	0.039
High	0.0243			0.0777		
Low						
Low	0.0233	1.25 (0.65-2.41)	0.497	0.0726	1.05 (0.68-1.62)	0.826
High	0.0408			0.1030		
Categorical						
High						
Low				0.0378	Reference	
High				0.0377	1.28 (0.85-1.93)	0.233
Active				0.0252	1.06 (0.68-1.64)	0.801
Passive	Cell size too small			0.0758	1.19 (0.81-1.74)	0.384
Low						
Low				0.0226	Reference	
High				0.0691	0.91 (0.47-1.77)	0.780
Active				0.0151	0.71 (0.30-1.71)	0.445

Stratified Variables	2-year proportion	RR (95% CI)	p	14-year proportion	RR (95% CI)	p
Passive				0.0688	1.01 (0.52-1.96)	0.981
10+ drinks/week for women						
	2-year proportion (n=68)	RR (95% CI)	p	14-year proportion (n=260)	RR (95% CI)	p
<u>Job Strain</u>						
High						
Low				0.0493	1.20 (0.84-1.71)	0.321
High		Cell size too small		0.0362		
Low						
Low				0.0412	1.33 (0.73-2.43)	0.355
High				0.0741		
15+ drinks/week for men						
	2-year proportion (n=95)	RR (95% CI)	p	14-year proportion (n=245)	RR (95% CI)	p
<u>Job Strain</u>						
High						
Low				0.0604	0.73 (0.51-1.05)	0.088
High		Cell size too small		0.0270		
Low						
Low				0.0404	0.50 (0.25-1.02)	0.058
High				0.0275		

Note: cell sizes were to small to report estimates stratified by quartiles of work stress.

Table 9.14: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and MDE.

Stratified Variables	5+ drinks on one occasion at least once per month					
	2-year proportion (n=462)	RR (95% CI)	p	14-year proportion (n=829)	RR (95% CI)	p
<u>Job Strain</u>						
No						
Low				0.1615	1.02 (0.86-1.19)	0.846
High		Cell size too small		0.1147		
Yes						
Low				0.1009	1.47 (0.72-2.99)	0.286
High				0.1863		
Stratified	**Problematic Drinking by AUDIT-C for women**					

Variables	2-year proportion (n=205)	RR (95% CI)	p	14-year proportion (n=540)	RR (95% CI)	p
Job Strain						
No						
Low				0.0932	1.19 (0.95-1.48)	0.123
High	Cell size too small			0.0774		
Yes						
Low				0.1198	1.28 (0.68-2.40)	0.439
High				0.1925		

Stratified Variables	**10+ drinks/week for women**					
	2-year proportion (n=68)	RR (95% CI)	p	14-year proportion (n=260)	RR (95% CI)	p
Job Strain	Cell size too small					
No						
Low				0.0476	1.22 (0.89-1.69)	0.216
High				0.0407		
Yes						
Low				0.0706	1.14 (0.45-2.92)	0.783
High				0.1010		

Note: Cell sizes for estimates stratified by categorical job groups and quartiles of work stress were too small to report. Further, cell sizes were too small to report estimates for outcomes specific to men.

Table 9.15: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and part/full time work status.

Stratified Variables	**5+ drinks on one occasion at least once per month**					
	2-year proportion (n=462)	RR (95% CI)	p	14-year proportion (n=829)	RR (95% CI)	p
Job Strain						
Full time						
Low	0.0701	0.84 (0.67-1.07)	0.155	0.1680	0.99 (0.83-1.16)	0.861
High	0.0447			0.1194		
Part time						
Low	0.0438	1.36 (0.78-2.36)	0.272	0.1134	1.38 (0.85-2.23)	0.193
High	0.0463			0.1138		
Quartiles						
Full time						

	2-year proportion	RR (95% CI)	p	14-year proportion	RR (95% CI)	p
<25th	0.0351	Reference		0.0888	Reference	
25-50th	0.0357	1.08 (0.80-1.47)	0.603	0.0888	1.08 (0.87-1.34)	0.467
50-75th	0.0201	0.95 (0.67-1.34)	0.758	0.0580	1.17 (0.92-1.49)	0.196
>75th	0.0247	1.10 (0.79-1.53)	0.590	0.0539	1.07 (0.84-1.35)	0.600
Part time						
<25th	0.0159	Reference		0.0524	Reference	
25-50th	0.0226	1.19 (0.47-3.06)	0.712	0.0488	0.98 (0.42-2.32)	0.964
50-75th	0.0258	1.64 (0.70-3.85)	0.253	0.0634	1.55 (0.70-3.44)	0.279
>75th	0.0258	1.64 (0.69-3.89)	0.267	0.0625	1.58 (0.72-3.48)	0.258

