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Predictors of Excessive Alcohol Consumption Among U.S. Business Travelers

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Abstract

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MHA, Medical University of South Carolina, 1995

BS, University of Louisville, 1992

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Excessive alcohol consumption (EAC) is an important public health problem. Several researchers have examined work-related influences on EAC, but few have investigated the predictors of EAC related to business travel. This study measured the association between EAC and frequency of business travel, duration of business travel, and job industry among U.S. business travelers. Research was conducted within the social-ecological theoretical framework. Snowball sampling was used to gather data from business travelers. Data were evaluated using bivariate analysis to assess the association between measures of EAC and each independent variable. Multiple logistic regression was used to adjust for covariates. Respondents aged 45-54 and 55 and older had significantly lower odds of binge drinking than those aged 18-34, $OR = 0.33$, 95% CI [.11, .98], $p < .05$; and $OR = .13$, 95% CI [.03, .55], $p < .01$, respectively. Females aged 55 and older and all females who traveled frequently in the previous month had lower odds of binge drinking compared to females 18-34 and infrequent female travelers ($OR = .03$, 95% CI [.00, .37], $p < .01$; $OR = .34$, 95% CI [.12, .99], $p < .05$, respectively). Both males (compared to females) and Protestants (compared to Catholics) had lower odds of heavy drinking ($OR = .34$, CI [.14,.84], $P < .05$; $OR = .301$, CI [.09,.99], $P < .05$, respectively). Results highlight the prevalence of EAC among business travelers, particularly among females. Multilevel interventions are proposed, which may reduce health-related disparities associated with EAC among this population of business travelers.

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Dedication

This dissertation is dedicated to all the working mom-students who manage, somehow, to juggle it all. While we doubt ourselves and wonder if we're doing right by our children and families, we are simultaneously providing inspiration through fortitude. "The will to persevere is often the difference between failure and success" -- David Sarnoff

Acknowledgments

First, I would like to acknowledge the unknown professor who gave a visiting lecture about epidemiology during my master's program at the Medical University of South Carolina in 1993. His fascinating examples of how the study of epidemiology could identify patterns and distributions of disease led to my interest in this field. Next, I must recognize my study Chair, Dr. Rohrer, who was endlessly available for any and all questions and provided such rational advice and guidance throughout the entire process. Similarly, my methodologist, Dr. Thorpe, provided clear and thoughtful input.

This period working on my dissertation has been wrought with family and personal illnesses, the passing of loved ones, and too many challenges to mention. It has also been full of joy, blessings, and exciting milestones. I must acknowledge my family, without whom I could never have completed this daunting task. When I began this process my children, Jack and Elaina, were just small kids (ages four and seven). Now they are 10 and 13 and have grown into amazing, funny, and intelligent little people. Regretfully, their mental image of me will likely always be me sitting at the computer. To my husband, thank you for believing in me and letting me be selfish with time and energy. I would have given up multiple times had I not had your support to keep trudging along. To my dear mother who has always been my biggest fan--my love and appreciation are beyond words. Finally, thanks to all my friends and colleagues who I neglected during this period but you kept cheering me along anyway. I look forward to making up some lost time!

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Chapter 1: Introduction to the Study

Introduction

Excessive alcohol consumption (EAC), which includes binge drinking and heavy drinking, is an important public health problem. According to the CDC, heavy drinking is defined as 15 or more drinks per week for men, and eight or more drinks per week for women (Centers for Disease Control and Prevention [CDC], 2012b). The CDC report also stated that binge drinking is the most common form of EAC in the United States. Binge drinking is defined as consumption that brings the blood alcohol concentration (BAC) level to 0.08%; this level typically correlates to five or more drinks (men) or four or more drinks (women) on one occasion. In addition, any alcohol use by pregnant women or by persons under the legal minimum drinking age is also considered EAC (CDC, 2014b). It is important to distinguish that the Substance Abuse and Mental Health Services Administration (SAMHSA, 2014) defines heavy drinking as drinking 5 or more drinks on the same occasion on each of 5 or more days in the past 30 days. The SAMHSA definition is related to the disorder as a result of behavior and; therefore, not appropriate for this research study. Alcohol dependence, also referred to as alcohol addiction or alcoholism, is characterized by a strong craving for alcohol, continued use in spite of physical, psychological, or personal problems, and the inability to limit drinking (American Psychiatric Association, 1994). This clinical assessment of behavior is not the focus of- and will not be considered in- the current study.

EAC was responsible for one in ten deaths among U.S. adults aged 20-64 between 2006-2010 (Gonzales et al., 2014). Between 2008-2010, approximately 5% of U.S.

adults reported heavy drinking (Adams & Schoenborn, 2006). According to CDC (2012b), approximately one in six U.S. adults binge drank approximately four times per month between 2006-2010. More research into factors associated with EAC is warranted.

Although many researchers have examined work-related factors associated with alcohol consumption (Burkholder, Joines, Cunningham-Hill, & Xu, 2010; Joyce, Tomlin, Somerford, & Weeramanthri, 2013), few have examined the predictors of EAC with respect to business travel (Biron, Bamberger, & Noyman, 2011; Hiro, Kawakami, Tanaka, & Nakamura, 2007; Marchand, Parent-Lamarche, & Blanc, 2011; Morikawa et al., 2013 Barnes & Zimmerman, 2013; Burkholder, Joines, Cunningham-Hill, & Xu, 2010; Cunradi, Ames, & Xiao, 2014; Gimeno, Amick, Barrientos-Gutiérrez, & Mangione, 2009; Joyce, Tomlin, Somerford, & Weeramanthri, 2013). In my research of the literature, I found no answer to the question of whether EAC varies with frequency of business travel, duration of business travel, or job industry. Several factors support the need for identification of risk factors associated with EAC to inform future prevention and control efforts. First, EAC poses a significant public health burden. Next, there is a large and growing population of business travelers. Finally, five specific goals have been defined to reduce the burden of alcohol-associated negative health outcomes as part of Healthy People 2020 (HP 2020) goals (U.S. Department of Health and Human Services [DHHS], 2014). Clearly, this behavior warrants further understanding.

My purpose in carrying out this study was to identify the association between EAC and frequency of business travel, duration of business travel, and job industry, among U.S. business travelers. My literature search did not reveal any previous studies that considered these travel-related variables and job industry in association with EAC. I hope to fill a gap in knowledge related to specific predictors of EAC among U.S. business travelers.

Background

EAC is a significant public health problem. The percentages of adults who reported either binge drinking or heavy drinking in the past 30 days have remained relatively steady from 2002 through 2012 (Centers for Disease Control and Prevention, 2014b). In the general population, these rates vary by several factors including race, ethnicity, marital status, veteran status, educational status, religious preference, smoking status, and birthplace (Chartier, Caetano, & Chartier, K., Caetano, 2010; Kanny, Liu, Brewer, & Lu, 2013; Karlamangla, Zhou, Reuben, Greendale, & Moore, 2006). Survey reports of alcohol consumption likely underestimate the prevalence due to sampling errors and response bias. In addition, it has been reported that excessive alcohol consumption may be underreported since respondents do not generally include binge drinking when reporting average daily alcohol consumption (Stahre, Naimi, Brewer, & Holt, 2006). In fact, including binge drinks in average daily alcohol consumption calculations was found to increase the prevalence of heavy drinking among all U.S. adults from 19% to 42%.

HP 2020 is a science-based government-supported effort to promote health and longevity (DHHS, 2015). The Agency drives collaboration, provides information to empower informed health decisions, and measures progress toward goals. The epidemiology and surveillance goals listed in HP2020 related to alcohol use include reducing cirrhosis deaths, the proportion of persons who binge drink alcoholic beverages, the proportion of adults who drank excessively in the previous 30 days, average annual alcohol consumption, and the number of deaths attributable to alcohol (DHHS, 2014). These goals measure alcohol use behaviors directly and indirectly, including EAC.

The association between work-related risk factors such as job stress, job autonomy, workplace environment, and workplace social norms have been widely described (Biron, Bamberger, & Noyman, 2011; Gimeno et al., 2009; Hiro, Kawakami, Tanaka, & Nakamura, 2007; Sheard, Hungtington, & Gilmour, 2014). However, the association between job industry and alcohol consumption is not clear. Higher rates of alcohol use have been associated with specific industries, such as sales, craft, and service workers (Cunradi et al., 2014; Diala, Muntaner, & Walrath, 2004). However, other studies suggest the variation lies within the occupational level of employment (Barnes & Zimmerman, 2013; Sumeet, Athar, Zulfia, & Najam, 2012). For example, Barnes and Zimmerman described that occupational attributes such as job autonomy, physical demand, and workplace social engagement increased alcohol use and misuse. And Sumeet et al. found that both skilled and unskilled workers were more likely to drink compared to well-paid professionals. It remains unclear whether occupation or industry drives alcohol use behavior.

In this study, I will measure job industry as an independent variable because occupation may be somewhat homogenous in my proposed population of business travelers. More specifically, standard occupational categories are based on skills, work performed, education, training and credentials (U.S. Bureau of Labor Statistics, 2010). Business travelers across all industries are more likely to be in somewhat higher occupational levels than those who do not travel for business purposes (United States Department of Transportation, n.d.). In 2012 the median household income for U.S. business travelers was $87,500, compared to $52,800 for those in the general population (U.S. Travel Association, 2015). However, occupation was a covariate to adjust for potential occupation-level influences. People in similar occupations (i.e., those who perform similar duties) may be more alike across industries. Ames considered these overlapping occupational characteristics as job duties, position within the organization, educational or skill level, and social class or background (2000). These data point toward the important influence of both job industry and occupation on individual behaviors.

Business travelers might be expected to drink more frequently and more heavily than the general population but the health impact of EAC in this population is unknown. Few researchers have explored predictors of EAC and alcohol-related health outcomes of business travelers. Burkholder, Joines, Cunningham-Hill, and Xu (2010) measured the association between objective and subjective health outcomes of international business travelers compared to non-travelers. Objective measures included length and frequency of travel and BMI. Subjective measures included items such as self-reported blood pressure, total cholesterol, smoking, and drinking more than one to two drinks per day for men and more than one drink per day for women. My study combined frequency and duration of travel into one categorical variable and did not consider these factors separately. This was intended to isolate which variable (travel frequency or travel duration), if any, was the primary influence on EAC.

Girasek and Olsen (2009) measured the factors associated with alcohol consumption in a group of 1548 airline passengers. The authors found that alcohol consumption varied with race, gender, outcome expectancies (e.g. whether passengers viewed alcohol as being relaxing), social norms, and situational characteristics (e.g., whether passengers were traveling during the evening or whether they work responsibilities on the day of the flight). Girasek and Olsen's study focused only on air travel, which may be influenced by flight-related characteristics. This may be different from other types of travel, including vehicle and rail. Risk factors associated with EAC among U.S. business travelers using all types of travel have not been identified. My study, on the other hand, measured the relationship of the following independent variables frequency of business travel, duration of business travel, and job industry with the dependent variable, which was EAC. It was important to me to determine if certain sub-populations are at higher risk of EAC and; therefore, potentially experience more negative health outcomes associated with business travel. Data from my research may inform appropriate interventions to reduce the public health burden of EAC, address disparities, and improve health outcomes.

Problem Statement

Excessive alcohol consumption is an important public health problem. Alcohol use was responsible for approximately 88,000 deaths in the United States for each year during 2006-2010, which equates to 2.5 million years of potential life lost (Gonzales et al., 2014). As Gonzales et al. (2014) reported, one in ten deaths among adults aged 20-64 were attributed to EAC during this same period. Business travel may be defined work-related travel that includes at least one overnight stay. This travel may promote increased alcohol consumption because travelers may have more access to alcohol during dinners and social events more free time, and more acceptance of social drinking (DHHS, 1999). Although many researchers have studied work-related influences on alcohol consumption (Azagba & Sharaf, 2011; Barnes & Zimmerman, 2013; Biron et al., 2011; Cunradi et al., 2014; Gimeno et al., 2009; Hiro et al., 2007; Joyce et al., 2013; Marchand, Parent-Lamarche, & Blanc, 2011; Morikawa et al., 2013). I found a paucity of knowledge about the predictors of EAC related to business travel. In addition, my literature review revealed no studies examining whether EAC varies with frequency of business travel, length of business travel, or job industry. The significant public health burden of alcohol use combined with the large population of business travelers requires identification of risk factors to inform future prevention and control initiatives. With this research, I attempted to fill a gap related to specific predictors of EAC among U.S. business travelers, including travel frequency, trip duration, and job industry.

Purpose

My purpose in conducting this quantitative cross-sectional survey study was to measure the association between EAC and frequency of business travel, duration of business travel, and job industry among U.S. business travelers. I used primary data collected from adult U.S. business travelers via self-administered online questionnaires. I collected standard demographic data such as age, gender, race/ethnicity, birthplace, marital status, veteran status, smoking status, religious preference, occupation, and educational status. I analyzed associations of these confounding variables to determine whether the dependent variable, EAC, could be explained by frequency of travel, duration of travel, or job industry.

Research Questions and Hypotheses

I used the following research questions and hypotheses to guide my investigation of the predictors of EAC among U.S. business travelers:

RQ1. Do U.S. business travelers who travel frequently (i.e., > 6 trips per year) have higher odds of EAC than U.S. business travelers who travel infrequently (≤ 6 trips per year)?

$H_0$1: The odds of EAC are the same for frequent U.S. business travelers (> 6 trips per year) compared to infrequent U.S. business travelers (≤ 6 trips per year) when controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, smoking status, religious preference, occupation, and educational level.

H_a1: The odds of EAC are higher for frequent U.S. business travelers (> 6 trips per year) compared to infrequent U.S. business travelers (≤ 6 trips per year) when controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, smoking status, religious preference, occupation, and educational level.

RQ2. Do U.S. business travelers who travel for short durations (≤ 3 days per trip) have higher odds of EAC than U.S. business travelers who travel for long durations (> 3 days per trip)?

$H_0$2: The odds of EAC are the same for U.S. travelers who travel for short durations (≤ 3 days per trip) compared to U.S. business travelers who travel for longer durations (> 3 days per trip) when controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, smoking status, religious preference, occupation, and educational level.

H_a2: The odds of EAC are higher for U.S. travelers who travel for short durations (≤ 3 days per trip) compared to U.S. business travelers who travel for short durations (> 3 days per trip) when controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, smoking status, religious preference, occupation, and educational level.

RQ3. Is EAC among U.S. business travelers more positively associated with traditionally male-dominated industries such as construction, mining and armed forces than for other industries?

$H_0$3: EAC among U.S. business travelers is not associated with traditionally male-dominated industries such as construction, mining and armed forces when controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, smoking status, religious preference, occupation, and educational level.

H_a3: EAC among U.S. business travelers is positively associated with traditionally male-dominated industries such as construction, mining and armed forces when controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, smoking status, religious preference, occupation, and educational level.

Theoretical Framework

According to the World Health Organization (WHO), health is defined as "…complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1948). There exist multiple levels of influence on health, including individual, community, physical- and built-environment, regulations, and policy. In conducting this study, I used a social-ecological framework which supports the perspective that health is influenced by both social and ecological forces within a community (Berkman & Kawachi, 2000; Sallis, Owen, & Fisher, 2008). Social determinants of health, which encompass social structure, social position, social or physical environment, behavioral or psychological factors, and illness and injury, and their social consequences, may be more powerful predictors of health and well-being than medical care (Graham & East, 2004). For example, an unhealthy and/or unsafe physical and built environment may be a barrier to physical activity (Centers for Disease Control and Prevention, 2014c). Food deserts, which are common in poverty-ridden urban environments, may also lead to a lack of access to nutritious foods. The combination of these factors influence health beyond the traditional scope of healthcare.

The social-ecological model is built on an appreciation for the multilevel influence of these determinants within individual, relationship, community, and societal contexts (Centers for Disease Control and Prevention, 2014b). This complex interplay can lead to health inequities. Low-income residents may have poor living conditions and be surrounded by a poor--and even unsafe--built environment. This may be coupled with strained individual and community relationships, all which may contribute to poor health status.

Corporate cultures across different industries may influence alcohol use patterns. Ames, Grube, and Moore (2000) reported that organizational drinking norms predicted work-related drinking behaviors in employees within one single industry but different occupational work environments. Ames described the complex influences of work that form and maintain alcohol beliefs as “normative regulation of drinking.” Travel-related stress may be associated with negative health behaviors, including excess alcohol consumption (DeFrank, Konopaske, & Ivancevich, 2000). Furthermore, it’s possible that contextual factors, such as the inviting social environment of the hotel bar and the desire for group belonging and social identity may contribute to a drinking environment. The combination of varying workplace cultures, occupational influences, and travel-related factors make business travelers a desirable and interesting study population.

Nature of the Study

In this study, I used a quantitative, cross-sectional survey to measure the association between EAC (dependent variable) and frequency of business travel, duration of business travel, and job industry (independent variables) among U.S. business travelers. I surveyed U.S. adult business travelers using an anonymous web-based survey. The dependent variables are categorical and I analyzed them using logistic regression. I then adjusted final models controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, religious preference, occupation, and educational level.

Definition of Terms

Excessive alcohol consumption (EAC): binge drinking, heavy drinking, any alcohol use by pregnant women or by persons under the legal, minimum drinking age (Centers for Disease Control and Prevention, 2014a).

Binge drinking: consumption that brings the blood alcohol concentration (BAC) level to 0.08%. This typically corresponds to five or more drinks within approximately two hours for men or four or more drinks within approximately two hours for women (National Institute on Alcohol Abuse and Alcoholism, n.d.).

Heavy drinking: 15 or more drinks per week for men; eight or more drinks per week for women (Centers for Disease Control and Prevention, 2014a).

Behavioral Risk Factor Surveillance System (BRFSS): the world's largest telephone health survey system, designed to monitor state-level prevalence of major behavioral risks in U.S. adults associated with morbidity and mortality (Centers for Disease Control and Prevention, 2013a).

U.S. business traveler: a permanent resident of the United States who travels for business purposes.

Frequent U.S. business traveler: U.S. business traveler who completed more than six business trips per year.

Infrequent U.S. business traveler: U.S. business traveler who completed six or fewer trips per year.

Short duration business trip: a business trip that is three days or less.

Long duration business trip: a business trip that is more than three days.

Assumptions

Excessive alcohol consumption is a pervasive public health problem and the fourth leading cause of premature death in the United States during 2006 through 2010 (Gonzales et al., 2014). Approximately 5% of U.S. adults were heavy drinkers during 2008-2010 (Adams & Schoenborn, 2006). According to CDC (2012b), approximately one in six U.S. adults binge drank approximately four times per month in 2010. This study was based on an important assumption that respondents would answer potentially sensitive questions about alcohol consumption truthfully. There was an assumption that U.S. business travelers use alcohol both to cope with travel-related stress and as a means of social identity. It was also assumed that business travelers stay in hotel accommodations. Results may not apply to a business traveler who stayed with friends or family at the destination. Burkholder et al. (2010) reported that international business travelers who travel more than six trips per year and less than five days per trip were at higher risk of drinking over the limit than those who took fewer trips. However, frequency and duration of travel were grouped as one variable. Researchers have not previously studied frequency of travel and duration of travel independently in the U.S. business traveler population.

Another assumption was that business travelers are more likely to consume alcohol, in part, due to workplace-enabling factors. These include the ability to expense alcohol charges, social functions where alcohol is widely available and erratic work schedules which blur the lines between work hours and free time. In addition, business trips may occur in resort destinations which can also make it difficult to distinguish between business and pleasure. Finally, it was assumed that EAC is more acceptable in male-dominated job industries, such as construction, oil and gas, mining, and utilities. Researchers have not studied EAC across all industries in the context of business travel. This study addressed a gap in the literature on EAC among U.S. business travelers associated with frequency of travel, duration of travel, and job industry.

Scope and Delimitations

The focus on U.S. business travelers presents an opportunity to fill a gap in the literature. My sample population was anticipated to be enriched for pharmaceutical industry employees due to the survey method which was proposed as web-based snowball sampling administered to LinkedIn contacts. I sought to measure alcohol consumption as captured through self-report. Therefore, no conclusions about harmful alcohol use or negative physical- or psychological- impacts of this behavior can be made. In addition, I limited the sample to U.S. business travelers due to the survey method which was thought to limit international participation. The results may only be applied to the U.S. business traveler population as country-specific or non-business travel factors may yield different results. Influences such as individual workplace cultures of drinking and the effects of traveling across time zones may also confound results. Finally, the somewhat arbitrary thresholds of high- and low -travel frequency and short- and long-trip duration may mask important interval differences in outcomes that exist within the thresholds chosen. This may require further research to delineate.

Limitations

This was a cross-sectional study and causal inferences cannot be drawn. The target population for my study was U.S. business travelers who, by nature, may be extremely busy. Selection bias may have resulted from non-participation and results are subject to recall bias. Self-reported alcohol consumption may have been underreported due to stigma related to substance use. Due to the sampling method, the study population may not be representative of all U.S. business travelers and; therefore, may not be widely generalizable. Furthermore, the timing of survey distribution may influence results. Drinking behaviors within the past 30 days were collected. Timing of the survey collection (i.e. during summer season) may have skewed results. Specifically, typical business travel patterns may have been interrupted by personal and family vacation travel. In addition, the results can only be applied to internet users. Finally, there is no generally accepted consensus regarding the definitions of frequent business travel and short- versus long- business trip. Thresholds were chosen based on both available literature and pragmatism. Future longitudinal studies should be conducted to confirm these findings.

Significance

Short-term adverse health effects of EAC include injuries, violence, risky sexual behavior, miscarriage, stillbirth, and physical/mental birth defects, and alcohol poisoning (Centers for Disease Control and Prevention, 2014b). Long-term consequences of EAC include neurologic effects, cardiovascular problems, psychiatric issues, social problems, certain cancers, liver disease, and gastrointestinal problems. Health inequities due to social determinants of health that influence alcohol consumption can result in disproportionate negative health outcomes among certain populations.

Excessive alcohol consumption poses a significant health burden across the world. This study intended to measure the association of specific predictors of alcohol consumption that may be unique to U.S. business travelers. Findings may support social change in the form of individual behavior- or organizational- change. My original contribution sought to determine if certain sub-populations were at higher risk of EAC and; therefore, potentially experience more negative health outcomes associated with business travel. In keeping with Healthy People 2020 goals, interventions may be tailored to address these specific groups to reduce the public health burden of EAC, address disparities, and improve health outcomes.