Problematic Drinking by AUDIT-C for men						
Stratified Variables	**2-year proportion (n=381)**	**RR (95% CI)**	**p**	**14-year proportion (n=618)**	**RR (95% CI)**	**p**
Job Strain						
Full time						
Low	0.0661	0.68 (0.52-0.88)	0.004	0.1573	0.73 (0.60-0.90)	0.003
High	0.0339			0.0832		
Part time						
Low	0.0304	0.63 (0.28-1.40)	0.255	0.0713	0.67 (0.31-1.45)	0.310
High	0.0149			0.0348		

Problematic Drinking by AUDIT-C for women						
Stratified Variables	**2-year proportion (n=205)**	**RR (95% CI)**	**p**	**14-year proportion (n=540)**	**RR (95% CI)**	**p**
Job Strain						
Full time						
Low	0.0238	1.32 (0.88-1.99)	0.181	0.0893	1.16 (0.92-1.46)	0.221
High	0.0238			0.0745		
Part time						
Low	0.0303	1.95 (1.06-3.58)	0.032	0.1138	1.43 (0.90-2.27)	0.133
High	0.0458			0.1184		
Quartiles						
Full time						
<25th		Cell size too small		0.0500	Reference	
25-50th				0.0495	1.07 (0.78-1.47)	0.644
50-75th				0.0341	1.23 (0.87-1.72)	0.239
>75th				0.0296	1.04 (0.73-1.47)	0.829

Stratified Variables	2-year proportion (n=68)	RR (95% CI)	p	14-year proportion (n=260)	RR (95% CI)	p
Part time						
<25th				0.0520	Reference	
25-50th				0.0598	1.21 (0.54-2.73)	0.644
50-75th				0.0613	1.51 (0.70-3.28)	0.297
>75th				0.0592	1.51 (0.69-3.29)	0.305

Stratified Variables	10+ drinks/week for women					
	2-year proportion (n=68)	RR (95% CI)	p	14-year proportion (n=260)	RR (95% CI)	p
Job Strain						
Full time						
Low	0.0098	0.87 (0.44-1.72)	0.689	0.0461	1.26 (0.89-1.79)	0.195
High	0.0064			0.0419		
Part time						
Low	0.0088	2.50 (1.06-5.89)	0.035	0.0590	1.21 (0.65-2.25)	0.555
High	0.0171			0.0519		

Note: Cell sizes for estimates stratified by categorical job groups were too small to report, as were estimates for the outcome of 15+ drinks/week for men.

Table 9.16: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and shift type.

Stratified Variables	5+ drinks on one occasion at least once per month		
	14-year proportion (n=829)	RR (95% CI)	p
Job Strain			
Regular Day			
Low	0.1665	0.92 (0.76-1.11)	0.363
High	0.1018		
Regular Night			
Low	0.2142	1.15 (0.67-1.97)	0.610
High	0.1895		
Rotate/split/on-call			
Low	0.1000	1.66 (1.05-2.62)	0.030
High	0.2123		
Irregular			
Low	0.1370	1.13 (0.64-2.00)	0.665
High	0.0979		

Note: Cell sizes for estimates stratified by categorical job groups and quartiles were too small to report, as were estimates for the outcomes specific to women and men and for 2-year incidence estimates.

Table 9.17: 2-year and 14-year incidence proportion for outcome indicators of problematic drinking, by baseline work stress and self-reported health status.

Stratified Variables	5+ drinks on one occasion at least once per month		
	14-year proportion (n=829)	RR (95% CI)	p
Job Strain			
Excellent/good			
Low	0.1586	1.05 (0.89-1.23)	0.572
High	0.1197		
Fair/poor			
Low	0.1612	0.74 (0.34-1.62)	0.454
High	0.0832		

Note: Cell sizes for estimates stratified by categorical job groups and quartiles were too small to report, as were estimates for the outcomes specific to women and men and for 2-year incidence estimates.

Appendix I: Non-significant regression results for Objective 2.

Table 10.1: Final regression models for 2 and 14-year incidence of 5+ drinks on one occasion at least once per month, with job strain ratio as the exposure.

Variable	5+ drinks on one occasion at least once per month				
	14-year incidence				
	β	SE	p	95% CI LU	95% CI UU
Job strain	0.01	0.08	0.934	-0.15	0.17
Age	-0.02	0.01	<0.001	-0.03	-0.01
Gender	-0.34	0.27	0.208	-0.88	0.19
	2-year incidence				
	β	SE	p	95% CI LU	95% CI UU
Job strain	-0.08	0.11	0.455	-0.30	0.13
Age	-0.03	0.01	<0.001	-0.04	-0.02
Gender	-0.93	0.12	<0.001	-1.17	-0.70

Table 10.2: Final regression models for 2 and 14-year incidence of the proxy AUDIT-C for women, with job strain ratio as the exposure.

Variable	Problematic drinking by the AUDIT-C for women				
	14-year incidence				
	β	SE	p	95% CI LU	95% CI UU
Job strain	0.11	0.11	0.290	-0.10	0.32
Age	-0.03	0.01	<0.001	-0.04	-0.02
	2-year incidence				
	β	SE	p	95% CI LU	95% CI UU
Job strain	0.32	0.18	0.073	-0.03	0.68
Age	-0.02	0.01	<0.001	-0.04	-0.01

Table 10.3: Final regression models for 2 and 14-year incidence of 10+ drinks/week for women, with job strain ratio as the exposure.

Variable	10+ drinks per week for women				
	14-year incidence				
	β	SE	p	95% CI LU	95% CI UU
Job strain	0.19	0.15	0.201	-0.10	0.49
Age	-0.01	0.01	0.047	-0.02	-0.01
	2-year incidence				
	β	SE	p	95% CI LU	95% CI UU
Job strain	0.15	0.28	0.599	-0.41	0.71
Age	0.01	0.01	0.935	-0.02	0.02

Table 5.10. Final regression results for 5+ drinks on one occasion at least once per month, by categorical job strain (low strain jobs represent reference group).

Variable	5+ drinks on one occasion at least once per month				
	14-year incidence				
	β	SE	p	95% CI LU	95% CI UU
High strain	0.03	0.12	0.791	-0.21	0.28
Active jobs	-0.08	0.14	0.581	-0.35	0.20
Passive jobs	0.16	0.11	0.139	-0.05	0.36
Age	-0.02	0.01	<0.001	-0.03	-0.01
Gender	-0.42	0.26	0.110	-0.94	0.10

Table 5.12. Final regression results for the proxy AUDIT-C for women, by categorical job strain (low strain jobs represent reference group).

Variable	5+ drinks on one occasion at least once per month				
	14-year incidence				
	β	SE	p	95% CI LU	95% CI UU
High strain	0.05	0.19	0.776	-0.31	0.42

Active jobs	-0.06	0.21	0.780	-0.47	0.35
Passive jobs	0.07	0.17	0.705	-0.28	0.41
Age	-0.03	0.01	<0.001	-0.04	-0.02

Table 10.4. Final regression results for 10+ drinks/week for women, with participants defined by categorical job groups (low strain jobs represent the reference group).

Variable	10+ drinks per week for women				
	14-year incidence				
	β	SE	p	95% CI LU	95% CI UU
High strain	0.24	0.23	0.295	-0.21	0.69
Active jobs	-0.38	-.30	0.196	-0.97	0.20
Passive jobs	-0.30	-.24	0.215	-0.76	0.17
Age	-0.01	0.01	0.040	-0.02	-0.01
	2-year incidence				
	β	SE	p	95% CI LU	95% CI UU
High strain	0.09	0.41	0.830	-0.72	0.90
Active jobs	-1.09	1.82	0.551	-4.65	2.48
Passive jobs	-0.76	0.43	0.078	-1.61	0.09
Age	0.01	0.01	0.923	-0.02	0.02

Table 5.12. 2-year RR for the proxy AUDIT-C for men, by categorical job strain (low strain jobs represent reference group).

	2-year incidence				
High strain	0.69	-1.79	0.073	0.46	1.04
Active jobs	0.89	-0.53	0.597	0.58	1.36
Passive jobs	0.96	-0.23	0.821	0.68	1.35

Table 5.13. 2-year RR for 15+ drinks/week for men, by categorical job strain (low strain jobs represent reference group).

	15+ drinks per week for men				
	RR	z	p	95% CI LU	95% CI UU

		2-year incidence			
High strain	0.48	-1.45	0.147	0.18	1.30
Active jobs	0.43	-1.38	0.169	0.13	1.44
Passive jobs	1.23	0.55	0.584	0.58	2.62

Table 5.14: 2-year RR for the proxy AUDIT-C for men, by quartiles of work stress (<25th quartile represents reference group).

	Problematic drinking by the AUDIT-C for men				
	RR	z	p	95% CI LU	95% CI UU
			2-year incidence		
25-50th	1.04	0.25	0.800	0.75	1.46
50-75th	0.76	-1.46	0.146	0.53	1.10
>75th	0.86	-0.74	0.460	0.58	1.28

Table 5.15: 2-year RR for 15+ drinks/week for men, by quartiles of work stress (<25th quartile represents reference group).