Summary

I conducted a study to measure the association between frequency of business travel, duration of business travel, job industry and EAC within the social-ecological framework. The goal of my research was to identify predictors of excessive alcohol consumption among U.S. business travelers. Findings can be used to inform future prevention and control efforts to reduce the public health burden of EAC in this population. Chapter 2 provides a review of the current literature related to EAC in general, employed, and traveler populations. A discussion of the social-ecological model, the framework for my study, is also included.

Chapter 2: Literature Review

Overview

EAC is an important public health problem. It was the fourth leading cause of premature death in the United States in 2000 (Gonzales et al., 2014). During the period 2006-2010, approximately 88,000 people died from alcohol attributed deaths (AADs). An estimated 2.5 million years of potential life were lost due to excessive alcohol use. One in ten deaths among adults aged 20-64 were attributed to EAC during this same period. Alcohol use was responsible for approximately 3.5% of all cancer deaths in the United States in 2009, including 15% of all female deaths from breast cancer (Nelson, 2013).

EAC and Physical Health

Although researchers have reported a positive association between cancer and increased levels of alcohol consumption, they have not clarified what level of alcohol consumption may be safe (Adams & Schoenborn, 2006). Evidence shows that even low levels of alcohol may pose a health risk. Short-term effects of EAC may include physical injuries, violence, risky sexual behavior, miscarriage, stillbirth, physical/mental birth defects, and alcohol poisoning (CDC, 2014). Alcohol poisoning, typically the result of high intensity binge drinking, caused an average of 2,221 deaths per year during 2010-2012 (Kanny et al., 2015). Long-term consequences include neurologic effects, cardiovascular problems, psychiatric issues, social problems, some cancers, liver disease, and gastrointestinal problems (Centers for Disease Control and Prevention, 2014a). The alcohol consumption threshold for imposing health risks is unclear.

Economic Impact of EAC

The economic cost of EAC is great. In 2006, EAC was estimated to be responsible for $223.5 billion lost due to reduced productivity, health care costs, criminal justice costs, and other effects (Bouchery, Harwood, Sacks, Simon, & Brewer, 2011). This figure equates to approximately $746 per person. Binge drinking exerts the largest toll; of the $223.5 billion lost, it accounts for $170.7 billion. Add concluding sentence.

EAC and Socioeconomic Disparities

Chartier and Caetano (2010) have described racial/ethnic patterns of alcohol consumption. National survey data reveal higher rates of high-risk drinking among Native Americans, Hispanics, and African-Americans. There also seem to be more severe consequences of EAC among these minorities. The overall prevalence of binge drinking is higher among individuals who Native Americans (Chartier et al., 2010). Yet, Hispanics and blacks are more likely to be heavier drinkers. However, Kanny et al. (2013) reported that those with household annual income of at least $75,000 were more likely to binge drink. These racial/ethnic differences translate into a variety of disparities. For example, blacks and Hispanics have a higher rate of alcohol-related liver disease compared to whites.

Chartier et al. (2010) also noted that Native Americans or Alaska Natives experience higher rates of alcohol-related traffic deaths compared to other minorities. Binge drinking generally decreases with age; however, Kanny et al. found the highest average number of binge drinking episodes occurred among binge drinkers ages 65 and older (2013). I expect EAC prevalence to be higher among racial/ethnic minorities in my sample of U.S. business travelers. I also expect EAC will generally decrease with age among this population.

EAC and the Workplace

EAC among employees is associated with negative effects for the individual, such as lost productivity and workplace injury, but it can also be detrimental to others (International Center for Alcohol Policies, n.d.). For example, coworkers of drinkers are at greater risk of injury and may be subject to longer work hours to make up for lost productivity. In addition, interpersonal relationships may be strained, and coworkers may suffer from low morale (Ahern, Galea, Hubbard, Midanik, & Syme, 2008; Barnes & Zimmerman, 2013; Biron et al., 2011). This evidence demonstrates the broad-reaching impact of EAC.

Many researchers have conducted studies to assess the influence of work-related characteristics on alcohol use (Azagba & Sharaf, 2011; Barnes & Zimmerman, 2013; Cunradi et al., 2014; Gimeno et al., 2009; Hiro et al., 2007; Joyce et al., 2013; Marchand et al., 2011). They have examined variables including the psychosocial environment, norms, policies, job stress, and work schedule (Ansoleaga, 2013; Azagba & Sharaf, 2011; Brown, Bain, & Freeman, 2008; Frone & Brown, 2010; Frone, 2008; Saade & Marchand, 2013). However, few studies researchers have examined the association between business travel and alcohol use (Burkholder et al., 2010; Joyce et al., 2013). Evidence suggests that travel-related characteristics may impact EAC. This study will explore the relationship between travel frequency and duration and EAC.

Travel and EAC

Two recent studies have explored the association between travel factors and EAC. Joyce et al. (2013) found that fly-in fly-out (FIFO) miners in Australia had significantly greater risk of EAC than shift workers or other types of employees. FIFO workers live and work at a mine site for a defined period then return home between work assignments. This is a common work practice for operating mines in Australia. Burkholder et al. (2010) reported a positive association between frequency and duration of travel and among international business travelers. Clearly, this evidence shows that travel-related factors can impact alcohol use behaviors.

Business travel, defined as at least one overnight stay, may promote increased alcohol consumption through easier access to alcohol during dinners and social events, excess free time, and a workplace culture of acceptance (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 1999). Over 405 million business trips occur in the U.S. each year, with an estimated cost of over $200 billion (United States Department of Transportation, n.d.; Vantage Strategy, 2010). Industries reporting highest travel activity include real estate, social and personal services, utilities, and food processing and services. The primary purpose for business travel is customer meetings (Vantage Strategy, 2010). Sales, marketing, or internal meetings are the second most frequent purpose of business travel.

Direct effects of travel on health are understood, such as exposure to infectious agents and other environmental health risks, injury and violence, and psychological well-being (WHO, 2014). Psychosocial effects of travel on health may be more complex.

While leisure travelers may enjoy a relaxed pace that allows time to adjust to effects of jet lag, business travelers are often under strict timelines, increased job demands, and subject to social environments that may increase stress. Some business travelers may cope with this stress through the use of excessive alcohol. Many studies have been conducted to assess the influence of work-related characteristics on alcohol use. Common variables which have been studied include the workplace psychosocial environment, workplace norms, workplace policies, job stress, and work schedule (Azagba & Sharaf, 2011; Biron et al., 2011; Cunradi et al., 2014; Gimeno et al., 2009; Hiro et al., 2007; Kerr-Corrêa et al., 2008; Morikawa et al., 2013; Sheard et al., 2014; Sumeet et al., 2012). Additional work- and travel-related variables associated with EAC likely exist.

While a large body of literature has measured work-related influences on alcohol consumption there is a paucity of knowledge about the predictors of EAC related to business travel. We do not know if EAC varies with frequency of travel, duration of travel, or job industry. The significant public health burden of EAC combined with the large population of business travelers requires identification of risk factors to inform future prevention and control initiatives. This study attempted to fill a gap related to specific predictors of EAC among U.S. business travelers. The purpose of this study was to identify the association between job industry, frequency of business travel, and duration of business travel with EAC among U.S. business travelers.

Literature Search Strategy

I retrieved articles for this literature review from Walden University online library databases including the multidisciplinary databases Academic Search Complete, ProQuest Central, and ProQuest Dissertations and Theses Database. I used the following keywords and BOOLEAN operators in searching each database: *alcohol* OR *drinking* NOT *water* AND *workplace OR occupation* AND *survey* AND *BRFSS; alcohol* OR *drinking* NOT *water* AND *workplace OR occupation* AND *survey* AND *community; travel AND alcohol* OR *drinking* NOT *water* AND *survey* AND *BRFSS;* and *travel AND alcohol* OR *drinking* NOT *water* AND *survey* AND *community.* I specifically *excluded water* from the search since I found that drinking water was frequently associated with *drinking* in the context of environmental and pollution studies not related to alcohol consumption. My search includes articles from 2008 to present. I performed a cited references search for key articles. I also considered publications within reference lists of found articles for review. The complete literature matrix is included is included as appendix A.

Epidemiology of EAC

My research identified consistent patterns of EAC in the general population. Blackwell et al. reported descriptive statistics from the 2012 National Health Interview Survey (NHIS) related to alcohol and drinking status (2014). Researchers conducting the NHIS collect population-based health data in an effort to monitor trends in disability and illness of non-institutionalized U.S. civilians (CDC, 2012a). Surveys were conducted in person by trained interviews from the U.S. Census Bureau via cluster sampling. Cluster sampling is used to obtain data from a homogenous subset of the study sample, rather than individual-level data (Crosby, DiClemente, & Salazar, 2006). Current drinking among U.S. adults ranged between 52% and 64.9%. Men were found to drink more regularly and also more heavily than women. In fact, the 2012 NHIS survey found the highest proportion (64.8%) of regular drinking among non-Hispanic white males (Blackwell et al., 2014). The percentages of adults who reported either binge drinking or heavy drinking the past 30 days have remained relatively steady from 2002 through 2012 (Centers for Disease Control and Prevention, 2014b). In the general population, rates of heavy drinking and binge drinking vary by age, gender, race/ethnicity, birthplace, marital status, veteran status, smoking status, religious preference, occupation, and educational level (Barnes & Zimmerman, 2013; Blackwell et al., 2014; Cunradi et al., 2014; Gimeno et al., 2009; Kanny et al., 2013; Karlamangla et al., 2006; Morikawa et al., 2013; Pillai et al., 2013). These covariates will be assessed in my study.

Kanny et al. conducted a study to determine state-specific socioeconomic disparities in binge drinking during 2011 (2013). Behavioral Risk Factor Surveillance Survey (BRFSS) responses related to binge drinking, including prevalence, frequency, and largest number of drinks consumed from 457,555 surveys were analyzed. The BRFSS, which is the world's largest telephone health survey system, was designed by government researchers to monitor state-level prevalence of major behavioral risks in U.S. adults associated with morbidity and mortality (Centers for Disease Control and Prevention, 2013a). Binge drinking prevalence was calculated by dividing the total number of individual cases who reported binge drinking one at least one occasion during the previous 30 days by the total number of cases. Frequency of binge drinking was calculated by averaging the number of episodes for the previous 30 days. Intensity of binge drinking was calculated by averaging the largest number of drinks consumed by binge drinkers over the past 30 days. Data were weighted for demographic variables and adjusted for age and gender. The overall prevalence of binge drinking in a random population of U.S. adults was 18.4%, with binge drinkers reporting 4.1 episodes within the previous 30 day period (Kanny et al., 2013). Intensity of binge drinking was 7.7 drinks per episode. The researchers found a higher prevalence of binge drinking among younger adults; 30.0% and 29.7% of young adults between the ages of 18-24 and 25-34, respectively, reported binge drinking. While the intensity of binge drinking was higher among the younger age groups (i.e., ages 18-34), frequency of drinking was higher among older adults. Other interesting trends were reported, such as higher prevalence of binge drinking episodes in higher income (≥\$75,000/year) households but higher frequency and intensity among lower income (<\$25,000) households. In addition, respondents with no high school diploma reported lower prevalence of binge drinking episodes (16.8%) than other educational levels, but reported the highest frequency (4.7 episodes) and intensity (7.4 drinks) compared to respondents of other educational levels. Geographically, the Midwest, District of Columbia, and Hawaii reported the highest prevalence of binge drinking. The Midwest experienced both high prevalence of binge drinking and intensity.

In a convenience sample of 11 states, alcohol attributed fractions (AAFs) were used to quantify the extent to which alcohol directly or indirectly contributed to a specific health condition (Gonzales et al., 2014). The authors found that alcohol attributed deaths (AADs) varied significantly by race and ethnicity. It was also found that while the majority of AADs were experienced by non-Hispanic whites, AIs/ANs experienced AADs more than twice that of any other race/ethnicity. Kanny et al. (2015) reported that AIs/ANs had the highest age-adjusted alcohol poisoning death rate (49.1 per million) during 2010-2012.

Distinct patterns also exist between regular drinking and employment status. Sixty percent of full-time employed adults reported regular drinking compared to 51% employed part-time, 45% unemployed who had worked previously and 20% never employed (Blackwell et al., 2014). Adults in poor families were less likely to be regular drinkers compared to those in near-poor and not-poor families. Regular drinking is highest in adults under age 65 with private health insurance (61%) compared to 48% who were uninsured and 33% on Medicaid.

The association between job industry and alcohol consumption is not clear. Higher rates of alcohol use have been reported for specific industries (Cunradi et al., 2014) while other studies suggest the variation lies within the occupational level of employment (Barnes & Zimmerman, 2013; Marchand, Demers, Durand, & Simard, 2003).

This chapter will focus on studies conducted in the community setting which measured variables associated with EAC, including a summary of the social ecological model of health as related to EAC. This review will demonstrate the gap in research related to predictors of EAC among U.S. business travelers.

Social-Ecological Model

According to WHO, health is defined as "…complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1948). Most health problems are the result of lifestyle or individual behaviors (Centers for Disease Control and Prevention, 2014a). In fact, the following four health behaviors are responsible for the majority of chronic diseases today: physical inactivity, poor nutrition, tobacco use, and EAC. While many health interventions are targeted toward the individual, the most successful programs focus on multilevel approaches to health promotion and disease prevention.

This study was conducted within a social-ecological framework which supports the perspective that health is influenced by individual, social, and ecological forces and their interdependent relationships (Berkman & Kawachi, 2000; McLaren & Hawe, 2005; Sallis et al., 2008). In fact, the complex interplay of individual, community, and social determinants of health may be more powerful predictors of health and well-being than medical care. These determinants include social structure, social position, social/material environment, behavioral/psychological factors, illness and injury, and their social consequences and may occur over the lifecourse (Ahern et al., 2008; Karlamangla et al., 2006). The multilevel influence of these factors may lead to health disparities.

Alcohol use has previously been studied within the social ecological framework. Ade, Rohrer, & Rea (2011) conducted a cross-sectional study to measure the relationship between immigration status, income, drinking, and overweight/obesity among African American adults in the U.S. using the social-ecological model. Researchers collected data using a modified BRFSS questionnaire via an online survey. Measures of alcohol consumption included frequency of alcohol consumption over the past month, and binge drinking during the past month. Bivariate logistic regression was used to measure associations between immigration status and obesity. Results were adjusted for demographic variables and health behaviors, such as age, income, education, gender, smoking, diet quality, physical activity, avoiding medical cost, race/ethnicity and mental distress, years of residence in the U.S., and alcohol consumption. Multiple logistic regression showed no difference in overall risk of obesity. However, obesity was significantly associated with binge drinking in this population (*OR* = 1.77, 95% *CI* [1.33, 2.37). The authors concluded that risk factors that affect weight in African Americans and African American immigrants may be attributed solely to alcohol consumption.

In fact, alcohol consumption is appropriately suited for study within the social-ecological framework as many studies have examined the multi-level interaction of social-ecological influences on alcohol consumption, including availability (Halonen et al., 2013; Moore, Ames, & Cunradi, 2007), drinking norms (Biron et al., 2011; Kerr-Corrêa et al., 2008; Sheard et al., 2014; Sumeet et al., 2012), cultural aspects (Iwamoto, Takamatsu, & Castellanos, 2012; Pillai et al., 2013), job industry (Cunradi et al., 2014), stress (Azagba & Sharaf, 2011; Gimeno et al., 2009; Hiro et al., 2007; Marchand, 2008; Morikawa et al., 2013), travel (Burkholder et al., 2010; Girasek & Olsen, 2009; Joyce et al., 2013; Klunge-de Luze, de Vallière, Genton, & Senn, 2014), and contextuel factors (Morleo, Cook, Bellis, Meah, & Threlfall, 2011). While these studies did not formally approach alcohol consumption within a social-ecological framework, the diverse and multi-level influence of variables demonstrates the broad range of factors associated with alcohol consumption.

As previously mentioned, most heavy or binge drinkers are not alcohol dependent. This presents a greater challenge for multilevel community interventions aimed and social-environmental influences since the large majority of the target population are not likely to be undergoing treatment for alcohol disorders. Many individuals may not meet the criteria for alcohol dependence although they may consume excessive amounts of alcohol. The Community Preventive Services Task Force (2013) recommendations and findings to prevent EAC among the general population include dram shop liability, increasing alcohol taxes, imposing limits on days and hours of sale, enforcement of overservice laws, preventing privatization of retail alcohol sales, regulation of density of alcohol outlets, and responsible beverage service training programs for owners, managers, and staff of alcohol establishments.

With this in mind, the following hypotheses were proposed:

1) U.S. business travelers who travel frequently (> 6 trips per year) are more likely to consume excessive levels of alcohol.
2) U.S. business travelers who travel for short durations (< 3 days per trip) are more likely to consume excessive levels of alcohol.
3) Excessive alcohol consumption among U.S. business travelers is positively associated with male-dominated industries, such as construction, mining and armed forces.

Literature Review

From June through December, 2005, researchers conducted random telephone interviews of 4000 adults aged 18 or older in New York City (Ahern et al., 2008). Researchers sought to examine neighborhood-level exposures associated with substance use using National Institute for Alcohol Abuse and Alcoholism (NIAAA) recommended questions related to binge drinking. Structured interviews collected data related to demographic and socioeconomic characteristics. Previous 12 month alcohol consumption was assessed using World Mental Health Comprehensive International Diagnostic Interview alcohol module and NIAAA-recommended questions regarding binge drinking. Responses were weighted and analyzed using three logistic regression models. One model compared moderate drinkers and abstainers, the other compared binge drinkers to abstainers, the final compared moderate drinkers to abstainers. They found that neighborhood norms around drunkenness were strongly associated with moderate drinking (*OR* = 1.20, 95% *CI* [1.03- 1.39]) and binge drinking (*OR* = 1.92, 95% *CI* [1.44, 2.56]) independent of other influencers, including friend, family, and individual norms. The authors noted a relatively small participation rate (54%) may not be representative of the population. In addition, underreporting may have occurred due to self-report bias.

A limitation of cross-sectional studies is the inability to draw conclusions regarding causality. While most studies of EAC have been cross-sectional examinations, (Karlamangla et al., 2006) conducted a longitudinal study of 14,127 adults aged 25-74. Researchers analyzed National Health and Nutrition Examination Survey (NHANES) data at baseline and three additional time points over a period of 22 years to better understand the effects of age, cohort, and period influence on the trajectory of heavy drinking. The authors found that age and period affects were the primary determinants of alcohol consumption in this cohort. Findings were of interest in that they reported demographic differences in longitudinal trajectories of alcohol consumption. Specifically, as men and smokers aged they reduced average alcohol consumption at a different (more rapid) rate than they reduced heavy drinking behaviors. This study demonstrates the importance of understanding EAC in the context of social-ecological factors, including changes over life course. Limitations included some variability in how the alcohol consumption questions were asked across the time points which may have affected final measures, and only heavy drinking, not binge drinking, was assessed.

Halonen (2013) studied if the proximity to the nearest bar was associated with alcohol consumption, both cross-sectionally and longitudinally. GPS was used to measure distance from home to nearest bar; close proximity was defined as distance less than one kilometer. Heavy alcohol use was defined as drinking more than the 288 grams of alcohol per week for men and more than 192 grams of alcohol per week for women. Extreme drinking was defined as passing out due to alcohol use within the past 12 months. Binomial logistic regression and conditional logistic regression were used to analyze data. Covariates included age, sex, occupational status, self-rated health, and marital status. Cross-sectional results in the adjusted model showed that living in proximity to a bar was associated with greater likelihood of both heavy alcohol use (*OR* = 1.04, 95% CI [.97,1.11]) and extreme drinking (*OR* = 1.09, 95% CI [1.01,1.17]). The longitudinal analysis suggests this may be causal as a decrease in proximity to nearest bar increased the likelihood of both measures. When the mean distance from residence to nearest bar decreased from at least 1 km to under 1 km, the odds ratio for heavy drinking was 1.12 (95% *CI* [.97, 1.29]) and the odds ratio for extreme drinking was 1.18 (95% *CI* [.98, 1.41]). Limitations of this study include self-reported alcohol consumption, potential self-selection bias as alcohol heavy alcohol users may choose to live in close proximity to a bar, and reverse causation wherein bars may have arisen as a result of a population likely to drink.

Kerr et al. (2008) compared gender differences in drinking patterns between males and females in two Brazilian communities to understand variables related to alcohol consumption. Researchers conducted face-to-face household interviews which collected data related to alcohol and drinking behaviors from the Gender, Alcohol, and Culture (GENACIS) Questionnaire. Residents from Botucatu, a predominantly urban community, were compared to those from the urban district of Rubiâo Jr., a smaller, rural community. Logistic regression analyses were performed for each gender and town and included the following variables: gender, total family income, age, marital status, religion, educational level, paid work, ethnicity, gender of co-workers, tobacco use, positive family alcohol abuse history, friend's drinking problems, level of partner's drinking, marriage satisfaction, drinking alone, ability to talk to the partner about feelings and problems, expectancies about drinking, and self-reported mental health. The authors found that gender patterns of alcohol consumption were similar in urban areas but differed in rural areas, suggesting that female drinking patterns are positively correlated to the changing sociocultural environment--as female roles become more similar to male roles, so does their drinking behavior.

Sheard, Huntington, and Gilmour (2014) conducted a cross-sectional study extracted from the second survey of three from longitudinal data collected of military nurses in the United Kingdom, Australia, and New Zealand. Alcohol consumption was assessed using the Food Frequency Questionnaire. Measures included drinking status, frequency of drinking, and number of drinks consumed per episode. While this was a small study of 40 nurses (15 male, 29 female), results showed that the median for older nurses (aged 60-69) consumed more drinks per week, consumed more drinks on drinking days, and reported higher frequency of drinking days per week. Of note, there were only two nurses in this age group analysis. Findings were interesting in that they revealed this group of nurses' drinking patterns more closely reflected the drinking patterns of the military organization rather than the nursing profession. Limitations include the small sample size which prevents generalizability, and self-reported alcohol consumption.

Additional community-based cross-sectional studies of alcohol consumption have generally confirmed findings from larger population-based studies. For example, (Sumeet et al., 2012) conducted a community-based household survey of 848 Hindus and Muslims aged 15 and older in Aligarh, a district of Northern India, to determine prevalence and risk factors for alcohol use. Alcohol use and drinking patterns were collected and assessed using chi square test of association. The authors found several variables positively associated with alcohol use in this population, including lower socioeconomic status, social class, rural residence, lower educational attainment, parental alcohol use, and male gender.

Biron, Bamberger, and Noyman (2011) conducted an anonymous survey of 361 employees from a large Israeli manufacturing company to test the external validity and cross-cultural applicability of an existing North American model of work-based risk factors and employee substance use. Frequency of alcohol use during the preceding month was measured on a five-point scale (0= "never" to 4 = "on more than 3 days per week"). Number of drinks on each drinking occasion was also collected. Zero-inflated Poisson regression and ordinal probit regression were used to measure the association between work-related risk factors and either quantity of alcohol consumption or frequency of alcohol consumption, respectively. Researchers controlled for gender, education, ethnic background, and trait negative affect. Results revealed that permissive drinking norms were positively associated with employee substance use while policy enforcement was inversely associated with substance use. Findings also suggested that job stress and work alienation may influence substance use problems. Limitations are that this study was conducted in an industrial setting where employees may have been homogenous, preventing generalizability. In addition, overall measures of substance use were assessed, including drinking during the workday and drinking at work but also drinking at locations and on occasions unrelated to work. This approach failed to consider alcohol use behaviors within a contextual framework.

Pillai et al. (2013) conducted a study of 732 male drinkers aged 18--49 in Gao, India to measure the association between drinking patterns and adverse outcomes related to socioeconomic class. Beverage-specific drink-size information was used to standardize the definition of a drink. Number of drinks was converted to pure grams of alcohol. A drink was defined as 10 grams of alcohol. Usual quantity of alcohol, heavy episodic drinking, and previous year drunkenness were assessed. The authors found that most drinkers (72%) consumed less than four drinks on an average drinking day while 14.8% consumed six or more. Lower educational status (30.2% for no education compared to 15.5% for high school education, $p < .001$) and lower standard of living 15.4% for lowest two quartile compared to 14.5% for upper three quartile, $p = .002$) were associated with high risk alcohol consumption. Rural residence was associated with monthly frequency of drunkenness compared to urban residence (9.1% versus 5.8%, $p = .002$). Increasing quantity of alcohol was positively associated with heavy episodic drinking and common mental disorders. This study shows the adverse impact of diverse drinking patterns on health and social outcomes. The authors noted that limitations included cross-sectional design, which prevents drawing conclusions about causality; potential residual confounders of personality traits; and potential underreporting due to self-report.

Iwamoto, Takamatsu, and Castellanos (2012) studied the socio-cultural determinants of binge drinking and alcohol-related problems among 1575 Asian American undergraduates at a public university in Southern California. Daily Drinking Questionnaire (DDQ) was used to measure the quantity and frequency of perceived peer drinking behaviors and self-reported quantity and frequency. Binge drinking was measured using a one-item response and based on standard gender-based definitions for the variable. Alcohol-related problems or negative alcohol-related consequences were measured using the Rutgers Alcohol Problem Index. Analysis of variance was conducted to measure ethnic group and gender mean differences in binge drinking and alcohol-related problems. Negative binomial regression revealed the following variables were significantly associated with self-reported binge drinking: living with friends off-campus ($IRR = 1.47$, $p < .001$); Greek status ($IRR = 2.25$, $p < .001$); and descriptive norms ($IRR = 1.30$, $p < .001$) (Iwamoto et al., 2012). Even within the Asian population, there were distinct variations: Japanese ($IRR = 2.25$, $p < .001$), Multi-Asian ($IRR = 2.15$, $p < .001$), Filipino ($IRR = 1.66$, $p < .01$), Korean ($IRR = 1.81$, $p < .01$), and South Asian ($IRR = 1.54$, $p < .05$). However, Filipino ($IRR = 1.57$, $p < 0.001$), South Asian ($IRR = 1.53$, $p < 0.001$), or other Asian ($IRR = 1.73$, $p < .05$) were more likely to experience alcohol-related problems. The authors noted that these findings were consistent with previous studies and attribute the high levels of binge drinking among Japanese, Filipinos, and Koreans, which is similar to other high-risk racial/ethnic groups, to acculturation. The study is limited in that data were collected from a single institution and protective factors, such as socioeconomic status, religion, and cultural values were not measured.

In the general population, males tend to report higher frequency of binge drinking than females. However, this may be altered by the workplace. Cunradi et al. conducted a study to assess the patterns of substance use among female construction workers compared to their male counterparts (2014). Telephone survey data were collected from 956 women (104 female construction workers and 852 female spouses/partners of construction workers) aged 18-65. Monthly binge drinking was assessed by asking how often the participant drank four or more drinks in a two-hour period within the past 12 months. Respondents were considered binge drinkers if they consumed this amount at least once per month. Bivariate associations between sample characteristics and labor participation were reported. Multivariate logistic regression was used to measure odds ratios of monthly binge drinking and other substance use behaviors. The authors found that construction worker women had the highest rate (10.6%) of monthly binge drinking, compared to 5.9% among those unemployed, 2.7% for 'other' employed, and 0.9% among homemakers (Cunradi et al., 2014). The likelihood of monthly drinking was higher for female construction workers (*OR* = 4.01, 95% *CI* [1.68, 9.59]) compared to homemakers (*OR* = .30, 95% *CI* [.07, 1.37]). Findings suggest that workforce participation may influence the use of alcohol, even when adjusted for age, race/ethnicity, and education. Limitations include the cross-sectional design which prevents drawing conclusions about causality, and the omission of additional potentially-mediating factors.

Gimeno, Amick, Barrientos-Gutiérrez, and Mangione (2009) studied the relationship between job alienation and job stress with frequent drinking, heavy drinking, and drinking at work. This cross-sectional household survey study, part of the Work and Alcohol Project, included 3099 U.S. drinking workers from 16 worksites at six Fortune 500 companies. Mailed questionnaires collected self-reported data related to drinking frequency and heavy drinking. Alcohol consumption data was collected as ordinal but dichotomized for analysis. Heavy drinking was defined as ≥ five drinks (males) and ≥ four drinks (females) in any one day of the previous month. Workers were considered frequent drinkers if they had consumed any beer, wine, or liquor on ≥ five days in one week. Drinking outcomes were analyzed using logistic regression using separate models for each exposure. After adjusting for covariates, the authors found that high complexity jobs were associated with lower risk of frequent drinking (*OR* = 0.80, 95% *CI* [6.4,1.00]) and heavy drinking (*OR* = 0.88, 95% *CI* [.74, 1.04]), but higher risk of drinking at work (*OR* = 1.06, 95% *CI* [.87,1.29]) (Gimeno et al., 2009). Passive jobs were associated with lower risk of frequent drinking (*OR* =.71, 95% *CI* [.52, .97]), but higher risk of heavy drinking (*OR* = 1.06, 95% *CI* [.84, 1.34]). These findings suggested that passive jobs may have characteristics of low self-direction, including underutilization of skills and low decision latitude which influence alcohol consumption. A large number of covariates were included in this study, such as gender, age, race/ethnicity, education, frequency of attending religious services, marital status, living with children, family history of alcohol abuse, self-rated health, smoking status, job category and seniority, weekly working hours, working offsite, working shift, salary, job insecurity, and alcohol availability at work. Limitations included cross-sectional design, lack of generalizability to a larger population, self-reported data, and short period of assessment of drinking behaviors.

Consistent results were reported by Marchand, Parent-Lamarche, and Blanc (2011). They conducted a study to understand the association between occupational groups and work-organization conditions to high-risk alcohol consumption among workers aged 15-75 who were part of the population-based Canadian Community Health Survey (CCHS). The CCHS is cross-sectional survey that collects information related to health status, health care utilization and health determinants for the Canadian population (Government of Canada, 2014a). Alcohol consumption was collected as an ordinal variable and recoded as dichotomous. High-risk drinking was defined as 10 or more drinks per week for females and 15 or more drinks per week for males. Occupational group were coded using Canadian Standard Occupational Classification. The initial 471 occupations were collapsed into six job groups: senior managers, managers, supervisors, professionals, white-collar workers, and blue-collar workers. Data about workplace characteristics, including skill utilization, decision authority, and social support were collected using five-point Likert scales. Descriptive statistics showed that 10% of men and 5.9% of women were high-risk drinkers (Marchand et al., 2011). Multiple logistic regression was used to analyze occupational groups, work-organization conditions, and high-risk alcohol consumption. The model which included all variables showed that both work hours (*OR* = 1.022, 95% *CI* [1.000, 1.004]) and job insecurity (*OR*= 1.27, 95% *CI* [1.11,1.46]) were positively associated with high-risk alcohol consumption, as was living in a high-income family (*OR* = 1.35, 95% *CI* [1.17.1.56]). These findings were contrary to previous reports which revealed variations in high-risk alcohol consumption by occupational group. However, the authors noted this study as unique in that it considered additional variables such as workplace factors, family situation, neighborhood, and individual characteristics. In addition, the authors noted that the occupations in this study were aggregated into large, heterogeneous job groups which may have confounded results. Nonetheless, these findings indicated that alcohol consumption may be used to cope with work-related stress and is influenced by both factors outside of work and individual characteristics.

Another group analyzed data collected from 17,501 male workers aged 18-72 during April 1996 through May 1998 from the Japan Work Stress and Health Cohort (JSTRESS) Study (Hiro et al., 2007). The aim of this study was to analyze the association between 13 occupational stressors and weekly heavy drinking between four different age groups: 18-29, 30-39, 40-49, and 50-72. Participants completed questionnaires which collected data regarding job stress, workplace social support, and heavy drinking. Nondrinkers and females were excluded. Descriptive statistics showed that 6.5% of participants were heavy drinkers (Hiro et al., 2007). The rate of daily drinking was highest among the 50-72 age group (37.9%). Logistic regression was conducted to measure the association of variables and was adjusted for smoking and marital status. Researchers found significant associations between heavy drinking and job stressors that varied with age. For those aged 30-39, intragroup conflict and job control were positively associated with heavy drinking (*OR* = 1.63, 95% *CI* [1.05, 2.54], *OR* = 1.54, 95% *CI* [1.00, 2.37], respectively). Cognitive demands reduced the likelihood of heavy drinking in this age group (*OR* = .67, 95% *CI* [.47, .97]). For those aged 40-49, heavy alcohol consumption was associated with physical environment (*OR* = 1.34, 95% *CI* [1.02, 1.77]) and underutilization of skills (*OR* = 1.42, 95% *CI* [1.10, 1.84]). However, there was no significant correlation with measures of job stress, including work schedule, and heavy alcohol use in the age groups 18-29 or 50-72. The authors noted that weekly heavy drinking may not capture important patterns of drinking, such as binge drinking, where the weekly total may be consumed in one episode. This study highlights the differences in workers' heavy alcohol consumption across age groups and supports the need for better understanding of factors associated with excessive alcohol use among U.S. business travelers, whose average age is 45.9. Study limitations include cross-sectional design, potential underreporting as a result of self-report, unidentified and/or confounding variables associated with job stress, and omission of non work-related stress variables. Another limitation is that the sample consisted of only Japanese males, which prevents the ability to generalize to other races/ethnicities and to females.

A cross-sectional study was conducted to measure the association between work schedule, poor sleep quality and heavy drinking among 909 factory workers aged 35–54 years in Japan (Morikawa et al., 2013). Participants completed a self-administered survey with questions related to sleep and alcohol consumption and grouped based on work schedule (day workers, two-shift workers without night shift, and two-shift or three- shift workers including night shift). Heavy drinking was defined as more than 60g/day, based on the Japan Ministry of Health, Labor, and Welfare Guidelines. Data collected regarding alcohol consumption included frequency of alcohol intake and amount consumed, by type, during each occasion. Multiple logistic regression with all variables showed that current smokers (*OR* = 2.85, 95% *CI* [1.56, 5.19]) and those taking hypertension medications (*OR* = 3.39, 95 % *CI* [1.82,6.30]) were more likely to be heavy drinkers (Morikawa et al., 2013). Night shift work was significantly associated with heavy drinking in an age-adjusted model (*OR* = 2.17, 95% *CI* [1.20,3.93]) and a fully adjusted model (adjusted for age, smoking, and medication) (*OR* = 2.14, 95% *CI* [1.16, 3.94]). These findings conflict with Hiro et al.’s study (2007) which found no association between work schedule and risk of heavy drinking. However, as Morikawa et al. (2013)

pointed out, day workers and two-shift workers in this study also included former night workers which may have confounded results. The authors also cautioned against generalizability of these findings since the sample was restricted to one Japanese factory and research has shown that permissive drinking norms in the workplace influence employee drinking patterns. In addition, the authors highlighted cultural differences in using drinking as a sleep aid. Finally, other confounders of sleep disorders and alcohol intake, such as depression, job stress, family factors, and education were not assessed.

The relationship between smoking and consumption of alcohol to job stress was measured by Azagba and Sharaf (2011). The study was an analysis of data from cycle four (2000/2001) to cycle eight (2008/2009) of the Canadian National Population Health Survey (NPHS). The NPHS is a longitudinal survey that collects information on health status, health service utilization, factors that influence health, and age-related changes from the same group of Canadians every two years (Government of Canada, 2014b). Three levels of job strain were measured against cigarette smoking and alcohol consumption. Control variables included: cigarette taxes, age, income, gender, household size, employment status, education, marital status, workplace social support, workplace smoking restrictions, and ethnicity. The authors found similar results after conducting order of least squares (*OLS*), Poisson, and negative binomial regression. *OLS* revealed lower alcohol consumption was associated with being immigrant, being married, higher educational level, and older age (Azagba & Sharaf, 2011). Job strain significantly impacted alcohol consumption among heavy drinkers. Workplace social support was found to attenuate these results.

A limited number of publications have explored the public health burden of alcohol consumption among business travelers. Alcohol was identified as a negative health factor associated with international business travel (Burkholder et al., 2010). The authors measured the association between objective and subjective health outcomes of international business travelers compared to non-travelers using a validated health risk appraisal survey. Objective measures included length and frequency of travel and BMI. Subjective measures included items such as self-reported blood pressure, total cholesterol, smoking, and drinking over the limit (more than one to two drinks per day for men and more than one drink per day for women). Logistic regression analysis revealed that international business travelers had a higher odds ratio of drinking over the limit, and was highest among those the high travel frequency (> 6 international trips per year) / low trip duration (< 5 days per trip) group (*OR* = 1.63, 95% *CI* [1.06, 2.05]) (Burkholder et al., 2010). This group is defined as those who take more than six international trips per year with trip duration less than five days per trip. It is important to note that this study combined frequency of travel and duration of travel into one categorical variable and did not consider these factors separately. Additional limitations include failure to adjust for other variables which are known to influence alcohol consumption, such as educational status and religious preference. Finally, this was a unique sample of international business travelers which may limit the ability to generalize results.

Safety implications of alcohol use for airline passengers were described by Girasek and Olsen (2009). The authors conducted a study between November 2005 and

March 2006 to assess the individual and contextual factors associated with airline passengers' alcohol use. Data was collected related to alcohol intentions and use from passengers prior to boarding one of 24 domestic flights in the South Atlantic U.S. Actual alcohol consumption was ascertained post-flight by self-report and alcohol purchase records and was found to have 86% and 91% correlation, respectively (Girasek & Olsen, 2009). Chi-square and t-tests were used to measure associations of variables. Several factors were associated with alcohol consumption, such as business/first class (OR = 5.47, 95% CI [3.29, 9.09]); current alcohol consumption of four or more drinks per week (OR = 26.73, 95% CI [5.63, 126.82]); and flight duration over four hours (OR = 2.70, 95% CI [1.79, 4.08]). This study is consistent with previous research that found positive outcome expectations and social norms to be predictors of alcohol use. Specifically, the belief that alcohol is relaxing, or does not increase jet lag was positively associated with increased intention to consume alcohol during flight. Social norms and situational characteristics, such as evening flight or having no work responsibilities on the day of flight, were also significantly associated with higher likelihood of intention to drink during flight. Interestingly, the authors did not find a gender variation. Limitations included self-reported alcohol use which may underestimate true measures, and the narrow population sample which prevents generalizability.

In a different study (Joyce et al., 2013) conducted a cross-sectional computer-assisted survey of 11,906 workers aged 16 and older in West Australia to evaluate the association between health behaviors and outcomes. Alcohol risk was assessed by measuring the frequency of drinking more than two drinks per day (high risk of long-term harm) and frequency of drinking more than four drinks per day (high risk of short-term harm). Participants were categorized as fly-in fly-out (FIFO) workers, shift workers, and other types of workers Chi-square tests of association were conducted. The authors found that, compared to shift workers, FIFO workers were more likely to be male, aged 25-44, higher SES, and live in a metropolitan region. FIFO workers and shift workers were more likely to be at high risk of short-term harm than other workers (64.7%; 95% *CI* [57.5, 71.9], 59.0 %; 95% *CI* [53.7, 64.3], respectively). FIFO workers and shift workers were also more likely to be at high risk of long-term harm from alcohol consumption than other workers (29.8%; 95% *CI* [22.8, 36.8]; 30.2%; 95% *CI* [25.1, 35.2], respectively) (Joyce et al., 2013). FIFO workers also had the lowest level of self-reported mental health problems compared to shift workers or other workers, an unexpected finding in light of the separation and isolation presumed to be experienced by this group during travel away from home. Limitations included cross-sectional design and self-reported health.

The association between occupational attributes and alcohol use was studied by Barnes and Zimmerman (2013) using the National Longitudinal Survey of Youth 1979 (NLSY79) cohort 2006 wave and the Department of Labor’s Information Network database (O*NET). Previous month’s alcohol use was measured by the number of drinking days, number of drinks consumed on a typical day, and number of episodes when six or more drinks were consumed. Data were weighted to be nationally representative. Results showed that the average respondent drank alcohol on 4.9 days during the previous month, consumed 1.5 drinks per drinking episode, and reported 0.3

occasions where six or more drinks were consumed (Barnes & Zimmerman, 2013). Pairwise correlations between variables were conducted and then adjusted for covariates, such as race/ethnicity, and gender. Male workers with high job strain and job alienation reported higher drinking levels across multiple industries and positions. Specific occupations that ranked highest in physical demand were construction; oil, gas and mining extraction; installation; maintenance; and repair. Jobs with higher physical demand were positively associated with number of drinks consumed per day (0.12, $p < .01$), and the number of times a respondent consumed more than six drinks on one occasion (0.16, $p < .01$). High social engagement seemed to protect against all drinking measures (-.10, -.06, -.08, respectively). Cross-sectional design and potential individual- and work-specific confounders were potential limitations in this study.

Researchers in Switzerland conducted a study to measure changes in alcohol consumption and recreational drugs among Swiss travelers (Klunge-de Luze et al., 2014). Travelers completed pre- and post-travel questionnaires which collected information regarding at-risk alcohol consumption and any recreational drug use at baseline and related to their last trip abroad. At-risk alcohol consumption was based on the standard CDC definition of heavy drinking (≥ 8 drinks per week for females and ≥15 drinks per week for men). Bivariate analysis was conducted to identify predictors of risk and used for logistic regression modeling in the final analysis. Results revealed that more participants consumed alcohol during their last trip, and the amount of alcohol consumed was increased compared to baseline (Klunge-de Luze et al., 2014). Overall, 56% of participants drank at baseline. Average consumption was 6.1 drinks per week. During their last trip, 67% of participants drank, and averaged 8.1 drinks per trip. At baseline, 7% were at-risk drinkers. This increased to 14% during travel. Multivariate analysis showed that at-risk alcohol consumption was more likely among those aged 35 and younger (*OR* = 1.6, 95% *CI* [1.2, 2.1]) and among females (*OR* = 1.1, 95% *CI* [.8, -1.3]). European destination was also associated with greater likelihood of at-risk alcohol consumption (19%) compared to America (13%), Africa (10%), and Asia (11%). Participants for this study were identified through visiting a travel clinic and; therefore, may be a more health-conscious group. Additionally, although participants were identified in a clinical setting, the study collected self-reported behaviors that were not clinical measures of substance use. An important limitation of the study is the failure to assess binge drinking.

A joint study by the Greater Manchester Public Health Practice Unit and the Centre for Public Health at Liverpool John Moores University was conducted to estimate alcohol consumption for future baseline comparisons (Morleo et al., 2011). Telephone surveys were conducted from random digit dial sampling of participants in Greater Manchester, United Kingdom. The questionnaire was based on a tool developed in New Zealand which aimed to contextualize drinking. Questions asked about the locations where alcohol was consumed (i.e.) frequency of consumption, and typical amount consumed by vessel type (i.e. pint, bottle, glass). Self-reported amounts were calculated and reclassified based on alcohol strength. Drinkers were classified as non-drinkers, lower risk drinkers, increasing risk drinkers, or higher risk drinkers. The authors reported that higher risk drinkers were significantly more likely to be male (11.7%, 95% *CI* [9.5, 14.3]) than female (5.4%, 95% *CI* [3.8, 7.6]) (Morleo et al., 2011). The most common location for alcohol consumption was the home (74%) and the largest quantity (average 15 units per week) was consumed there. The authors concluded that using context-specific questions resulted in higher reported alcohol consumption. Limitations included self-report and cross-sectional design.

Critique of Methods

The prevailing limitation of cross-sectional studies is the inability to draw conclusions about causality. In addition, small sample size in some cross-sectional studies along with unique characteristics of sample populations limit the generalizability of findings. Studies included in this review used a wide array of sample sizes, ranging from 44 to over 70,000. Community-based survey studies tended to be smaller, with sample sizes under 2000.

Longitudinal studies of alcohol consumption have shown demographic and availability/proximity patterns (Halonen et al., 2013; Karlamangla et al., 2006). In this review of predominantly cross-sectional studies, measures of EAC were varied and included NIAAA standard definitions of binge drinking (five or more drinks within approximately two hours for men; four or more drinks within approximately two hours for women) and heavy drinking (15 or more drinks per week for men; 8 or more drinks per week for women) but also included other measures, such as number of drunk episodes, passing out from drinking, problem drinking, and other thresholds for EAC. For example, Marchand et al. (2011) used Canadian guidelines for weekly low-risk consumption, which defines alcohol misuse as more than 10 drinks per week for females and more than 15 drinks per week for males. Additional threshold measures of alcohol consumption were used, such as weekly alcohol consumption > 275 grams or daily alcohol consumption > 60 grams. One study used the New Zealand Health Promotion Agency threshold for safe drinking, which is defined as drinking less than five days per week, or consuming no more than two standard drinks on an occasion for females or no more than three on one occasion for males (Sheard et al., 2014). Definitions of a standard drink also varied within these studies from 10 grams of alcohol to 14 grams of alcohol. Time period for drinking behavior assessed was also variable and ranged from past 12 months to previous week. Tools used to assess drinking were inconsistent and included study-specific survey items, BRFSS, Daily Drinking Questionnaire, Food Frequency Questionnaire, and Rutgers Alcohol Problems Index. Finally, there was wide inter-study heterogeneity with respect to sample population, which limits generalizability.