	15+ drinks per week for men				
	RR	z	p	95% CI LU	95% CI UU
			2-year incidence		
25-50th	1.16	0.47	0.637	0.62	2.16
50-75th	0.94	-0.15	0.880	0.39	2.24
>75th	0.94	-0.16	0.876	0.45	1.96

Table 10.5: Final regression model results for 5+ drinks on one occasion at least once per month, with quartiles of work stress as the exposure (<25th quartile represents the reference group).

	5+ drinks on one occasion at least once per month				
Variable	14-year incidence				
	β	SE	p	95% CI LU	95% CI UU
25-50th	0.05	0.10	0.562	-0.13	0.26
50-75th	0.14	0.12	0.247	-0.09	0.38

Variable	β	SE	p	95% CI LU	95% CI UU
>75th	0.08	0.12	0.482	-0.14	0.31
Age	-0.02	0.01	<0.001	-0.03	-0.01
Gender	-0.39	0.26	0.141	-0.90	0.13
2-year incidence					
	β	SE	p	95% CI LU	95% CI UU
25-50th	0.05	0.14	0.732	-0.23	0.33
50-75th	0.01	0.15	0.934	-0.29	0.31
>75th	0.10	0.16	0.534	-0.22	0.42
Age	-0.03	0.01	<0.001	-0.04	-0.02
Gender	-0.95	0.12	<0.001	-1.19	-0.71

Table 10.6: Final regression model results for the proxy AUDIT-C for women, with quartiles of work stress as the exposure (<25th quartile represents the reference group).

Variable	Problematic drinking by the AUDIT-C for women				
	14-year incidence				
	β	SE	p	95% CI LU	95% CI UU
25-50th	0.05	0.15	0.769	-0.26	0.35
50-75th	0.17	0.16	0.283	-0.14	0.48
>75th	-0.01	0.17	0.991	-0.33	0.33
Age	-0.03	0.01	<0.001	-0.04	-0.02
	2-year incidence				
	β	SE	p	95% CI LU	95% CI UU
25-50th	0.01	0.27	0.960	-0.52	0.55
50-75th	0.19	0.27	0.477	-0.33	0.71
>75th	0.25	0.26	0.332	-0.26	0.76
Age	-0.02	0.01	<0.001	-0.03	-0.01

Table 10.7: Final regression model results for 10+ drinks/week for women, with quartiles of work stress as the exposure (<25th quartile represents the reference group).

Variable	10+ drinks per week for women				
	14-year incidence				
	β	SE	p	95% CI LU	95% CI UU
25-50th	-0.15	0.22	0.476	-0.58	0.27
50-75th	0.22	0.22	0.309	-0.21	0.66
>75th	0.04	0.23	0.880	-0.42	0.49
Age	-0.01	0.01	0.048	-0.02	-0.01
	2-year incidence				
	β	SE	p	95% CI LU	95% CI UU
25-50th	-0.64	0.40	0.114	-1.43	0.15
50-75th	0.13	0.43	0.754	-0.70	0.97
>75th	-0.14	0.44	0.753	-1.01	0.73
Age	-0.01	0.01	0.961	-0.02	0.02

Appendix J: Non-significant regression results for Objective 3

Table 11.1: Final regression model results for 5+ drinks on one occasion at least once per month, with continuous changes in work stress as the exposure.

Variable	5+ drinks on one occasion at least once per month				
	6-year incidence				
	β	SE	p	95% CI LU	95% CI UU
Work stress	0.16	0.29	0.58	-0.41	0.72
Age	-0.02	0.01	0.007	-0.05	-0.01
Gender	-0.64	0.20	0.001	-1.04	-0.25

Table 11.2: Final regression model results for the proxy AUDIT-C for women, with continuous changes in work stress as the exposure.

Variable	Problematic drinking by the AUDIT-C for women				
	6-year incidence				
	β	SE	p	95% CI LU	95% CI UU
Work stress	0.28	0.29	0.326	-0.28	0.84
Age	-0.03	0.01	<0.001	-0.05	-0.02

Table 11.3: Final regression model results for 10+ drinks/week for women, with continuous changes in work stress as the exposure.

Variable	10+ drinks per week for women				
	6-year incidence				
	β	SE	p	95% CI LU	95% CI UU
Work stress	0.09	0.46	0.847	-0.82	0.99
Age	-0.01	0.01	0.691	-0.03	0.02