The most commonly used statistical analysis to measure associations with alcohol consumption use was multiple logistic regression. In cases where alcohol consumption was collected as an ordinal variable, it was re-coded as dichotomous for analysis. Covariates typically included in these and other studies of alcohol consumption were age, gender, race/ethnicity, education, marital status, veteran status, smoking status, religious preference and birthplace. Additional covariates revealed in this review included social support factors, self-rated health status, and work characteristics such as weekly hours worked, job category and shift work. The variables for this study were selected based on existing research, knowledge gaps, and plausibility of association between travel attributes (frequency and duration) and job industry with EAC.

Knowledge Gap

Limited research on travel-related alcohol consumption has shown that travel attributes such as frequency, duration, and destination influence alcohol use behaviors (Burkholder et al., 2010; Girasek & Olsen, 2009; Joyce et al., 2013; Klunge-de Luze et al., 2014). While Burkholder et al. (2010) measured the association between alcohol consumption and both frequency and duration of travel as a single, combined independent variable but the author was unaware of any study that measured the association between EAC and frequency or duration of travel as separate and distinct independent variables among U.S. business travelers. Furthermore, many studies have measured the association between alcohol consumption and job industry, but none were identified that included measures of the frequency and duration of business travel (Barnes & Zimmerman, 2013; Cunradi et al., 2014; Kerr-Corrêa et al., 2008; Morikawa et al., 2013; Sheard et al., 2014) . In addition, while BRFSS was frequently used to collect data on population health behaviors, including alcohol use, the author was not aware of any study of business travelers' self-reported use of alcohol as assessed by BRFSS questions. This chapter revealed a gap in the literature related to predictors of EAC among U.S. business travelers.

Summary

Research on alcohol consumption has consistently revealed that social-ecological influences are associated with EAC. Studies of EAC in the general population have shown clear demographic patterns of use; however, these associations were frequently altered by workplace factors. Employee groups that have been well-studied related to risks of excessive alcohol use include restaurant/hospitality workers and military personnel. Limited research on travel-related alcohol consumption has shown that variables such as frequency and duration of travel, and travel destination influence alcohol behaviors. These associations had not previously been measured in the context of U.S. business travel. In addition, literature was quite heterogeneous with respect to measures of alcohol use and thresholds for excessive (or high-risk) alcohol consumption. While BRFSS was frequently used to collect data on population health behaviors, including alcohol use, business travelers' self-reported use of alcohol had not been measured using BRFSS questions. The studies reviewed for this chapter revealed many differences in study populations, alcohol use measures, definitions of excessive alcohol use, and assessment tools and; thus, supported the need for further research to measure the predictors of EAC among U.S. business travelers.

Chapter 3: Research Method

Research Design and Rational

The purpose of this study was to measure the association between EAC and each of the following independent variables: frequency of business travel, duration of business travel, and job industry among U.S. business travelers. I used a cross-sectional survey design using quantitative methods to measure the association between EAC and frequency of business travel, duration of business travel, and job industry among U.S. business travelers. Cross-sectional studies, which collect data from a population subset at a point in time, do not allow inferences to be drawn about causality (Trochim, 2006); however, I believe that this design was appropriate for assessing self-reported behaviors and consistent with other studies of alcohol consumption. Another option for capturing alcohol consumption behaviors was observation. However, this was not feasible due to logistical and time constraints. Cross-sectional study design, using surveys, is commonly employed by observational researchers (Crosby et al., 2006). This design allows the researcher to measure the relationship of variables in the population of study. According to Crosby, DiClemente, and Salazar (2006) self-administered surveys render higher prevalence when studying sensitive behaviors, such as substance use. This method allows the participant to answer questions directly and avoid engaging with an individual administering the survey. Although interviewer-administered questionnaires may reduce the number of missed questions, I selected to use a self-administered questionnaire for my study.

Population

The target population for this study was U.S. business travelers aged 18 and older. I chose to use the professional social networking site LinkedIn to generate my sample. LinkedIn (2015) is an online professional network site with over 300 million members in more than 200 countries. A unique aspect of LinkedIn is that it enables users to reach a broad network of first- and second-degree connections and beyond. First-degree connections can generally view one-another's profiles and contacts and communicate directly via LinkedIn. Second-degree connections can view contacts in common but cannot view details about the individual. This model allows access to large network of professionals.

I decided to use snowball sampling, which is a non-probability sampling method in which current participants recruit future participants from among their contacts. At study onset, I had over 600 first degree connections and over 320,000 second degree connections. I also encouraged my LinkedIn first-degree connections to forward the survey to their contacts to increase total participation through snowball sampling to achieve the target sample size (N = 376) based on power calculations.

Power analysis and sampling

According to the U.S. Travel Association (2015), U.S. business travelers complete over 400 million trips per year (2015) . However, based on my literature review, I could not find credible estimates for the number of unique U.S. business travelers. Since I wanted to collect BRFSS data related to alcohol use among business travelers, I decided to collect primary data through online survey. My research questions and desire to use a modified BRFSS required that I collect primary data. Therefore, I used nonprobability convenience sampling and snowball sampling techniques. While probability sampling increases the reliability of a study, nonprobability sampling is often used in social science research, particularly for cost and time considerations (Frankfort-Nachmias, C., & Nachmias, 2008). Nonprobability sampling is not a random sample and; instead, gathers data from a limited subset of the population. Snowball sampling relies on participants to recruit additional subjects from their contacts.

My criteria for participant inclusion were broad: All U.S. business travelers aged 18 and older were eligible to participate. Individuals under the age of 18 and non-U.S. citizen were ineligible to participate. I calculated power analysis using OpenEpi open source calculator version 3 to determine sample size (Dean, Sullivan, & Soe, 2014). I calculated my sample size based on a 95% confidence interval and 80% power. Researchers who have conducted large population-based surveillance studies have reported that 17% of Americans are binge drinkers and 5% are heavy drinkers (Adams & Schoenborn, 2006; Centers for Disease Control and Prevention, 2012b).

The baseline population assumptions I previously described were used for the following series of sample size calculations. Sample size estimates for the first two hypotheses (the odds of EAC are higher for frequent U.S. business travelers [> 6 trips per year] compared to infrequent U.S. business travelers [≤ 6 trips per year]; and the odds of EAC is higher for U.S. travelers who travel for short durations [≤ 3 days per trip] compared to U.S. business travelers who travel for short durations [> 3 days per trip]) were based on studies which measured the association of travel-specific factors and alcohol consumption (Burkholder et al., 2010; Joyce et al., 2013; Klunge-de Luze et al., 2014). Burkholder et al. (2010) reported that international business travelers were found to have odd ratios of 1.27 to 1.63 for *drinking over the limit*, or heavy drinking, compared to general employees. In Burkholder's study drinking over the limit was defined as more than two drinks per day for men and more than one drink per day for women. This is the equivalent to heavy drinking is used in this proposal, which is 15 or more drinks per week for men, and eight or more drinks per week for women.

My study will evaluate travel frequency and travel duration as distinct independent variables; whereas, the Burkholder study treated frequency and duration of travel grouped as one categorical variable. Those who completed one to five trips per year lasting less than five days per trip had an *OR* of 1.27 for drinking over the limit. Those who completed one to five trips with duration more than five days had an *OR* of 1.35. And those who took more than six international trips per year with duration less than five days had an *OR* of drinking over the limit of 1.63. The high- and low- *ORs* were used to calculate a high and low estimate of sample size and can be found in table 1. Based on the odds of EAC associated with travel frequency/duration described in existing literature, a sample size between 2,386 and 10,734 would be required. Joyce et al. (2013) reported that 64.7 % of FIFO workers were likely to be heavy drinkers compared to other non-traveling workers that were studied. Using these assumptions, a sample size of 24 would be required. In a study of Swiss leisure travelers, Klunge-de Luze et al. (2014) reported that heavy alcohol consumption doubled when traveling compared to staying at home (14% compared to 7%). Based on the assumptions considering background literature, and considering feasibility of conducting a random survey, the required sample size was determined to be 376.

The assumptions for the third hypothesis are based on studies which measured the association of job industry/workplace characteristics and alcohol consumption (Barnes & Zimmerman, 2013; Cunradi et al., 2014; Sheard et al., 2014). Barnes & Zimmerman (2013) found that employees in jobs with high physical demand had 20% greater odds of heavy drinking compared to those in non-physically demanding jobs. Based on an assumption of 20% difference in heavy drinking between job industries, the sample size required is 18,772.

Cunradi et al.(2014) reported that female construction workers had four times greater odds for binge drinking (*OR* = 4.01) compared to other employment categories, such as homemaker, unemployed, and other. Using this assumption, the required sample size would be 98. Finally, in a small study (*N* = 44) of military nurses, Sheard et al. (2014) reported that 15.9% of military nurses were heavy drinkers. Based on this assumption of heavy drinking prevalence, a sample size of 282 would be required. Each of the calculations and sample sizes are located in Table 1.

I conducted sample size calculations to evaluate EAC in the context of travel-specific factors and job industry factors (see Table 1). Considering each of the aforementioned calculations, varying assumptions related to EAC odds and prevalence resulted in a wide range of recommended sample sizes, from 24 to 18,772. Due to resource constraints and feasibility reasons, I decided to use a target sample size of 376. This sample size provides 80% power to reject the $H_0 1$ and $H_0 2$ hypotheses. Based on a sample size of 376, I calculated statistical power using 15.9% prevalence of heavy drinking among workers compared to 5% among the general population. This assumption yields a continuity-corrected power of 91% to reject $H_0 3$.

Table 1

Estimates of Sample Size and Power

Parameter	Assumptions
Two-sided confidence level(%)	95
Power (1-beta or % chance of detecting)	80
Ratio of unexposed to exposed in sample	1
Percent of unexposed with outcome	5
Percent exposed with outcome	7.9
Odds ratio	1.3
Risk/Prevalence ratio	1.3
Risk/prevalence difference	1.3
	Fleiss with CC
Sample size--exposed	5367
Sample size—non-exposed	5367
Total sample size	10734
Two-sided confidence level(%)	95
Power (1-beta or % chance of detecting)	80
Ratio of unexposed to exposed in sample	1
Percent of unexposed with outcome	5
Percent exposed with outcome	7.9
Odds ratio	1.6
Risk/Prevalence ratio	1.6
Risk/prevalence difference	2.9
	Fleiss with CC
Sample size--exposed	1193
Sample size—non-exposed	1193
Total sample size	2386
Two-sided confidence level(%)	95
Power (1-beta or % chance of detecting)	80
Ratio of unexposed to exposed in sample	1
Percent of unexposed with outcome	5
Percent exposed with outcome	65
Odds ratio	35
Risk/Prevalence ratio	13
Risk/prevalence difference	60

(table continues)

Parameter	Assumptions
	Fleiss with CC
Sample size--exposed	12
Sample size—non-exposed	12
Total sample size	24
Two-sided confidence level(%)	95
Power (1-beta or % chance of detecting)	80
Ratio of unexposed to exposed in sample	1
Percent of unexposed with outcome	5
Percent exposed with outcome	14
Odds ratio	3.1
Risk/Prevalence ratio	2.8
Risk/prevalence difference	9
	Fleiss with CC
Sample size--exposed	188
Sample size—non-exposed	188
Total sample size	376
Two-sided confidence level(%)	95
Power (1-beta or % chance of detecting)	80
Ratio of unexposed to exposed in sample	1
Percent of unexposed with outcome	5
Percent exposed with outcome	5.9
Odds ratio	1.2
Risk/Prevalence ratio	1.2
Risk/prevalence difference	0.94
	Fleiss with CC
Sample size--exposed	9386
Sample size—non-exposed	9386
Total sample size	18772
Two-sided confidence level(%)	95
Power (1-beta or % chance of detecting)	80
Ratio of unexposed to exposed in sample	1
Percent of unexposed with outcome	17
Percent exposed with outcome	45
Odds ratio	4
Risk/Prevalence ratio	2.7
Risk/prevalence difference	28
	Fleiss with CC
Sample size--exposed	49
Sample size—non-exposed	49
Total sample size	98

(table continues)

Parameter	Assumptions
Two-sided confidence level(%)	95
Power (1-beta or % chance of detecting)	80
Ratio of unexposed to exposed in sample	1
Percent of unexposed with outcome	5
Percent exposed with outcome	16
Odds ratio	3.6
Risk/Prevalence ratio	3.2
Risk/prevalence difference	11
	Fleiss with CC
Sample size--exposed	141
Sample size—non-exposed	141
Total sample size	282
Two-sided confidence Interval (%)	95
Number of exposed	188
Prevalence/coverage among exposed (%)	15.9
Number of non-exposed	188
Prevalence of coverage among non-exposed (%)	5
Prevalence/coverage ratio	3.2
Prevalence difference (%)	10.9
	Power
Normal approximation	93.56%
Normal approximation with continuity correction	91.04%

Procedures for Recruitment and Participation

I sent potential participants an email invitation via LinkedIn with a linkto complete an online survey that was hosted on SurveyMonkey, which is a free, web-based survey tool. I then invited additional contacts to participate through individual email messages. These participants were also be encouraged to recruit others to increase participation through snowball sampling. I collected the following demographic and covariate information--age, sex, race, birthplace, marital status, educational status, religious preference, smoking status, occupational level, employment status, and veteran status. All participants received a consent form which explained the study and described the voluntary and anonymous nature of the research. SurveyMonkey. Data were collected one time only in keeping with the cross-sectional design to capture data at a point in time.

Operationalization of Constructs and Data Analysis

In operationalizing my variables, I modeled the approach taken by previous researchers in analyzing and reporting BRFSS alcohol use data (Stahre et al., 2006). EAC, the dependent variable, was measured using the four BRFSS questions related to alcohol use. The first question related to alcohol consumption was "During the past 30 days how many days per week or per month did you have at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor?" Values for drinking days per week will be aggregated to provide a number of weekly drinking days. Values for drinking days in the past 30 days will be divided by four to yield weekly drinking days. Continuous variable responses for *heavy drinking* were dichotomized based on the standard definitions for heavy drinkers; i.e., ≥ 15 drinks per week for men and ≥ 8 drinks per week for women) and non-heavy drinkers (< 15 drinks per week for men and < 8 drinks per week for women) (CDC 2014b). Prevalence of heavy drinking is reported as total number of respondents who reported heavy drinking as per definition. I will also report the average daily drinks among those found to be heavy drinkers. Question two is "One drink is equivalent to a 12-ounce beer, a 5-ounce glass of wine, or a drink with one shot of liquor. During the past 30 days, on the days when you drank, about how many drinks did you drink on the average? (Note: A 40-ounce beer would count as 3 drinks, or a cocktail drink with 2 shots would count as 2 drinks.)" Continuous variable responses were dichotomized as binge drinker or non-binge drinker based on average number of drinks reported and using the standard definition of binge drinking: five or more drinks on one occasion for men or four or more drinks on one occasion for women. Continuous variable responses for *prevalence of binge drinking* were reported as the total number of respondents who reported at least one binge drinking episode in the past 30 days. This method has been successfully used for analysis and reporting of BRFSS alcohol use data (Kanny et al., 2013).

The third question was "Considering all types of alcoholic beverages, how many times during the past 30 days did you have X (X = 5 for men, X = 4 for women) or more drinks on an occasion?" Continuous variable responses for *binge drinking frequency* are reported as number of binge drinking episodes. Kanny, Liu, Brewer, and Lu (2013) previously used this method was for analysis and reporting of BRFSS alcohol use data.

The final question related to alcohol consumption was "During the past 30 days, what is the largest number of drinks you had on any occasion?" Continuous variable responses for *binge drinking intensity* were categorized using the sex-specific binge drinking definition (≥ 5 drinks for men; ≥ 4 drinks for women). This method was previously used for analysis and reporting of BRFSS alcohol use data (Kanny et al., 2013).

Data Analysis Plan

Survey data was downloaded from SurveyMonkey, transferred to an Excel spreadsheet, and imported into Epi Info for analysis. Epi Info is a free software suite that performs data collection and analysis and supports the generation of tables and graphs (CDC, 2013b). The data was cleaned and reviewed for eligibility requirements, outliers, and missing values. The data was analyzed for sample demographics and the statistical analysis was performed to test the hypotheses. This study was based on the following research questions and hypotheses:

RQ_1. Do U.S. business travelers who travel frequently (> 6 trips per year) have higher odds of EAC than U.S. business travelers who travel infrequently (≤ 6 trips per year)?

$H_0$1: The odds of EAC are the same for frequent U.S. business travelers (> 6 trips per year) compared to infrequent U.S. business travelers (≤ 6 trips per year) when controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, religious preference, and educational level.

H_a1: The odds of EAC are higher for frequent U.S. business travelers (> 6 trips per year) compared to infrequent U.S. business travelers (≤ 6 trips per year) when controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, religious preference, and educational level.

RQ_2. Do U.S. business travelers who travel for short durations (≤ 3 days per trip) have higher odds of EAC than U.S. business travelers who travel for long durations (> 4 days per trip)?

H_02: The odds of EAC are the same for U.S. travelers who travel for short durations (≤ 3 days per trip) compared to U.S. business travelers who travel for longer durations (> 3 days per trip) when controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, religious preference, and educational level.

H_a2: The odds of EAC are higher for U.S. travelers who travel for short durations (≤ 3 days per trip) compared to U.S. business travelers who travel for short durations (> 3 days per trip) when controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, religious preference, and educational level.

RQ_3. Is EAC among U.S. business travelers higher in male-dominated industries, such as construction, mining and armed forces, compared to other job industries?

H_03: The odds of EAC among U.S. business travelers are the same in male-dominated industries, such as construction, mining and armed forces, compared to other job industries when controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, religious preference, and educational level.

H_a3: The odds of EAC among U.S. business travelers is higher in male-dominated industries, such as construction, mining and armed forces, compared to other job industries when controlling for age, gender, race/ethnicity, birthplace, marital status, veteran status, religious preference, and educational level.

Statistical Analysis Methods

Descriptive statistics were used to identify out of range variables and missing data. Univariate statistics were performed to describe sample population characteristics. Chi-square tests were performed to measure proportional differences between the independent variables (frequency of business travel, duration of travel, and job industry) and the dependent variables (EAC). Bivariate logistic regression was used to measure associations between EAC and frequency of travel, duration of travel, and job industry. Multiple logistic regression was used to measure the association of EAC with frequency of travel, duration of travel and job industry while adjusting for the following covariates: age, gender, race/ethnicity, birthplace, marital status, veteran status, smoking status, religious preference, occupation and educational level. Odds ratios are reported.

Threats to Validity

Ultimately, no method of data collection is perfect; therefore, recognition of potential threats to validity is critical. Cross-sectional observational studies allow for collection of real-world data which increases external validity. Web-based questionnaires may eliminate errors in data entry and coding experienced by manual entry.

While this study may have been better suited for natural observation, the lack of randomization may have been a threat to internal validity. Web-based survey distribution posed a threat to external validity in that online respondents may be different than standard survey participants (Crosby et al., 2006). Furthermore, participants may be extreme outliers and self-select due to an interest in the topic (i.e. they may be either drinkers or abstainers who have an interest in alcohol consumption behaviors) or they may practice selective nonparticipation.

Additionally, there exists some concern about the reproducibility of results when using web-based surveys compared to standard surveys. The retest reliability of BRFSS was assessed by Stein, Lederman, & Shea (1993). Researchers administered the telephone-based questionnaire twice, 21 to 44 days apart, to two distinct random samples of adults. Demographics and risk factors were similar for both groups. Results showed that reliability coefficients for behavioral risk factors were greater than .70, except for variables with extreme distributions.

A final threat to external validity was the potential for Hawthorne Effect. The target population with prior knowledge about the research project may have changed their behavior if they anticipated they may be asked to self-report related to alcohol use behaviors. To limit this threat, I used discretion when discussing both the research hypothesis and the public health burden of EAC with potential study participants.

A threat to statistical validity arose from the assumptions to estimate sample size. If the general population estimates of heavy drinking prevalence and binge drinking prevalence were incorrect, this could affect the study power. In addition, statistical assumptions were based on small community-based cross-sectional studies. These studies are sample-specific and assumptions therein may threaten the statistical results of the current study.

Ethical Procedures

I obtained IRB approval prior to data collection. Participants were informed about the research purpose through the consent letter. Participants were also assured their participation was completely voluntary and that their responses were confidential and anonymous. No personally-identifiable information was be collected. As noted in the consent letter, participants had the option to decline participation for any reason. In addition, all data was stored on password-protected computers maintained at the researcher’s residence.

Summary

In summary, I conducted a cross-sectional web-based survey study using quantitative methods. My data collection used convenience and snowball sampling methods. Survey questions included demographics and four BRFSS items related to alcohol use which have been widely accepted as reliable and valid across a large body of research and publications. This chapter described details related to proposed research design, rationale, methodology, and threats to validity.

Chapter 4: Results

Introduction

My purpose in carrying out this quantitative cross-sectional study was to measure the association between EAC and frequency of travel, duration of travel, and job industry among U.S. business travelers. I identified potential participants through my LinkedIn network and sent them an email invitation asking them to complete an anonymous online survey hosted on SurveyMonkey. I used a snowball sampling technique and encouraged participants to forward the survey link to others for whom it might be of interest. I conducted this study to answer the following research questions:

RQ_1: Do U.S. business travelers who travel frequently (> 6 trips per year) have higher odds of EAC than those who travel infrequently (≤ 6 trips per year)?

RQ_2. Do U.S. business travelers who travel for short durations (≤ 3 days per trip) have higher odds of EAC than those who travel for long durations (> 4 days per trip)?

RQ_3. Is EAC among U.S. business travelers positively associated with traditionally male-dominated industries, such as construction, mining and armed forces, compared to other job industries?

In this chapter, I explain my process to collect primary data. I also include a description of the sample population. Finally, I describe my data analysis and including tables.

Data Collection

I received IRB approval to conduct this study on June 4, 2015 (Walden approval number 06-04-15-0194368**)**. I was given 8 weeks to collect data. I contacted potential participants through repeat duplicate invitations. I sent the first invitation to all of my LinkedIn contacts on June 7, 2015. Direct emails were also sent to my personal contacts between June 7 and June 8, 2015. The second duplicative invitations to LinkedIn contacts occurred on June 16, 2015. This attempt also included a post on the researcher's LinkedIn profile page with an invitation to participate and a web link to the survey. I sent the third invitation to LinkedIn contacts, posted on LinkedIn group pages, and emailed to personal contacts on June 21, 2015. The fourth invitation was sent on June 28, 2015. This also included an updated post to the profile page with invitation to participate. A final invitation was sent directly to LinkedIn contacts and the personal profile page was updated with an invitation to participate.

At the end of data collection, my LinkedIn first-degree connections numbered 756 individuals. Due to the nature of LinkedIn account access, it is impossible to know how many individuals actually received the email invitation. Specifically, LinkedIn messages are routed through the email address linked to each account. Since LinkedIn profiles are connected to email accounts, I assumed that my contacts who did not access email did not receive the invitation. LinkedIn provides statistical reports which show how many times a post is viewed. Data revealed the public survey invitation was viewed a total of 332 times. I am not able to determine the number of unique views. Finally, an additional 286 email contacts were directly invited to participate. Some of these were presumed to be duplicate contacts of those on LinkedIn. Because Snowball sampling was used I am not able to ascertain how many times participants referred the survey to additional contacts.

There were a total of 208 survey attempts and 187 of those who completed surveys, which reflects a 90% overall survey completion rate. Response to individual survey items varied. For example, gender and marital status questions up to 9% missing values. Therefore, missing values were replaced for these variables. The variables travel frequency in prior year and travel duration in previous month had more than 25% missing values, so these variables were removed to prevent invalid results.

Measures

I used even measures of alcohol consumption on my survey instrument: average drink amount, binge drinking status, drinking days per month, drinking days per week, heavy drinking status, drink intensity, and weekly drink amount. Due to the relatively large population of female binge drinkers among this sample, female binge drinking was also assessed as a distinct dependent variable. The primary independent variables included frequency of business travel, duration of business travel and job industry. Using logistic regression models, I adjusted for age, birthplace, education, gender, marital status, veteran status, occupation, race/ethnicity, religion. Smoking status was originally proposed as a covariate. However, the final sample did not include enough smokers to appropriately adjust for this variable.

Demographic variables were categorized using nominal and ordinal scales. They included age range (18-34, 35-44, 45-54, and 55 and older), gender (male or female), education (college graduate or less and post graduate or doctoral degree), race/ethnicity (white and non-white), birthplace (North America and non-North America), job industry (health care services and hospitals and other), marital status (married and non-married or other [including divorced, separated, never married, widowed, or member of an unmarried couple]), religion (Catholic; Protestant; and Jewish, none, other, don't know), occupation (health care and non-healthcare) and veteran status (prior military service and no prior military service). Lack of diversity among my sample required that I aggregate potentially non-similar categories for several variables. This may have led to misclassification and could confound results. For example, the college graduate group may be more similar to the post-graduate or doctoral degree group. However, small numbers of individuals with less than a college degree (n = 10) required this delineation for analysis. Likewise, respondents who replied 'Jewish' or 'other' as religion are likely more suited as a distinct category rather than being grouped with 'none' or 'don't know.' However, small sample size required that 'other' religious preference be aggregated with those who responded 'Jewish,' 'none,' 'don't know,' or 'prefer not to answer' for enough cases to conduct proper statistical analysis. This categorization may confound results as a result of misclassification error.

Behavioral variables were dichotomized using nominal and ordinal scales: travel frequency per month (≤ 2 trips and ≥ 3 trips), travel frequency per year (≤ 5 trips and ≥ 6 trips), travel duration in the previous month (≤ 2 days and ≥ 3 days), travel duration in the previous year (≤ 3 days and ≥ 4 days), drinking days per week (≤ 3 and ≥ 4), drinking days per month (≤ 14 and ≥ 15), average number of drinks per day (≤ 2 and ≥ 3), drink intensity (≤ 4 and 5-->8), binge status (binge drinker or non-binge drinker), and number of drinks per week ($\leq$ 3 and $\geq$ 4). I dichotomized travel duration in the previous month ($\leq$ 2 days and $\geq$ 3 days) differently than travel duration in the previous year ($\leq$ 3 days and $\geq$ 4 days) simply due to the number of cases required for proper statistical analysis in the respective categorical groups. There were only eight smokers in this sample which precluded any meaningful analysis of this variable.

Due to variability in random item non-response, missing values were imputed for variables having up to 10% missing responses. I eliminated the variable if more than 25% of responses were missing (Aday & Cornelius, 2006). These are commonly accepted methods for dealing with missing data.

In this chapter, I report on the results and provide summary statistics for each variable. Chi square results from bivariate analyses of each independent variable against each drinking outcome will be shown. I will also present results of logistic regression analyses.

Results

The final sample included 208 attempts (incomplete surveys)and 187 completed surveys, which reflected a 90% overall survey completion rate. The final sample reflected a relatively high overall response rate for those who attempted the survey, but low participation based on the total number of invitations I sent and overall survey access. More specifically, I sent the survey to over 700 LinkedIn contacts but website statistics revealed the request to participate was only viewed 332 times. As mentioned, I also sent the survey to an additional 286 email accounts. It is likely that some of these email contacts were duplicates of my LinkedIn contacts, However, the survey link was only accessed 208 times overall. This demonstrates the challenge in achieving target sample size for random online surveys.

Response rates to individual survey items was random and varied. Non-response was sporadic and did not seem to occur related to any specific question(s). The sample characteristics, such as education, race/ethnicity, and job industry are highly uniform likely due to the recruitment method which relied on personal and professional connections and snowball sampling. The study sample appears to be quite homogenous; for example, 85% of participants were white and 65% of the sample had completed a post graduate or doctoral degree. Therefore, I cannot assume that my sample is representative of the general population.

Missing Values Imputed

To form a complete data set, missing values were imputed for variables with at least 10% missing values. Variables with 25% or more missing values were removed from analysis since analysis of these variables may have yielded invalid results. This approach led to missing value imputation of the independent variables gender and marital status. Data as-reported consisted of 60% female and 40% male respondents. Therefore, missing gender values were imputed as female. There were 74% married participants compared to 26% non-married or other. Therefore, marital status was imputed as ‘married’ The independent variables travel frequency per year and travel duration in previous month were removed from further analyses due to 25% or more missing values.

Descriptive Statistics

Figure 1 shows the distribution of age categories in the sample population. Thirty-five percent of respondents were in the 45-54 age group, 18% in the 18-34 group, 29% in the 35-44 group, and 18% in the 55 and older group. Sixty-seven percent of the sample were female (*n* = 132) and 33% (*n* = 65) were male.

Figure 1. Frequency of Age Categories

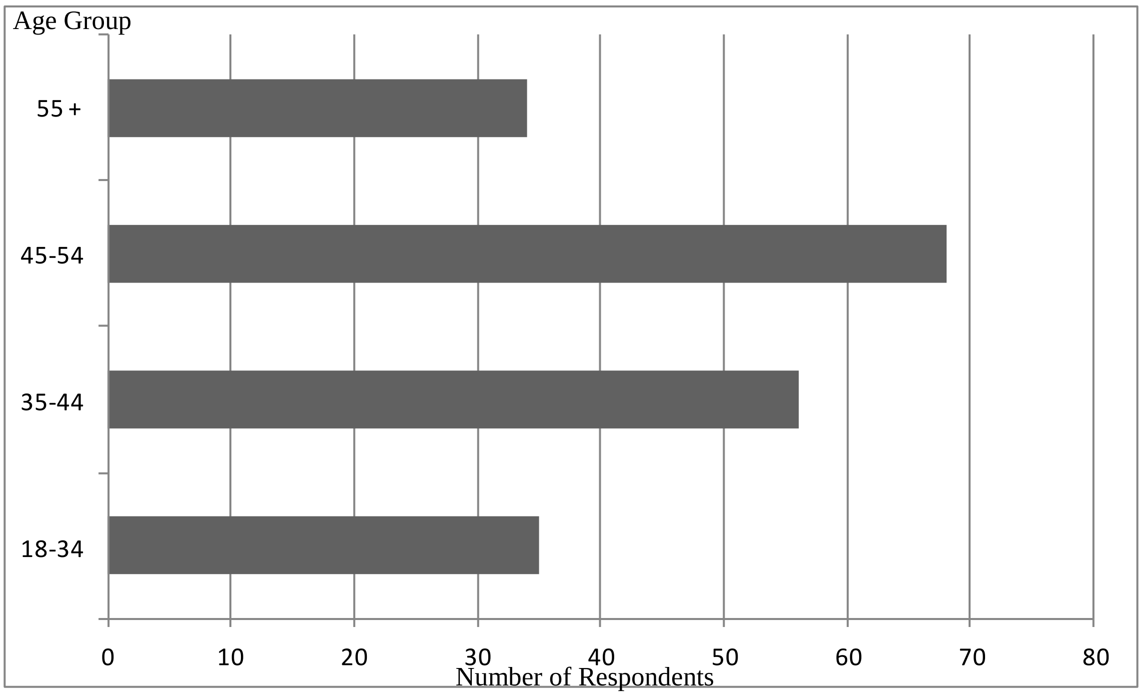

Figure 1. Frequency bar graph of age categories (n = 193) showing 35 participants ages 18-34, 56 participants ages 35-44, 68 participants ages 45-54, and 34 participants ages 55 and older.

The sample was primarily white (85%) compared to non-white (Table 2). Similarly, most respondents (84%) were born in North America versus outside of North America.

Table 2

Race/Ethnicity and Birthplace

Race/Ethnicity (*n* = 194)	Frequency	Percent
White	165	85
Non-White	29	15
Birthplace (*n* = 195)	Frequency	Percent
North America	164	84
Non-North America	31	16

As Table 3 shows, 63% were highly educated as they reported completion of post-graduate or doctoral degree compared to college graduate or less.

Table 3

Educational Status

Education Category (*n* = 195)		
College graduate or less	73	37
Post-graduate or doctoral degree	122	63

Marital status is shown in Table 4. Married respondents comprised 70% of the sample compared to all others (those who were never married, divorced, separated, widowed, or member of an unmarried couple).

Table 4

Marital Status (n = 197)

	Frequency	Percent
Married	138	70
Non-Married/Other	59	30

Religious preference revealed 35% Protestant, 23% Catholic, and 42% Jewish, none, other, don't know, or prefer not to answer (Figure 2).

Figure 2. Frequency of Religious Preference

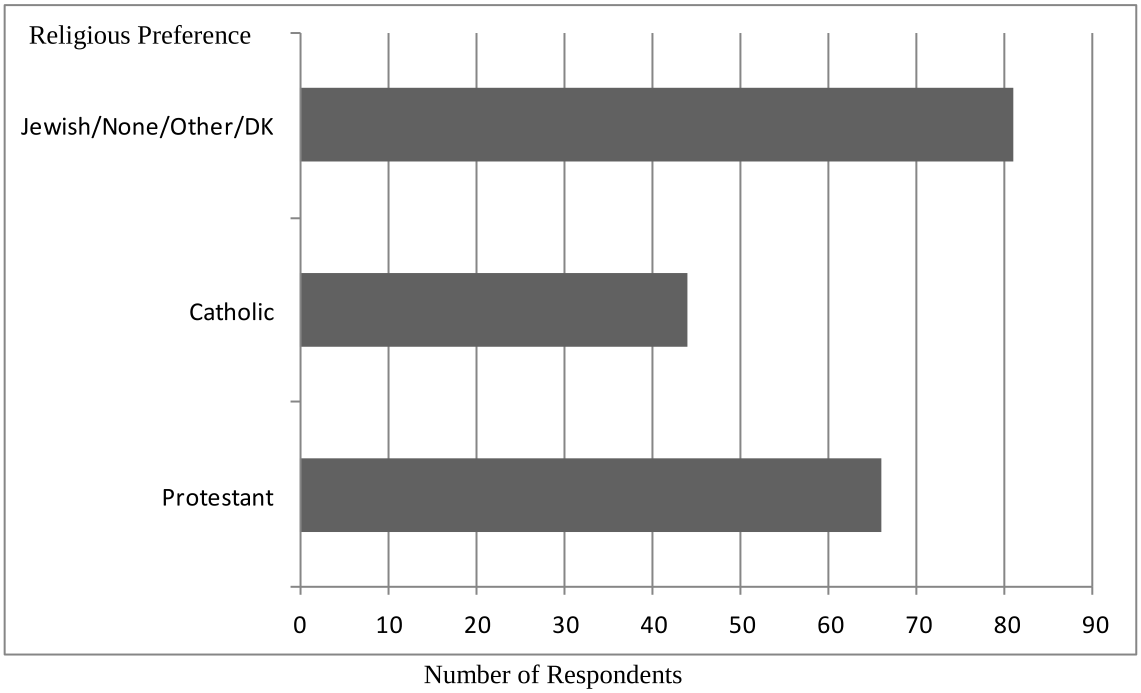

Figure 2. Frequency bar graph of religious preference (n = 191) showing 66 Protestants, 44 Catholic, and 81 Jewish, none, don't know, or other.

Low diversity in this sample prevented the ability to categorize job industry as originally proposed (i.e. male-dominated versus non-male dominated). There were only 15 cases who reported working in traditionally male-dominated industries. Therefore, this variable was dichotomized as healthcare services and hospitals and non-healthcare industries since half of the population fell into either of these categories (Table 5). Similarly, forty percent of the sample reported healthcare as occupation compared to all other non-healthcare occupations.

Table 5

Job Industry and Occupation

Job Industry Category (*n* = 191)	Frequency	Percent
Healthcare Svcs and Hospitals	96	50
Non-Healthcare	95	50
Occupation (*n* = 189)	Frequency	Percent
Healthcare	75	40
Non-Healthcare	114	60

Finally, 14% of respondents reported prior military service (Table 6). There were an insufficient number of veterans to conduct further meaningful analyses of this variable. It should be noted that seven of 197 responses to employment status indicated ‘not employed’ and were excluded from further analyses.

Table 6

Veteran and Employment Status

Veteran Status (*n* = 199)	Frequency	Percent
Yes	27	14
No	172	86
Employment Status (*n* = 197)	Frequency	Percent
Employed	190	96
Not employed	7	4

Participants were asked several behavior-related questions, including travel habits, alcohol consumption and smoking status . Most participants (96%) were non-smokers (Table 7).

Table 7.

Smoking Status (n = 205)

	Frequency	Percent
Yes	8	3.9
No	197	96.1

Figure 3 shows the frequency of travel in the previous month and year. Mean travel frequency per month (n = 191) was 1.87 trips (range: 0 to > 7). When dichotomized, most respondents (69%) traveled up to three times per month compared to four or more. Mean travel frequency per year (n = 128) was 3.81 (range: 0 to > 12). When dichotomized, the vast majority (70%) traveled six or less time per year compared to seven or greater.

Figure 3. Travel Frequency

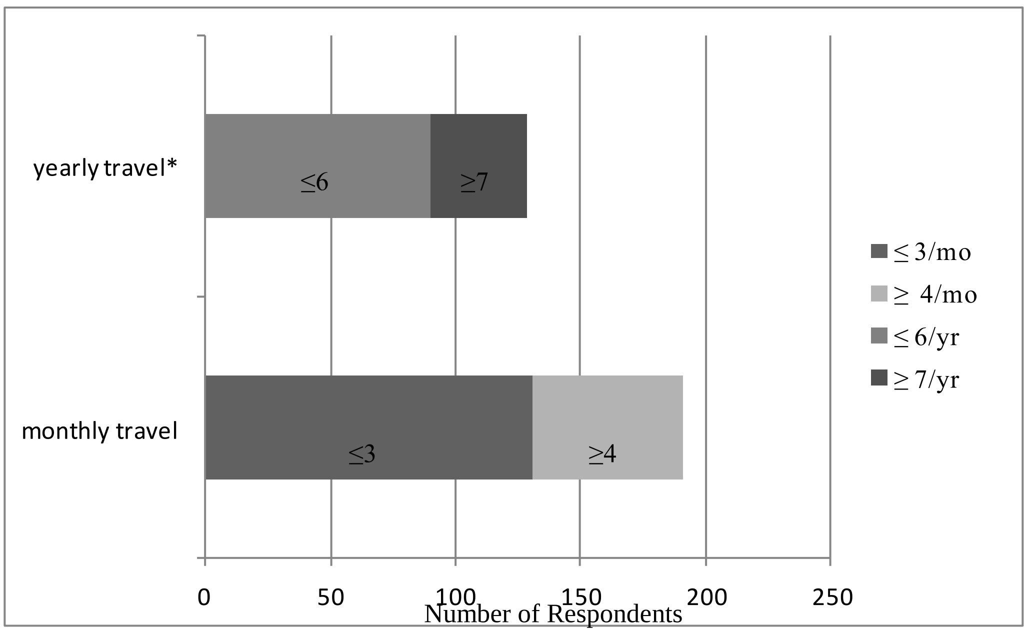

Figure 3. Frequency bar graph of travel frequency. Ninety respondents traveled ≤ 6 times in the previous year while 38 traveled ≥ 7 times. Of those who reported previous monthly travel (n = 191), 131 completed ≤ 3 trips in the prior month while 60 completed ≥ 4 trips in the prior month.
*>25% missing values

Travel duration in the previous month and year are show in Figure 4. Mean travel duration in the previous month (*n* =150) was 2.43 days (range: 1 to > 6). When dichotomized, 57% reported previous month travel duration up to two days, compared to 3 or more. Mean travel duration over the previous year (*n* =167) was similar, at 2.81 days (range: 1 to > 6). When dichotomized, 79% reported previous year travel duration up to three days compared to four or more days.

Figure 4. Travel Duration

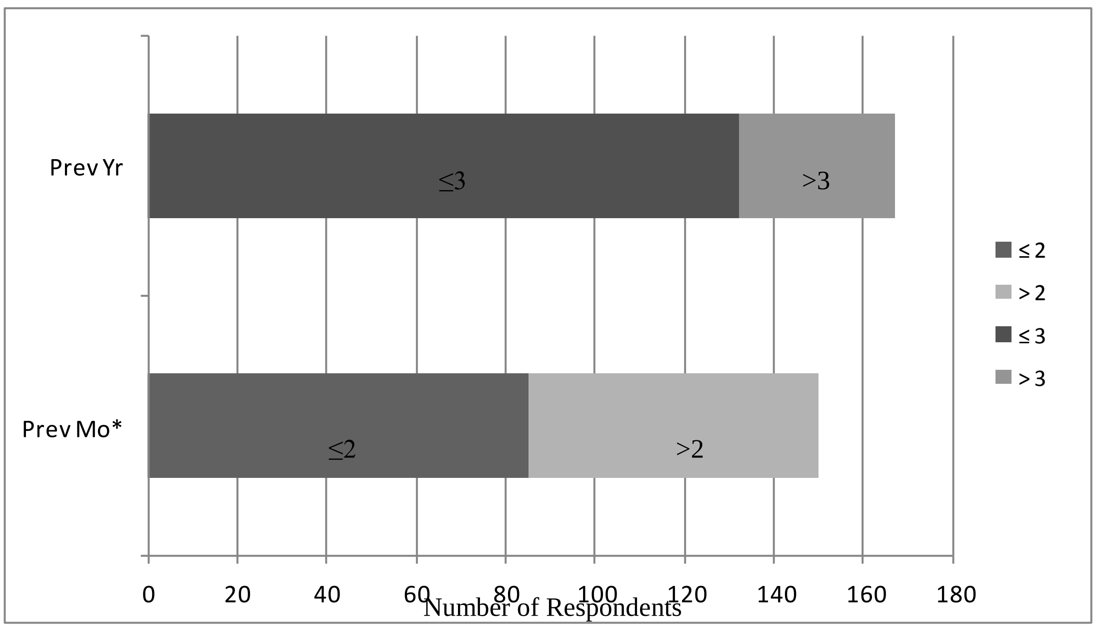

Figure 4. Frequency bar graph of travel duration. Eighty-five participants reported ≤ 2 days per trip in the previous month and 65 reported more than 2 days per trip in the previous month. Of those who reported duration of travel in the previous year (n = 167) 132 reported travel duration ≤ 3 days while 35 reported travel duration greater than 3 days.
*>25% missing values

Regarding alcohol consumption, participants were asked how many days in the past week or previous 30 days they had consumed alcoholic beverages (drink days per week and drink days per month, respectively). This was a deviation as the original proposal defined that drink days per week would be calculated as drinking days in past 30 days divided by four. Drinking days per week and per month are included in Figure 5. Mean drink days per week (n =144) was 2.58 (range: 0 to 7). This variable was dichotomized as ≤ 3 days (66%) and ≥ 4 days (34%). Mean drink days per month (n =114) was 10.15 (range: 1 to 30). This variable was dichotomized to ≤ 14 days (70%) and ≥ 15 days (30%).

Figure 5. Drinking Days Per Week and Per Month

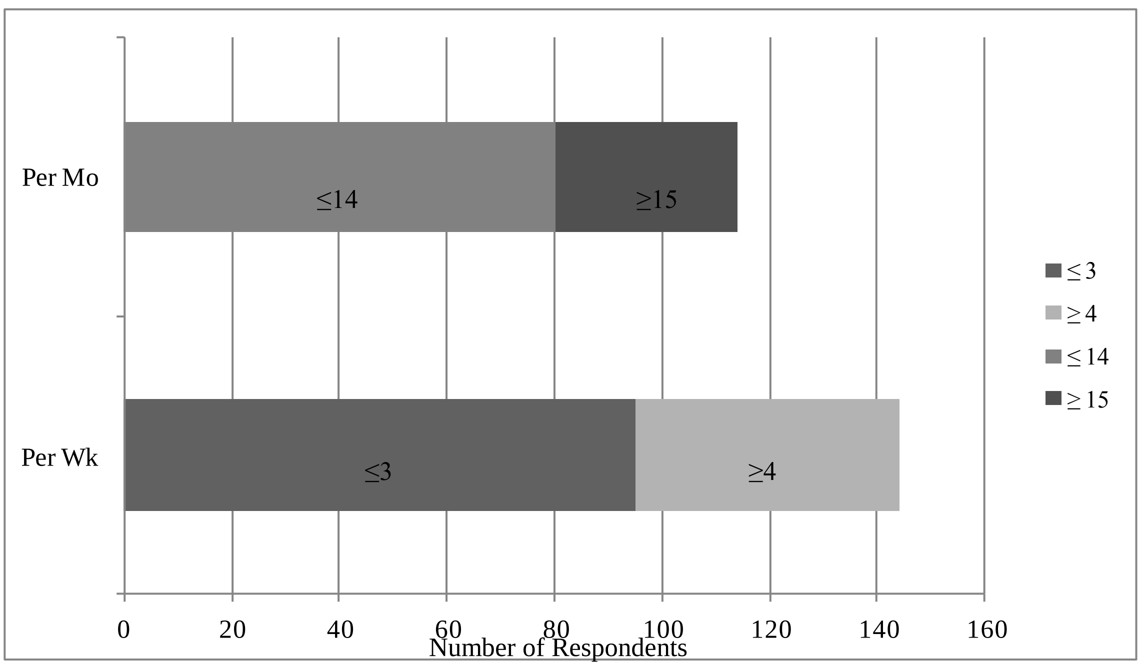

Figure 5. Frequency bar graph of drinking days per week and per month. Ninety-five respondents reported ≤3 drinking days per week while 49 reported ≥4 drinking days per week. Of those who reported previous 30-day drinking history (n = 114), 80 had ≤14 drinking days per month and 34 experienced ≥15 drinking days per month.

Participants were also asked “on days when you drank, about how many drinks did you drink on the average?” (*average daily drink*) (Table 8). The mean average daily drink was 2.78 (range: 2 to > 8). When dichotomized, results showed that 56% consumed an average of two or less daily drinks compared to three or more daily drinks (44%). Weekly drink amount was not directly ascertained but was calculated by multiplying average drink days per week and average drinks per drink day. Mean weekly drink amount was 7.96 drinks (range: 0 to 25). When dichotomized, 73% drank four or more drinks per week compared to 27% who consumed three or less drinks per week.

Table 8

Daily and Weekly Drink Amounts

Avg. daily drinks (*n* = 89)	Mean	Range	Variance	SD
	2.78	2-> 8	1.51	1.23
	Frequency		Percent	
≤ 2	50		56	
≥ 3	39		44	
Weekly drink amount (*n* = 92)	Mean	Range	Variance	SD
	7.96	0 – 25	42.42	6.51
	Frequency		Percent	
≤3	25		27	
≥4	67		73	

Table 9 includes frequency of heavy drinking and drink intensity. Twenty-four percent were classified as heavy drinkers according to standard gender-based definition (15 or more drinks/week [males], eight or more drinks per week [females]). Drink intensity was ascertained by asking "…what is the largest number of drinks you had on any occasion." Mean drink intensity was 3.04 drinks (range: 0 to > 8). This variable was dichotomized and results showed that most of the sample (78%) reported up to four drinks as maximum compared to 22% who were in the five to more than eight drinks group.

Table 9

Heavy Drinking and Drink Intensity

Heavy drinking (*n* = 154)	Frequency		Percent	
Yes	37		24	
No	117		76	
Drink intensity (*n* = 152)	Mean	Range	Variance	SD
	3.04	0-> 8	1.34	2.08
	Frequency		Percent	
≤ 4	119		78	
≥ 5	33		22	

Binge drinking status, which is gender-specific, was determined by asking males how many times they had consumed five or more drinks on one occasion and by asking females how many times they had consumed four or more drinks on one occasion. Overall prevalence of binge drinking was 36% (Table 10). Females comprised the majority of binge drinkers in this sample, at 63%.

Table 10

Binge Drinking (n = 159)

	Frequency	Percent
Yes	57	36
No	102	64

Chi-Square Results

Bivariate associations between sample characteristics and measures of alcohol consumption were assessed using chi-square tests of independence. Reverse step elimination was performed using p value .15 or less for selection (Dallal, 2012). Multiple logistic regression models were used to obtain adjusted odds ratios (*ORs*) and 95% confidence intervals (*CIs*) for seven measures of alcohol consumption: average drink amount, binge drinking, drinking days per week, drinking days per month, heavy drinking, drink intensity and weekly drink amount. Female binge drinking was also assessed individually against each independent variable. There were too few cases of male binge drinkers to perform similar tests on this subpopulation. In addition, the sample had insufficient cases of smokers to measure the association of this variable against outcomes. All analyses were conducted using *EpiInfo™7.*

Contingency tables were run for each independent variable against each measure of alcohol consumption. A full list of contingency tables can be found in Appendix C. Results that were significant ($p < .05$) or approached significance ($p \leq .15$) in bivariate analyses were selected for confirmation with multiple logistic regression analysis. Selected results, for variables used in final regression models (those with $p \leq .15$) follow. These include binge drinking with trip frequency per month, marital status, age, and religious preference (Table 11); female binge drinking with age and trip frequency per month (Table 12); heavy drinking with religious preference, marital status, and gender (Table 13); average drink amount with age, gender and religious preference (Table 14); drinking days per week with marital status and drinking days per month with religious preference (Table 15); drink intensity with age and religious preference (Table 16); and weekly drink amount with religious preference (Table 17).

Table 11.

Bivariate Results: Binge Drinking Contingency Table

Characteristic	Status		Chi-square (corrected)
	Binge Drinking		
	No	Yes	
Trip Frequency/mo.			
≤ 3	55	41	X^2 = 3.1997
≥ 4	41	15	*p* = .0737
Marital status			
Married	80	33	X^2 =7.7332
Non-married/other	20	24	*p* = .0054
Age category			
18-34	8	17	X^2 =14.7227
35-44	32	16	*df* = 3
45-54	37	17	*p* = .0021
55 and older	22	5	
Religious preference			
Catholic	20	16	X^2 =4.4229
Protestant	37	12	*df* = 2
Jewish,/None/Other/DK	41	25	*p* = .1207

Table 12

Bivariate Results: Female Binge Drinking Contingency Table

	Female binge status		
	No	Yes	
Age category			
18-34	8	17	$X^2 = 11.0245$
35-44	32	16	$df = 3$
45-54	37	17	$P = .0116$
55 and older	22	5	
Trip Frequency/mo.			
≤ 3	34	28	$X^2 = 3.5791$
≥ 4	24	7	$p = .0585$

Table 13

Bivariate Results: Heavy Drinking Contingency Table

	Heavy drinker		
	No	Yes	
Religious preference			
Catholic	25	10	X^2 = 4.6923
Protestant	41	6	*df* = 2
Jewish/None/Other/DK	44	18	*p* = .0957
Marital status			
Married	85	22	X^2 = 3.0502
Non-married/other	27	15	*p* = .0807
Gender			
Female	62	27	X^2 = 3.0737
Male	51	10	*p* = .0796

Table 14

Bivariate Results: Average Drink Amount Contingency Table

	Average drink amount		
	Low	High	
Gender			
Female	35	19	$X^2 = 3.3149$
Male	15	20	$p = .0687$
Age category			
18-34	11	11	$X^2 = 5.7797$
35-44	13	13	$df = 3$
45-54	18	12	$p = .1228$
55 and older	7	3	
Religious category			$X^2 = 3.8047$
Catholic	13	11	$df = 2$
Protestant	13	8	$p = .1492$
Jewish/None/Other/DK	21	17	

Table 15

Bivariate Results: Drink Days/Week and Drink Days/Month Contingency Tables

	Drink days per week		
	≤ 3	≥ 4	
Marital status			
Married	71	31	$X^{2 =}$ 2.3223
Non-married	22	18	p = .1267

	Drink days per month		
	≤ 14	≥ 15	
Religious preference			
Catholic	21	9	X^2 = 3.8254
Protestant	29	7	df = 2
Jewish/None/Other/DK	27	15	P = .1477

Table 16

Bivariate Results: Drink Intensity Contingency Table

	Drink intensity		
	≤ 4	≥ 5	
Age category			
18-34	14	8	
35-44	34	15	$X^2 = 10.0758$
45-54	46	7	$df = 3$
55 and older	22	3	$P = .0179$
Religious preference			
Catholic	26	10	$X^2 = 4.5028$
Protestant	42	5	$df = 2$
Jewish/None/Other/DK	49	14	$P = .1053$

Table 17

Bivariate Results: Weekly Drink Amount Contingency Table

	Weekly drink amount ≤ 3	≥ 4	
Religious preference			
Catholic	4	19	$X^2 = 4.6358$
Protestant	7	15	$df = 2$
Jewish/None/Other/DK	12	29	$P = .0985$

Low sample diversity with respect to job industry prevented the ability to address the third research question: “are the odds of EAC higher among U.S. business travelers in male-dominated industries?” There were only 15 cases who reported working in traditionally male-dominated industries. Therefore, an exploratory analysis of job industry category was performed with the variable dichotomized as healthcare services and hospitals compared to non-healthcare industry. It was decided to categorize as such based on the large proportion (50%) of respondents who fell into the two categories of healthcare services and hospitals compared to the other 29 industry categories represented. No significant associations were found.

Multiple Logistic Regression Results

Logistic regression was then performed using p value of $\leq .15$ for selection. Multiple logistic regression models were used to obtain adjusted odds ratios (*ORs*) and 95% confidence intervals (*CIs*) for measures of alcohol consumption. Binge drinking risk was adjusted for age, religious preference, travel frequency in prior month, and marital status. Results revealed that the odds of binge drinking were 67% lower in the 45-54 age group ($OR = .33$, $p = .0465$) compared to the 18-34 age group; and 87% lower in the 55 and older age group ($OR = .13$, $p = .0057$) compared to the 18-34 age group (Table 18). Religious preference, travel frequency in previous month, and marital status were not statistically significant predictors of binge drinking.

Table 18

Age Group a Predictor of Binge Drinking

Characteristic (n = 143)	*OR*	95% *CI*	*p*
Age category			
18-34	REF	N/A	
35-44	0.3196	0.0953 – 1.0716	0.0646
45-54	0.330*	0.1108 – 0.9829	0.0465
55 and older	0.1287**	0.0301 – 0.5511	0.0057
Religious preference			
Catholic	REF	N/A	
Protestant	0.4175	0.1478 – 1.1796	0.0993
None/other	0.7275	0.2965 – 1.7846	0.4871
Travel Freq (mo.)			
≤ 3	REF	N/A	
≥ 4	0.5073	0.2290 – 1.1238	0.0945
Marital status			
Married	REF		
Non-married	1.8873	0.7565 – 4.7083	0.1733

*p < .05, **p < .01

Logistic regression of age and travel frequency in prior month in relation to female binge drinking showed that females age 55 and older were 97% less likely to binge drink (*OR* = .03, *p* = .0057) than those ages 18-34 (Table 19). Females who were high frequency travelers per month were 66% less likely to binge drink (*OR* = .34, *p* = .474) than low frequency travelers.

Table 19

Age Group and Monthly Travel Frequency Predictors of Female Binge Drinking

Characteristic (*n* = 96)	*OR*	95% *CI*	*p*
Age category			
18-34	REF	N/A	
35-44	0.2669	0.0624 – 1.1424	0.0750
45-54	0.3680	0.0881 – 1.5376	0.1706
55 and older	0.0343**	0.0032 – 0.3740	0.0057
Travel Freq (mo.)			
≤ 3	REF	N/A	
≥ 4	0.3401*	0.1171 – 0.9876	0.0474

*p < .05, **p < .01

When average drink amount was regressed against age, religious preference, and gender, no variable was found to be a significant predictor (Table 20).

Table 20

Age, Religious Preference, and Gender Predictors for Average Drink Amount

Characteristic (*n* = 143)	*OR*	95% *CI*	*p*
Age category			
18-34	REF	N/A	
35-44	0.8509	0.2419 – 2.9924	0.8013
45-54	0.6024	0.1870 – 1.9408	0.3958
55 and older	0.2191	0.0351 – 1.3692	0.1044
Religious preference			
Catholic	REF	N/A	
Protestant	0.7948	0.2322 – 2.7207	0.7145
Jewish/None/DK/other	1.0569	0.3614 – 3.0912	0.9195
Gender			
Female	REF	N/A	
Male	2.0564	0.7950 – 5.3193	0.1371

Gender approached an association with heavy drinking in bivariate analysis and remained significant when adjusted for religious preference and marital status (Table 21). Males had 66% fewer odds of heavy drinking than females in this sample (*OR* = .34, *p* = .0196). Protestant religion showed almost 70% lower odds of heavy drinking (*OR* = .31, *p* = .0474) as compared to Catholics. There was no significant difference in odds of heavy drinking among those who were married compared to non-married when adjusted for religious preference and gender.

Table 21

Gender and Religious Preference Predictors of Heavy Drinking

Characteristic (*n* = 143)	*OR*	95% *CI*	*p*
Religious preference			
Catholic	REF	N/A	
Protestant	0.3065*	0.0953 – 0.9865	0.0474
Jewish/None/DK/other	0.9084	0.3515 – 2.3476	0.8429
Marital status			
Married	REF		
Non-married	1.9472	0.8136 – 4.6601	0.1345
Gender		N/A	-
Female	REF		
Male	0.3405*	0.1378 – 0.8414	0.0196

*p < .05

As shown in Table 22, neither religious preference nor age category showed significant difference in odds of high drink intensity.

Table 22

Age and Religious Preference Predictors of High Intensity Drinking

Characteristic (*n* = 143)	*OR*	95% *CI*	*p*
Age category			
18-34	REF	N/A	
35-44	1.0282	0.3199 – 3.3044	0.9628
45-54	0.4012	0.1134 – 1.4197	0.1567
55 and older	0.2335	0.0405 – 1.3446	0.1034
Religious preference			
Catholic	REF	N/A	
Protestant	0.3760	0.1120 – 1.2616	0.1133
None/other	0.7271	0.2732 – 1.9354	0.5235

Travel Frequency and Travel Duration Merged as One Variable

As previously discussed, Burkholder et al. (2010) conducted a study using travel frequency and duration as a combined variable. To determine if any associations would arise from a merged travel variable, a final data analysis was conducted. A new binary variable was defined as low travel: ≤ six trips per year and ≥ four days' duration or high travel: ≥ seven trips per year and ≤ three days duration. Due to sample size, thresholds for the categories in the current study differ from Burkholder's approach which dichotomized the variable as: up to 6 trips per year and more than five or more days per trip versus six or more trips per year and five or fewer days per trip. Missing values imputation (consistent with method two) was used for analysis of this additional variable. When merged as one variable (*n* = 47) there were 60% high frequency/short duration travelers and to 40% low frequency/long duration travelers. Unfortunately, small sample size led to sparse cell count and indeterminate chi-square results.

Summary

This study sought to determine predictors of EAC among U.S. business travelers. Missing values were imputed for two independent variables (gender and marital status). There was an attempt to assess an additional exploratory variable which treated travel frequency and duration as one merged variable.

Results showed age groups 45 to 54 and 55 and older had significantly lower odds of binge drinking (67% and 87%, respectively) compared to those ages 18 to 34. However, this was only significant for the 55 and older age group with respect to female binge drinking, but at much lower odds (97% decreased odds compared to ages 18-34).

Male gender and Protestant religion were negative predictors for heavy drinking (66% and 69% lower odds, respectively). These findings support null hypotheses one: the odds of EAC are not higher for frequent U.S. business travelers compared to infrequent travelers when controlling for confounders; and null hypothesis two: the odds of EAC are not higher for short-duration U.S. business travelers when controlling for covariates. Low job industry diversity in this sample precluded the ability to answer research question three: are the odds of EAC higher in male dominated industries. Therefore, no conclusion can be made about this hypothesis. Further curiosity led to an additional data analysis, whereby travel frequency and travel duration were merged as one categorical variable. Small sample size prevented valid bivariate analysis of this independent variable with outcome measures.

Small sample size and random item non-response posed challenges for data analysis. Of the primary independent variables studied, only one (travel frequency in the previous month) was found to be a predictor of any measure of EAC (specifically, female binge drinking) in final logistic regression models. However, the study hypothesis was based on travel frequency per year; therefore, results cannot be said to support the alternative hypothesis. Analyses of covariates historically reported in association with alcohol revealed age, gender, religious preference as predictors of EAC in this sample. Finally, an attempt to measure travel frequency and duration as a merged variable against measures of EAC was unsuccessful due to small sample size.

In addition to data analysis findings, the results of this study provide important lessons related to challenges of survey design and data collection using convenience snowball sampling. In Chapter 5, I provide a discussion and interpretation of my research findings including synthesis with previous research findings. I also present implications for social change.

Chapter 5: Discussion, Conclusions, and Recommendations

Discussion

The purpose of this study was to measure the association between EAC with travel characteristics and job industry. Based on my review of literature, I set out to answer the following research questions: do frequent business travelers who travel frequently have higher odds of EAC?; do short-duration business travelers have higher odds of EAC?; and is EAC among U.S. business travelers positively associated with traditionally male-dominated industries?

I collected primary data from an anonymous online survey over a period of eight weeks and 187 responses were collected (90% response rate). Data analysis was conducted using missing values imputation and included descriptive statistics, bivariate measures of association and multiple logistic regression. While I found no evidence to support any of the three alternate hypotheses, several significant associations were found between EAC and the independent variables. I set a significance threshold ($p \leq .15$) for variable inclusion in logistic regression models. Chi-square tests for independence met significance for average drink amount with gender, age, and religious preference, drinking days per month and religious preference, drinking days per week and marital status, heavy drinking with gender, marital status, and religious preference, drinking intensity with age and religious preference, weekly drink amount with religious preference, binge drinking with marital status, monthly trip frequency, age, and religious preference, and female binge drinking with monthly travel frequency and age.

Results from logistic regression analyses, indicate that respondents in age groups 45-54 and 55 and older had lower odds of binge drinking compared to those in age group 18-34 when adjusted for marital status, religious preference, and travel frequency in prior month. Among females, respondents who were 55 and older had lower odds of binge drinking compared to those ages 18-34 when adjusted for travel frequency in prior month. Both Protestants (compared to Catholics) and males (compared to females) had lower odds of heavy drinking.

Interpretation

Although travel frequency, travel duration, and job industry had been previously studied in association with EAC (Burkholder et al., 2010; Cunradi et al., 2014; Gimeno et al., 2009; Joyce et al., 2013; Kerr-Corrêa et al., 2008), my research did not reveal any single study that considered these variables together. I sought to identify predictors of EAC among U.S. business travelers. Three main research questions guided this research study:

RQ1: Do U.S. business travelers who travel frequently (> 6 trips per year) have higher odds of EAC than those who travel infrequently (≤ 6 trips per year)?

RQ2: Do U.S. business travelers who travel for short durations (≤ 3 days per trip) have higher odds of EAC that those who travel for long durations (> 3 days per trip)?

RQ3: Is EAC among U.S. business travelers positively associated with traditionally male-dominated industries, such as construction, mining and armed forces, compared to other job industries?

In this discussion, I will review findings from my research study of U.S. business travelers. I will present these findings within the context of trends revealed in my literature review. I will use my findings to suggest recommendations and address implications for social change.

Descriptive statistics showed that the sample was not highly diverse. For example, there were 67% females, 63% with a post-graduate or doctorate degree and 85% white race. Employment characteristics were also not highly varied; 41% of respondents worked in health care occupations, and 50% worked in the health care services and hospital industry. Similar educational and employment characteristics in the study sample prevent generalizability of results (Barnes & Zimmerman, 2013; Biron et al., 2011; Cunradi et al., 2014; Karlamangla et al., 2006). This is due to reports that have shown job industry, occupation and educational level are associated with EAC.

This study used several measures of EAC. I found a higher prevalence of binge drinking (36%) among my respondents than that found by the CDC (2012b), which reported 17% prevalence of binge drinking among U.S. adults in 2010. Prevalence of heavy drinking (24%) was also much higher in this sample compared to 5% reported from NHIS data for 2008-2010 (Adams & Schoenborn, 2006). Respondents' average number of drinks per day (2.8) was nearly double the 1.5 average daily drinks reported from a NLSY79 sample, which is generally accepted to be a nationally representative sample (Barnes & Zimmerman, 2013). Drinking days per month was also much higher in my sample (10.2 days) compared to 4.9 days reported also reported by Barnes et al. (2013). Weekly drink amount (7.96 drinks) was also higher in this sample than reported by Klunge et al. (2014). The Klunge study sample was obtained from travel clinic patients and not believed to be a nationally representative sample

These results show that, overall, my sample demonstrated higher prevalence and frequency of EAC than previous general population and subpopulation estimates. These trends may be expected due to unique characteristics of my sample population which have been shown to be associated with EAC. Previous researchers identified a positive relationship between drinking prevalence and higher educational level (Adams & Schoenborn, 2006). While annual income data was not collected in the current study, educational level may serve as a proxy for income level (Karlamangla et al., 2006). My findings are consistent with previous reports that have shown EAC is more prevalent at higher income levels (Adams & Schoenborn, 2006; Kanny et al., 2013). Furthermore, Schoenborn reported that whites, which comprised 85% of this sample, have higher prevalence, frequency, and intensity of drinking compared to blacks although minorities may suffer worse health outcomes due to EAC (Chartier et al., 2010; Kanny et al., 2013; Yuan et al., 2010). So, while more advantaged populations may have higher prevalence of EAC, data suggest less advantaged populations suffer disproportionately.

A surprising finding in the current study was the prevalence of EAC among females. CDC (2012b) researchers have found that males generally tend to have higher prevalence, frequency, and intensity of drinking than females. Specifically, the CDC reported that 23.2% of men were binge drinkers compared to 11.4% of women. This is in stark contrast to my study findings, which showed that 38% of females were binge drinkers. My findings suggest that female drinking may be influenced by workplace participation, as Cunradi (2014) reported. Similarly, Kerr-Correa et al. (2008) found that female drinking patterns begin to resemble male drinking patterns as social roles between the genders become more similar. This may be due to a variety of phenomena such as stress coping mechanisms, desire for social belonging, or acculturation. These findings are also consistent with research conducted by Ahern et al. (2008) that found drinking norms were more strongly associated with binge drinking for females compared to males.

The relationship between travel frequency in the previous year and EAC was not statistically significant. This supports the first null hypothesis which stated that the odds of EAC are not higher for frequent travelers. Results of bivariate analysis of travel frequency in the previous month and binge drinking supported the inclusion of this variable in logistic regression modeling; however, no significant association remained when adjusted for marital status, age, and religious preference (p = .0945).

While travel frequency in the previous year was not significant with EAC, travel frequency in the previous month was associated with 66% lower odds of binge drinking among females. I found no statistically significant association between travel duration in previous month or year any measure of EAC. This finding supports my second null hypothesis which stated that the odds of EAC are not higher for those who travel for short durations.

Burkholder et al. (2010) found that high frequency/low duration international business travelers were 1.6 times more likely to drink over the limit. High travel frequency/duration was defined by Burkholder as more than six international trips per yer and less than five days per trip. Drinking over the limit was defined as more than two drinks per day for men and more than one drink per day for women. These criteria meet the commonly accepted definition of heavy drinking. As I previously noted, travel frequency and travel duration were merged as one variable. The limited association between travel frequency and EAC in the current study and the lack of association between travel duration and any measure of EAC are difficult to reconcile in light of Burkholder's findings. Differences in the demographic composition of the respective samples, especially with respect to gender, should be noted. Females comprised a clear majority (67%) of respondents in my sample, whereas, they comprised 45% of the sample in Burkholder's (2010) study. Other variables such as age, marital status, and race were similar between the two studies. Additional variables collected in this study, including religious preference, education, job industry, and occupation were not reported in Burkholder's study. Likewise, several measures of individual health, such as blood pressure, cholesterol, physical activity, and back pain, were assessed in Burkholder's study but were not included in the current study. In an attempt to replicate Burkholder's findings I conducted an exploratory analysis in which travel frequency and duration were combined as one variable. I found no association between the merged travel variable and EAC. Possible explanations for a lack of association include arbitrary thresholds of high- and low- frequency of travel, and short- and long-duration of travel. In addition, this analysis did not account for additional travel-related factors such as purpose of the travel, work demands before and after travel, solo or group travel, time of year (i.e., holiday versus regular), distance from primary residence, and destination (i.e., resort location or conference center). These and other travel characteristics should be explored further in association with EAC.

Job industry was not assessed due to low response rate from respondents working in traditionally male-dominated industries. Therefore, I did not test my third research question, which examined whether EAC is positively associated with traditionally male-dominated industries. Instead, I dichotomized the job industry variable (as health care services and hospitals and non-health care) in order to conduct an exploratory analysis. I found no association between the variable as categorized and any measure of EAC.

Chi-square tests of independence revealed associations between several covariates previously described as related to EAC. Male gender met my threshold definition for inclusion ($p \leq .15$) in logistic regression analysis for both higher average drink amount and heavy drinking. Age was associated with average drink amount, drink intensity, overall binge drinking, and female binge drinking. These associations are consistent with other researchers' findings (Azagba & Sharaf, 2011; Centers for Disease Control and Prevention, 2012b; Marchand et al., 2011; Morleo et al., 2011). However, the prevalence of both binge drinking and heavy drinking in this sample was greater among females. This unexpected finding will be discussed later.

Religious preference was found to be independently associated with average drink amount, drink days per month, heavy drinking, drink intensity, weekly drink amount, and binge drinking. While variations in alcohol consumption have been reported, current findings are somewhat difficult to interpret as this variable was highly collapsed. Specifically, low cases of *Jewish, none, other*, *don't know*, or *prefer not to answer* required these categories to be grouped as one for proper statistical analysis. This grouping may have resulted in a misclassification error and could confound results. Caution should be used before making broader conclusions.

Chi-square test results also showed that marital status was significantly associated with drink days per week, heavy drinking, and binge drinking. These findings are consistent with cross-sectional research by Azagba et al. (2011) that showed that married individuals consume less alcohol than single or separated individuals. In addition, Karlamangla et al. (2006) showed that longitudinal effects of being married reduced rates of heavy drinking. This variable was then analyzed using logistic regression.

Logistic regression analyses were performed for variables that met the threshold for chi-square significance ($p \leq .15$) for selection as previously described. These results identified statistically significant predictors of binge drinking, female binge drinking, and heavy drinking. When adjusted for religious preference, travel frequency in previous month, and marital status, age remained a significant predictor of binge drinking. Respondents aged 55 and older had the lowest odds of binge drinking (*OR* = .13, *p* = .0057), which is 87% lower than that of respondents in the 18-34-year-old group. Age group 45-54 also had significantly lower odds of binge drinking (*OR* = .33, *p* = .0465), 67% lower than those in the 18-34 year old group. Similarly, females ages 55 and older had significantly lower odds of binge drinking (*OR* =.03, 95% *CI* [.08, .37], *p* = .0057), 97% lower than 18-34 year old females. Many researchers have reported that as age increased, EAC decreased (Adams & Schoenborn, 2006; Kanny et al., 2013;

Karlamangla et al., 2006). The inverse relationship between age and EAC also held true for both males and females in my study.

Among females, high travel frequency in the previous month was found to reduce the odds of binge drinking by 66% compared to low travel frequency in previous month (*OR* =.34, *p* = .0474). I did not find a similar association between travel frequency and male gender. In addition, when adjusted for religious preference and marital status, odds of heavy drinking were 66% lower for males compared to females (*OR* =.34, *p* = .0196). This study did not provide clues as to the nature of these findings and it would be interesting to understand contributory factors. Perhaps, females view business travel as an escape from the daily home and family demands and use the opportunity to indulge in drinking. Alternatively, female business travelers may experience undue work-related stress and use alcohol as a means to cope (Marchand et al., 2003). These concepts should be explored further.

Respondents who identified as Protestant had a significantly lower odds of heavy drinking (*OR* = .31, *p* = .0474), almost 70% lower than Catholics. While religion has been reported to be associated with alcohol consumption (Abu-Ras, Ahmed, & Arfken, 2010; Gimeno et al., 2009; Kerr-Corrêa et al., 2008), the findings from my study should be applied cautiously as this category contained extremely heterogeneous cases which may have led to misclassification bias. Misclassification bias occurs when there is an error in classifying exposure. For example, low response rates in my data set required that I group all respondents who were Jewish, other, don't know, or prefer not to answer into one category. It is reasonable to presume that an affirmative religious affiliation (i.e.

Jewish or other) might be highly different than 'none' and may confound results. Therefore, the group may be misclassified due to the heterogeneity of religious preference characteristics.

As mentioned, the primary independent variables under investigation (travel frequency in previous year and travel duration) showed no association with any measure of EAC. Job industry as a predictor of EAC was not tested as proposed. Education and occupation were also not associated with any measure of EAC in this study. Birthplace and smoking status variables contained too few cases to appropriately analyze. Veteran status and race were not associated with binge drinking (p = .944 and p = .8108, respectively) and were too sparse to be assessed against any other measures of alcohol consumption.

My findings showing no statistically significant associations between some variables in this study may be attributed, in part, to low sample size and a homogeneous sample population that required many variables to contain diverse and potentially dissimilar categories. This may confound results. For example, the lower educational level group of 'college degree or less' included a potentially dissimilar cases such as those with some high school education and high school graduates along with college graduates. A larger sample size with more variety in educational level may have supported a more appropriate delineation within the lower educational level group, such as 'college graduate', 'attended some college', or 'high school graduate.' Low response rates and similar sample characteristics forced me to split the educational level between college graduate and post-graduate. Again, my small number of respondents (n = 10) having less than a college degree prevented this approach. Similarly, the race category was also very broad, grouped as white and non-white. This was due to low racial diversity in the final sample and an insufficient number of non-white cases to evaluate other individual sub-categories of race. Again, grouping of heterogeneous characteristics may lead to confounding.

Limitations

My study had several limitations. My use of a convenience sample and snowball sampling may have resulted in self-selection bias and recall bias. For example, I received replies to my survey invitation from potential participants who questioned their eligibility saying “I am not a drinker” or “I don’t travel much.” This may have been attributed to the title of study which may have been erroneously perceived to include only excessive drinkers or frequent travelers. The potentially sensitive nature of self-reported alcohol use was subject to underreporting bias.

This was a highly uniform study sample which prohibits generalization of findings. Sample uniformity also prevented the ability to categorize variables as originally proposed and; thus, was an impediment to formal hypothesis testing. Small sample size required that categorical variables were collapsed into broad categories which may have cofounded results. Likewise, while nominal and ordinal variable categories were proposed based on existing literature, small sample size dictated final category definitions which may have masked interval differences between values. Results only support conclusions regarding associations and risks.

Due to the cross-sectional nature of the study, I was unable to draw conclusions regarding causality. In addition, other variables known to be associated with drinking were not assessed, including workplace stress, workplace drinking norms, annual income, geographic location, non-work-related stress, and travel destination. These factors were purposely omitted to limit the number of survey items and increase likelihood of survey participation. Temporal factors, specifically the summer time period of data collection, may have biased travel-related response items. Finally, results from this study were not intended to shed any light onto alcohol addiction or clinical measures of alcohol dependence.

Recommendations

The results of this study do not support any of the three research hypotheses. The odds of EAC were not higher for U.S. business travelers who completed more than six trips per year or for those who averaged three or less nights per trip. The odds of EAC and male-dominated industry were not tested. Therefore, recommendations are based on significant non-hypothesized findings from this study which were synthesized with the literature review. Based on low sample size and populations uniformity in the current study, additional, more diverse, sample populations should be explored. Additional travel-related variables which may influence alcohol consumption should be considered, such as travel destination, purpose of business trip, and traveling alone or with a group. The high overall prevalence and frequency of EAC among this sample, especially females, implore additional investigation into contributory factors.

Regarding study design, I recommend to perform an observational study to collect natural behaviors as opposed to self-report. With respect to data analysis, it would be optimal to categorize variables into more similar groups. This is, as previously noted, heavily dependent on sample size and balanced distribution of sample characteristics.

Implications for Social Change

To influence social change, multilevel interventions should be targeted toward groups found to have higher odds of EAC in this study. Specifically, programs to reduce binge drinking should be directed toward individuals ages 34 and under. Among females in particular, binge drinking reduction programs should target women who travel infrequently each month. Based on results from this study, intervention efforts to reduce heavy drinking should be aimed at females and Catholics.

Excessive alcohol consumption is one of the four main health behaviors responsible for the majority of chronic diseases (Centers for Disease Control and Prevention, 2012b). EAC negatively impacts individual health, public safety, and workplace quality and performance. And results of this study, showing high prevalence of EAC among females in particular, may indicate disproportionate adverse health outcomes for this subpopulation. Short term effects of EAC, such as injuries, violence, risky sexual behavior, miscarriage, and stillbirth may make females especially vulnerable to health inequities. Long-term consequences of EAC include neurologic effects, cardiovascular problems, psychiatric issues, social problems, certain cancers, liver disease, and gastrointestinal problems. This highlights the need for multilevel interventions targeted toward reducing alcohol consumption among business travelers, in general. While my study did not provide evidence to support any specific approach, several intervention measures may be of value. Adjusting workplace norms so that business gatherings occur at venues other than the hotel bar (e.g. group fitness class or live theatre) may promote healthier choices. Specific guidelines which define workplace expectations during travel can set boundaries where blurred lines between business and personal time may exist. Modification of policies to limit ease of availability, such as either restricting the dollar or volume which can be expensed, or prohibiting alcohol expense reimbursement altogether may deter excessive consumption. Removing hotel mini bars would also eliminate convenient in-room access to alcohol. However, this would likely be met with resistance by hotel industry leaders due to potential loss of revenue. Additional interventions aimed at alcohol establishments may include responsible service training to identify excessive consumption and avoid over- service. In addition, evidence supports the effectiveness of holding commercial hosts responsible for alcohol-related harms (i.e. dram shop liability enforcement) to reduce alcohol-related harms (Community Preventive Services Task Force, 2014). Combined, these actions can also serve to support HP 2020 goals related to reducing alcohol-related harms particularly among similar populations (i.e. well-educated female workers).

Conclusions

The main purpose of my study was to identify predictors of EAC among U.S. business travelers. I did not find any association between travel frequency in the previous year and any measure of EAC although there was an association between travel frequency in the previous month and female binge drinking, a non-hypothesized finding.

I did not find an association between travel duration and any measure of EAC. Due to small sample size, I was unable to test my third hypothesis as originally proposed. When I conducted an exploratory analysis, I did not find a difference in odds of EAC and healthcare industry compared to non-healthcare industry.

The sole primary independent variable found to be a predictor of any measure of EAC was travel frequency in the previous month. Age, gender, religious preference and marital status, confounding variables commonly reported to be associated with EAC, were confirmed as predictors of EAC in this highly uniform population of U.S. business travelers. Additional travel- and work-related variables should be studied in association with EAC to inform multilevel approaches to intervention and reduce the public health burden of this important problem.

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Appendix A: Literature Matrix

Author/Location	Title	Sample	Design	Findings
Ahern, Galea, Hubbard, Midanik, & Syme (2008) United States	"Culture of drinking" and individual problems with alcohol use.	*N* = 4000 aged 18 and older. 27.2% were moderate drinkers; 11.0 % were binge drinkers. Sample was 51.11% female; 27.03% African American, 38.18% white, 5.08% Asian, 27.19% Hispanic, 2.52% other. The 45-54 age group was most represented, at 21.42%.	Cross-sectional	Adjusted logistic regression models showed that permissive neighborhood drinking norms were associated with moderate drinking (*OR* = 1.28, 95% *CI* [1.05,1.55]) but not binge drinking; however, social network and individual drinking norms accounted for this association. Permissive neighborhood drunkenness norms were associated with more moderate drinking (*OR* = 1.20, 95% *CI* [1.03,1.39]) and binge drinking (*OR* = 1.92, 95% *CI*[1.44,2.56]); the binge drinking association remained after adjustment for social network and individual drunkenness norms (*OR* = 1.58, 95% *CI*[1.20, 2.08]). Drunkenness norms were more strongly associated with binge drinking for women than for men ($P_{interaction}$ = .006)
Azagba & Sharaf (2011) Canada	The effect of job stress on smoking and alcohol	Data from cycle 4 (2000/2001) to cycle 8	Cross-sectional	Statistical model using job strain, control variables,

Author/Location	Title	Sample	Design	Findings
	consumption.	(2008/2009) of Canadian National Population Health Survey (NPHS). Participants were aged 18-65. Of the alcohol consumption sample, 53% were male, 63% married, 77% had postsecondary education or greater, 14% were immigrants		time, drinking and smoking status, and province. Effects of job stress on smoking and alcohol consumption differ substantially for light and heavy users. All 3 *OLS* models found that being married, immigrant, more educated, or older significantly reduced the number of drinks consumed. *LCM* revealed that heterogeneous response to job stress had a positive and statistically significant impact on alcohol consumption mainly for heavy drinkers.
Barnes & Zimmerman (2013) United States	Associations of occupational attributes and excessive drinking.	N= 6426 (3252 male, 3174 female) from the 2006 wave of the National Longitudinal Survey of Youth 1979 cohort.	Cross-sectional	Summary statistics revealed that the average participant drank alcohol on 4.9 days (*SD*=7.1) of the past 30; 1.5 drinks (*SD* = 2.0) consumed per occasion; and consumed 6 or more drinks an average of 0.3 times in the past 30 days. Conducted pairwise regressions of occupational attributes and measures of alcohol use and misuse before and after adjustment for demographic and human capital covariates. Men working in occupations with high physical demands were

Author/Location	Title	Sample	Design	Findings
				at higher risk of heavy drinking occasions (*OR* = 1.20, 95% *CI* [1.07, 1.35]). Women in jobs with high physical demand reported more drinking days (*OR*= 1.13, 95% *CI*[1.02, 1.24]). For women, working in more socially engaging occupations was associated with lower numbers of drinking days (*OR* = 0.91, 95% *CI*[.83,.99]).
Biron, Bamberger, & Noyman (2011) Israel	Work-related risk factors and employee substance use: insights from a sample of Israeli blue-collar workers.	n=360 (46% female). Mean age = 37.8 (SD = 11.1)	Cross-sectional	Zero-inflated Poisson regression model was used to test the association between work-related risk factors and the quantity of alcohol consumption. Ordinal probit regression was used to analyze the frequency of alcohol use. Bivariate results showed a positive relationship between permissive drinking norms and and alcohol quantity (r = 0.35, p <0.01) and alcohol frequency (r = .42, p < .01). There was a negative relationship between policy enforcement and quantity of drinking (r = -.29, p < .01) and frequency of drinking (r = -.33, p < .01).

Author/Location	Title	Sample	Design	Findings
Burkholder, Joines, Cunningham-Hill, & Xu (2010) United States	Health and Well-Being Factors Associated With International Business Travel.	N=12942 health risk appraisal records (2692 international travelers, 9980 non-travelers). The average age of the non-travel group was 40.22; high frequency/low duration group was 43.20. The majority in each group was married and male gender, except the non-travel group (57.26% female). High frequency/low duration group was 66.67% male, 92.86% Caucasian, and 85.54% married.	Cross-sectional	Logistic regression revealed that all groups of international business travelers were more likely to have lower body mass index, lower blood pressure, sleep deprivation, diminished confidence to keep up with the pace of work, and drink over the recommended limit (*OR*= 1.27, 95% *CI*[1.07,1.50], *OR*= 1.35, 95% *CI* [1.09, 1.67], *OR* = 1.63, 95% CI [1.06, 2.45]).The high frequency/low duration travel group had the highest risk.
Cunradi, Ames, & Xiao (2014) United States	Binge drinking, smoking and marijuana Use: the role of women's labor force participation.	N=956 (104 female construction workers and 852 female spouses/partners of construction workers) aged 18-65. Sample characteristics: age 18-29 =22.4%; age 30-44 = 44.7%; age 45-65 =32.8%; predominantly white (52.6%). The largest percentage (42.9%) had some college. Overall, monthly binge drinking was 3.5%.	Cross-sectional	Multivariate logistic regression models were used to obtain adjusted odds ratios for monthly binged drinking. Results showed that construction workers were at increased risk of monthly binge drinking (*OR* =: 4.01; 95% *CI* [1.68, 9.59]). Impulsivity was also associated with greater risk of monthly binge drinking (*OR* = 1.92, 95% *CI* [1.22,3.03].
Gimeno, Amick, Barrientos-Gutiérrez, & Mangione (2009) United States	Work organization and drinking: an epidemiological comparison of two	N= 3099. The sample was predominantly male (63.4%), white (87.7%) had	Cross-sectional	Drinking outcomes were regressed on the OSM and the DCM using logistic

Author/Location	Title	Sample	Design	Findings
	psychosocial work exposure models.	no history of family drinking problems (66. 7%), reported good overall health (95.7%). Frequent drinking was reported in 13.9% and heavy drinking in 33.2%.		models. Workers in passive jobs had an increased likelihood of heavy drinking (*OR* = 1.29, 95% *CI* [1.02, 1.64]) and lower likelihood of frequent drinking (*OR* = 0.71, 95% *CI*[.52, .97]). Low complexity combined with low constraint related to more frequent drinking (*OR* = 1.60, 95% *CI*[1.22, 2.10]).
Girasek & Olsen (2009) United States	Airline passengers' alcohol use and its safety implications.	N=1548 adults. Sample characteristics: 55% male, mean age 44 (SD=14.16), 78% white, 95% non-Hispanic, 805 had a college degree or higher, 56% reported household income ≥ \$100,000. Final regression model included 1444 participants since some surveys had missing key variables.	Cross-sectional	Chi-square and t-tests were conducted to explore associations between independent variables and reported intentions to consume alcohol in-flight. A final logistic regression model included only the factors independently associated with drinking intentions at the $p < .05$ level. A Hosmer-Lemeshow test of the fitted model was also conducted. A majority (84%) of passengers indicated that they did not intend to consume alcoholic beverages on the plane they were waiting to board. Passengers who were more likely to report that they would drink were on longer flights (i.e. > 4hours) (*OR* =

Author/Location	Title	Sample	Design	Findings
				2.70, 95% *CI*[1.79, 4.08]), traveling with friends (*OR*= 2.50, 95% *CI*[1.41, 4.42]), and anticipating first- or business- class seating (*OR* = 5.47, 95% *CI*[3.29,9.09]). Those who drank more often (i.e. 4 or more times/week) were more likely to intend to consume alcohol (*OR* = 26.73, 95% *CI* [5.63,126.82]). Eighty-nine percent of the passengers who said they intended to drink reported that they would purchase one to two drinks.
Halonen, Kivimäki, Virtanen, Pentti, Subramanian, Kawachi, & Vahtera (2013) Finland	Living in proximity of a bar and risky alcohol behaviors: a longitudinal study.	Cross-sectional n= 78,858; longitudinal *n* = 54,778 (75% women, mean age = 44).	Cross-sectional and longitudinal	Binomial logistic regression in cross-sectional analyses and in longitudinal mixed effects (between-individual) analyses. Conditional logistic regression was used in longitudinal fixed effects (within-individual) analyses. Cross-sectionally, the likelihood of an extreme drinking occasion and heavy use was higher among those who resided <1 versus ≥ 1 km from a bar. Longitudinally, between individuals, a decrease from >1kmto ≤1 km in distance was weakly associated with

Author/Location	Title	Sample	Design	Findings
				an extreme drinking occasion (*OR* =: 1.18, 95% *CI* [.98,--1.41]) and heavy use (*OR* = 1.12, 95 % *CI* [.97, 1.29]). Within-individual, the *OR* for becoming a heavy user was 1.17 (95% *CI* [1.02,1.34]), per 1 km decrease in log-transformed continuous distance, the corresponding *OR* for an extreme drinking occasion was 1.03 (95% *CI* [.89, 1.18]).
Hiro, Kawakami, Tanaka, & Nakamura (2007) Japan	Association between job stressors and heavy drinking: age differences in male Japanese workers.	N=17,501 male workers aged 18 and over.		Descriptive statistics: daily drinking (≥ 28 d/month) was 11.1% among the 18–29 yr old group, 26.8% among the 30–39 yr old group, 36.1% among the 40–49 yr old group and 37.9% among 50–72 yr old group. Overall, 6.5% were heavy drinkers. Logistic regression analysis was conducted by handling heavy drinking as a dependent variable and the 13 job stressor scores and 2 workplace support indicators as independent variables. The same analysis was conducted adjusting for shift work and occupational class. The analysis was then conducted adjusting for

Author/Location	Title	Sample	Design	Findings
				marital status and smoking. Results showed that job stressors that influence heavy drinking vary by age group. Heavy drinking was related to “support from supervisor” for the 18–29 and 50–72 yr-old groups. For the 30–39 yr-old group, heavy drinking was related to “intragroup conflict”, “job control” and “cognitive demands.” For the 40–49 yr-old group, heavy drinking was related to “physical environment”, “quantitative workload” and “underutilization of abilities.
Iwamoto, Takamatsu, & Castellanos (2012) United States	Binge drinking and alcohol-related problems among U.S.-born Asian Americans.	N= 1575 Asian-American undergraduates. Mean ages of the groups ranged from 19.7-20.3. All groups were predominantly female (range: 63.9-77.8).	Cross-sectional	Analysis of variance was used to determine potential gender and ethnic differences in binge drinking and alcohol-related problems. Negative binomial regression was selected to examine the relationship between the predictors and outcomes in our model. Binge drinking was positively associated with quantity of alcohol consumption (r = .43, p < .01), alcohol-related problems (r =.43, p < .01), living off-campus (r = .11, p

Author/Location	Title	Sample	Design	Findings
				< .01), Greek status (*r* = .19, *p* < .01), and descriptive norms (*r* = 13, *p* < .01). A higher quantity of alcohol consumption was related to more alcohol- related problems (*r* = .44, *p* < .01), age (*r* = .07, *p* < .05), being male (*r* = .07, *p* < .05), living off-campus (*r* = .07, *p* < .01), Greek status (*r* = .22, *p* < .01), and descriptive norms (*r* = .22, *p* < .01). Alcohol-related problems were positively related to age (*r* = .07, *p* < .01), being male (*r* = .07, *p* < .05), living off-campus (*r* =.07, *p* < .01), Greek status (*r* = .20, *p* <.01), and descriptive norms (*r* = .09, *p* < .01). The following were all positively associated with self-reported binge drinking: living with friends off-campus (*IRR* = 1.47, *p* < .001); Greek status (*IRR* = 2.25, *p* < .001); descriptive norms (*IRR* = 1.30, *p* < .001); and being Japanese (*IRR* = 2.25, *p* < .001), Multi-Asian (*IRR* = 2.15, *p* < .001), Filipino (*IRR* = 1.66, *p* < .01), Korean (*IRR* = 1.81, *p* < .01), and South

Author/Location	Title	Sample	Design	Findings
				Asian (*IRR* = 1.54, $p < .05$).
Joyce, Tomlin, Somerford & Weeramanthri (2013) Australia	Health behaviors and outcomes associated with fly-in fly-out and shift workers in Western Australia.	N= 11,906 workers aged 16 and over (4.4% FIFO, 7.4% shift workers, 88.2% other employment)	Cross-sectional	Descriptive statistics showed that greatest gender difference in FIFO workers (88.5% male compared to 65.5% of shift workers and 54.2% other employment). In all groups, the majority of participants were married and the age group most represented was 25-44. Chi-square tests were conducted and revealed that FIFO workers and shift workers were more likely to be at risk for long-term harm from alcohol use (X_2 = 64.7 and 59.0, $p < .01$, respectively). FIFO workers and shift workers were also at higher risk of short-term harm from alcohol use (X_2 = 29.8 and 30.2, $p < .01$, respectively).
Karlamangla, Zhou, Reuben, Greendale, & Moore (2006) United States	Longitudinal trajectories of heavy drinking in adults in the United States of America.	N=14,127 participants aged 25-74 at baseline from four NHANES 1 timepoints (1971-1975, 1982-1984, 1987, and 1992). The sample consisted of 52.4% women, 89.4% white, 71.5% less than high school education, 78.7% married, 68.2% median or higher annual income, 56.4% non-smokers, and 84.8%	Longitudinal	Sampling weights were used to estimate prevalence. The prevalence of heavy drinking in the U.S. declined over successive survey periods. Among men, 15% were heavy drinkers at the time of the first survey and 11%, 10% and 6% were heavy drinkers at subsequent survey periods. Among women, these percentages

Author/Location	Title	Sample	Design	Findings
		employed who were relatively evenly distributed geographically.		were 8%, 5%, 3% and 2% for each of the four survey periods. Among heavy drinkers, the frequency of drinking varied: in the first survey, the mean number of drinking days per week was 5, the median was 2.5 days and the interquartile range was 1–10 days per week. Heavy alcohol consumption declined with increasing age (age effect) and tracked national average consumption (period effect). There was no cohort effect. Logistic regression showed a higher probability of heavy drinking was associated with male gender (relative risk: *RR* = 2.4, 95% *CI*[1.7, 3.4]), and smoking (*RR* = 3.4, 95% *CI*[2.8,4.0]). Getting married and quitting smoking during the study were each associated with reduction in heavy drinking (*RR* = 0.55, 95% *CI* [0.38, .50] and .61 95% *CI*[.50,.75] respectively). Slower age-related decline in the probability of heavy drinking was seen in men ($P < .0001$), married individuals ($P = .03$), and

Author/Location	Title	Sample	Design	Findings
				smokers (*P* = .05).
Kerr-Corrêa, Tucci, Hegedus, Trinca, de Oiiveira, Fioripes, & Kerr (2008) Brazil	Drinking patterns between men and women in two distinct Brazilian communities	N= 740 (372 men, 268 women aged 17 and over. Mean age for men was 50.3 (*SD* = 21.1). Mean age for women was 49.7 (*SD* = 16.5).	Cross-sectional	Chi-square test or Fischer's exact test were used to test association of variables in the logistic regression analysis. Chi-square results showed significant differences in the groups with respect to age, education, marital status, family income, and occupation. Logistic regression showed the possible risk factors for drinking (vs. abstaining) for women in both Botucatu and Rubiao Jr. was having education up to 7 years (*OR* = 3.57 ,95% *CI* [1.61, 7.91], *OR* = 10.44, 95% *CI* = 2.52, 43.24], respectively. For women in Botucatu family history of alcohol abuse was positively associated with drinking risk (*OR* = 2.86, 95% *CI* [1.50, 5.45]). For males and females in Rubiao Jr., smoking was associated with higher risk of drinking (*OR* = 3.08 [95% *CI*[1.54, 6.16], *OR* = 6.57 ,95% *C* =: 2.96, 14.58], respectively.
Klunge-de Luze, de Vallière, Genton, & Senn (2014)	Observational study on the consumption of recreational	N=3537 participants aged 18 and older (50% female, 43%	Cross-sectional	Chi-square test, bivariate analysis, and logistic

Author/Location	Title	Sample	Design	Findings
Switzerland	drugs and alcohol by Swiss travelers.	European, and 86% leisure travelers). Mean age was 34.		regression were conducted. In Switzerland, 56% [95% *IC* 55–58] of the participants drank alcohol (average consumption was 6.1 standard drinks/week). During the trip, 67% ,95% *IC* [65–68]) of the participants drank alcohol and their average consumption was 8.1 *SD* per week ($p < .01$). At-risk alcohol consumption in Switzerland was reported by 7% ,95% IC [6–8]) of the participants. During the trip, 14% ,95% IC [13–16]) of the participants had at-risk consumption ($p < .01$). Other variations were found based on gender, destination, and purpose of trip. In multivariate analysis, the following predictors were associated with at-risk behavior during a trip: at-risk alcohol consumption in Switzerland (*OR* = 30.8 ,95% *CI* [21–45]), smoking (*OR* = 1.7, 95% *CI* [1,2]), use of drugs in Switzerland (*OR* = 2.2 , 95% CI [2, 3]), leisure travel (*OR* = 1.6,95% *CI* [1–2]) and professional category of managers (*OR* =

Author/Location	Title	Sample	Design	Findings
				1.8,95% *CI* [1,3]). The adjusted *OR* for predictors for a change of behavior during a trip, with regard to at-risk alcohol consumption, were: smoking (*OR*= 1.5 95% *CI* [1,2]), use of drugs in Switzerland (*OR* = 2.2, 95% *CI* [2,3]), leisure travel (*OR* = 1.7,95% *CI* [1,3]) and the professional category of managers (*OR* = 2 95% *CI* [1, 3])
Marchand, Parent-Lamarche & Blanc (2011) Canada	Work and high-risk alcohol consumption in the Canadian workforce.	N=76,136 employees aged 15-75.	Cross-sectional	Descriptive statistics: overall high-risk drinking = 8.1% (10% men, 5.9% women). Dependent variable was binary. Multilevel logistic regression models were used to estimate the contribution of occupational groups and work-organization conditions to the odds of high-risk alcohol consumption, taking into account family, neighborhood, and individual characteristics. Multilevel logistic regression analysis, for the final model, suggested that increased work hours and job insecurity are associated with elevated odds of high-risk alcohol consumption

Author/Location	Title	Sample	Design	Findings
				(*OR* = 1.002, 95% *CI* [1.00, 1.004]; *OR* = 1.27, 95% *CI* [1.11, 1.46], respectively). Increased education (*OR* = 1.03, 95% *CI* [1.01, .05]), smoking (*OR*: 1.05, 95% *CI* [104, 105]), physical activities (*OR* = 1.003, 95% *CI* [1.001, 1.005]) and high income (*OR* = 1.35, 95% *CI*: 1.17- 1.56) were also associated with higher odds. Female gender (*OR* = 0.65, 95% *CI* [.59, 0.71]), older age (*OR* = 98, 95% *CI* [98, 99]), being in a couple relationship (*OR* = .67, 95% *CI* [.61, 0.73]) were associated were with lower odds of high-risk drinking. High-risk drinking varied between neighborhoods.
Morikawa, Sakurai, Nakamura, Nagasawa, Ishizaki, Kido, Naruse, & Nakagawa (2013) Japan	Correlation between shift-work-related sleep problems and heavy drinking in Japanese male factory workers.	N=909 factory workers aged 35-54 (530 day workers, 72 day shift workers, 290 night shift workers). Mean age was 45 (*SD* = 6).	Cross-sectional	Descriptive statistics and multiple logistic regression analysis were performed. Smoking habit (ex-smoker, (*OR* = 2.32, 95% *CI* [1.15, 4.68]), current smoker (*OR* = 2.85, 95% *CI* [1.56, 5.19]) and medication for hypertension (*OR* = 3.39, 95% *CI* [1.82, 6.30]) significantly increased the odds of heavy drinking. The *OR* for heavy drinking

Author/Location	Title	Sample	Design	Findings
				among night shift workers who suffered from poor sleep quality was 2.14 (95% *CI* [1.16–3.94]).
Morleo, Cook, & Bellis (2011) United Kingdom	Improving accuracy in recording alcohol consumption : a survey in Greater Manchester in partnership with Greater Manchester Public Health Practice Unit	N=1956 aged 16 and older. In the weighted sample, 51% were male, 84% white British, 33% abstinent.	Cross-sectional	Chi-square analysis was used to measure differences between groups. Overall, 68% of drinkers were low risk. This varied by gender (60.7% male, 76.4% female). Higher risk drinkers were 11.7% male and 5.4% female. With respect to age, age 75 and older reported the highest portion of lower risk drinkers (83.3%) while age 55-64 had the highest proportion of higher risk drinkers (12.8%). In terms of ethnicity, Asian or Asian British had the highest proportion of low risk drinkers (87.5%) and mixed ethnicity had the highest proportion of higher risk drinking (16.7%). The most frequently reported drinking location was home (74%) and was also where the highest weekly mean amount (15.0) was consumed. There was an average 11 unit difference in mean consumption between standard questions and

Author/Location	Title	Sample	Design	Findings
				context-specific questions.
Pillai, Nayak, Greenfield, Bond, Nadkarni, & Patel (2013) India	Patterns of alcohol use, their correlates, and impact in male drinkers: a population-based survey from Goa, India.	N= 732 male drinkers aged 18-49	Cross-sectional	Frequencies of alcohol use patterns showed: usual quantity of alcohol consumed by 14.8 % (rural 16.8 %; urban 13.6 %) current drinkers is at high-risk level. Frequent monthly heavy episodic drinking and drunkenness was found in 28.6 % (rural 31 %; urban 27.2 %) and 33.7 % (rural 30.5 %; urban 35.5 %) of current drinkers, respectively. Chi-square test of association revealed lower education and lower standard of living (SLI) were associated with higher usual quantity of alcohol consumption X^2 (22.1, n = 8) = 0.302, p < 0.001; and X^2 (12.7, n = 49) = 0.154, respectively. More frequent heavy episodic drinking was associated with older age X^2 (14.2, n = 67) = 0.363, p = 0.01, being separated (0.429, p = 0.01), lower education (0.633, p < 0.001), and lower standard of living X^2 (12.9, n = 99) = .358, p = .002. Weekly or more frequent drunkenness was associated only with rural

Author/Location	Title	Sample	Design	Findings
				residence. All three risky drinking patterns were associated with common mental disorders, sexual risk, intimate partner violence, acute alcohol-related consequences, and alcohol dependence. Adjusted logistic regression model showed that high mean quantity of drinks, frequency of heavy episodic drinking, and frequency of drunkenness were all associated with acute consequence of alcohol use (*OR* = 1.02 [95% *CI*, 1.011,1.029], 1.006 [1.004 - 1.008], and 1.006 [1.002-1.009), respectively; and alcohol dependence (*OR* = 1.024 [95% *CI* [1.014, 1.034], OR = 1.007 [1.005-1.01], and OR = 1.009 [1.004-1.015], respectively.
Sheard, Hungtington, & Gilmour (2014) United Kingdom, Australia, New Zealand	A study of alcohol consumption in a cohort of military nurses.	N= 44 nurses (15 male, 29 female). Current drinkers were 90.9%.	Cross-sectional	Descriptive, frequency and exploratory analyses were undertaken using variables categorized as nominal, ordinal or categorical. Tests of significance were not undertaken as the cohort was not large enough for generalizations to be made to wider defense nurse

Author/Location	Title	Sample	Design	Findings
				communities. Over 20% of respondents consumed more than the recommended daily limit for their gender with over 24% of females exceeding safe daily consumption rates. Fifteen per cent drank more than their recommended weekly limit. Defense nurses in their fifties and sixties drank every day more often and consumed more drinks over a week than younger nurses.
Sumeet, Athar, Zulfia, & Najam (2012) India	Biosocial determinants of risk behavior: an epidemiological study in urban and rural communities of Aligarh, Uttar	N=848 aged 15 and older.	Cross-sectional	Chi square test were used to test significance of correlates of alcohol use. Prevalence for alcohol use was 13.4% (5.07% current, 8.37% ever in lifetime). The following variables were found to be associated with increased risk of alcohol use: Hindu religion (X^2 [1, n = 97] = 0.36, p < .001), SC/ST/OBC caste (X^2 [1, n = 43] = 0.11, p < .001, parental alcohol use (X^2 [1, n = 107] = 0.21, p < 0.001), unemployed (X^2 [4, n = 27] = .06, p < 0.001, and rural residence (X^2 [1, n = 72] = 0.20, p < 0.01.

Appendix B: Survey

1. What is your age?
__ Years

2. What is your sex?
__ Male
__ Female

3. Which one or more of the following would you say is your race?
- ☐ White
- ☐ Black or African American
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Asian Indian
- ☐ Chinese
- ☐ Filipino
- ☐ Japanese
- ☐ Korean
- ☐ Vietnamese
- ☐ Other Asian
- ☐ Pacific Islander
- ☐ Native Hawaiian
- ☐ Guamanian or Chamorro
- ☐ Samoan
- ☐ Other

4. What region or country where you born?
- ☐ Asia/Pacific
- ☐ Europe
- ☐ Latin America
- ☐ Middle East
- ☐ North America
- ☐ Sub-Saharan Africa

5. What is the highest grade or year of school you completed?
- ☐ Never attended school or only attended kindergarten
- ☐ Elementary
- ☐ Some high school
- ☐ High school graduate or equivalent
- ☐ Some college or technical school

- ☐ College graduate
- ☐ Post-graduate or doctoral degree

6. Please select your marital status:

- ☐ Married
- ☐ Divorced
- ☐ Widowed
- ☐ Separated
- ☐ Never married
- ☐ A member of an un unmarried couple

7. What is your religious preference?

- ☐ Protestant
- ☐ Catholic
- ☐ Jewish
- ☐ None
- ☐ Other
- ☐ Don’t know
- ☐ Prefer not to answer

8. Are you a tobacco smoker?

__ Yes
__ No

9. Are you currently employed?

__ Yes
__ No

10. What job industry category best describes your current employment?

- ☐ Agriculture
- ☐ Forestry, logging, fishing, hunting, and trapping
- ☐ Mining
- ☐ Construction
- ☐ Nonmetalic mineral products
- ☐ Primary metals and fabricated metal products
- ☐ Machinery and manufacturing
- ☐ Computer and electronic products
- ☐ Electrical equipment, appliance manufacturing
- ☐ Transportation equipment manufacturing
- ☐ Wood products
- ☐ Furniture and fixtures manufacturing
- ☐ Miscellaneous and not specified manufacturing

- ☐ Food manufacturing
- ☐ Beverage and tobacco products
- ☐ Textile, apparel, and leather manufacturing
- ☐ Paper and printing
- ☐ Petroleum and coal products
- ☐ Chemical manufacturing
- ☐ Plastics and rubber products
- ☐ Wholesale trade
- ☐ Retail trade
- ☐ Transportation and warehousing
- ☐ Utilities
- ☐ Publishing industries (except internet)
- ☐ Motion picture and sound recording industries
- ☐ Broadcasting (except internet)
- ☐ Internet publishing and broadcasting
- ☐ Telecommunications
- ☐ Internet service providers and data processing services
- ☐ Other information services
- ☐ Finance
- ☐ Insurance
- ☐ Real estate
- ☐ Rental and leasing services
- ☐ Professional and technical services
- ☐ Management of companies and enterprises
- ☐ Administrative and support services
- ☐ Waste management and remediation services
- ☐ Educational services
- ☐ Hospitals
- ☐ Health care services except hospitals
- ☐ Social assistance
- ☐ Arts, entertainment, and recreation
- ☐ Accommodation
- ☐ Food services and drinking places
- ☐ Repair and maintenance
- ☐ Personal and laundry services
- ☐ Membership associations and organizations
- ☐ Private households
- ☐ Public administration
- ☐ Armed forces
- ☐ N/A (not employed)

11. What occupation best describes your current employment?
- ☐ Management
- ☐ Business and Financial Operations
- ☐ Computer and Mathematical
- ☐ Architecture and Engineering
- ☐ Life, Physical, and Social Science
- ☐ Community and Social Services
- ☐ Legal
- ☐ Education, Training, and Library
- ☐ Arts, Design, Entertainment, Sports, and Media
- ☐ Healthcare Practitioners and Technical
- ☐ Healthcare Support
- ☐ Protective Service
- ☐ Food Preparation and Serving Related
- ☐ Building and Grounds Cleaning and Maintenance
- ☐ Personal Care and Service
- ☐ Sales and Related
- ☐ Office and Administrative Support
- ☐ Farming, Fishing, and Forestry
- ☐ Construction and Extraction
- ☐ Installation, Maintenance, and Repair
- ☐ Production
- ☐ Transportation and Material Moving
- ☐ Military

12. Have you ever served on active duty in the United States Armed Forces, either in the regular military or in a National Guard or military reserve unit?

__ Yes
__ No

13. In the past 30 days how many trips have you taken for business purposes?

__ Trips

14. In the past 30 days how long, on average, was your typical business trip?

__ Days

15. In the previous 12 months how many trips have you taken for business purposes?

__ Trips

16. In the previous 12 months how long, on average, was your typical business trip?

__ Days

17. During the past 30 days how many days per week or per month did you have at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor?

__ Days per week
__ Days in past 30 days
--- Don't know/ Not sure

18. One drink is equivalent to a 12-ounce beer, a 5-ounce glass of wine, or a drink with one shot of liquor. During the past 30 days, on the days when you drank, about how many drinks did you drink on the average?

(Note: A 40 ounce beer would count as 3 drinks, or a cocktail drink with 2 shots would count as 2 drinks.)

__ Number of Drinks
--- Don't know/ Not sure

19. Considering all types of alcoholic beverages, how many times during the past 30 days did you have X (X = 5 for men, X = 4 for women) or more drinks on an occasion?

__ Number of times
---None
---Don't know/ Not sure

20. During the past 30 days, what is the largest number of drinks you had on any occasion?

__ Number of drinks
---Don't know/ Not sure

Appendix C: Contingency Tables

Characteristic	Measures of alcohol consumption											
	Average drink		Drink days/mo		Drink days/wk		Heavy drink		Drink intensity		Wk drink amt	
	X^2	*p*	X^2	*p*	X^2	*p*	X^2	*p*	X^2	*p*	X^2	*p*
Birthplace	*	N/A	*	N/A	*	N/A	*	N/A	*	N/A	*	N/A
Education	.43	.51	.45	.50	.86	.36	.29	.59	.96	.33	.38	.54
Gender	3.31	.07**	1.35	.25	.11	.74	3.07	.0796**	.72	.397	.16	.69
Industry	1.48	.22	.00	.97	.19	.67	.0399	.84	.66	.42	1.096	.295
Marital status	.00	.99	.02	.88	2.32	.13*	3.05	.08*	.03	.86	1.45	.23
Vet status	*	N/A	*	N/A	*	N/A	*	N/A	*	N/A	*	N/A
Occupation	0.08	.78	.57	.45	.33	.57	.81	.37	.49	.485	.00	.99
Race	*	N/A	*	N/A	*	N/A	*	N/A	*	N/A	*	N/A
Smoker	*	N/A	*	N/A	*	N/A	*	N/A	*	N/A	*	N/A
Trip dur/yr	*	N/A	*	N/A	1.15	.28	*	N/A	.14	.7127	*	N/A
Trip freq/mo	.01	.92	.00	.97	.20	.65	1.21	.27	1.599	.21	1.49	.22
Age	5.78	.12**	2.71	.44	2.99	.39	3.68	.299	10.08	.02**	*	N/A
Religion	3.80	.15**	3.83	.15**	2.24	.33	4.69	.096**	4.50	.11**	4.64	.099**

Characteristic	Measures of alcohol consumption			
	Binge drinking		Female binge drinking	
	X^2	*p*	X^2	*p*
Birthplace	.99	.75	*	N/A
Education	.44	.51	.45	.50
Gender	.12	.73	N/A	N/A
Industry	.21	.65	.107	.74
Marital status	7.73*	.01	1.24	.27
Veteran status	.01	.94	*	N/A
Occupation	1.50	.22	.0000	1.00
Race	.06	.81	*	N/A
Smoker	*	N/A	*	N/A

*sparse data, ***p* ≤ .15

Characteristic	Measures of alcohol consumption			
	Binge drinking		Female binge drinking	
	X^2	p	X^2	p
Trip dur/yr	.28	.595	*	N/A
Travel freq/mo	3.2	.07**	3.58	.06**
Age	14.72	.00**	11.02	.01**
Religion	4.23	.12**	1.39	.499

*sparse data, ***p* ≤ .15