

Frequency of Binge Drinking and the Perception of Peer Alcohol Use Among Post-Secondary
Students: A Survey of University Students in a Western Canadian Province

by

Michael J. Lee

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Abstract

Problematic alcohol use, including binge drinking, is a highly prevalent but widely unaddressed public health issue in North America. Binge drinking is especially problematic for young adults in college and university because their rates of binge drinking are considerably higher in comparison to their non-college and non-university young adult peers. High alcohol consumption and binge drinking is normalized throughout college and university and there are gross misperceptions of perceived alcohol use among peers. Few studies have examined the extent of the problem within Canadian colleges and universities. Therefore, the purpose of this study was to examine the differences among students self-reported frequency of binge drinking over the past two weeks and compare their perceptions of peer alcohol use and examine the predictive qualities of these variables. Using data collected with the American College Health Association's National College Health Assessment II survey instrument at the University of Alberta, I found there were differences in perceived alcohol use among students based on frequency of binge drinking and that students who binge drink have higher perceptions of perceived peer alcohol use. Variables that predicted alcohol consumption included being of white race/ethnicity, concurrent substance use, and being involved in intramural sports, while variables that predicted perception of peer alcohol use included being a binge drinker and being involved in varsity sports. The findings from this study suggest that students who binge drink have higher perceptions of peer alcohol use, and greater misperceptions of peer alcohol use that, in turn, could play a role in increasing alcohol consumption within this group. For nurses, public health professionals, and university/college administrators, my findings bring attention towards problem drinking within Canadian colleges and universities, opens the possibility of using the

perception of peer alcohol use as a screening tool to identify at-risk students, and supports changes in college and university policy to promote the moderation of alcohol use.

Preface

This thesis is an original work created by Michael Lee. This research project received ethics approval from the University of Alberta Ethics Board, Project Name "A Secondary Analysis Examining the Differences Between Student Frequency of Binge Drinking and the Perception of Peer Alcohol Use Among Canadian University Students", No. Pro00067029_CLS1, Sept 17, 2016.

The data was collected through University Wellness Services at the University of Alberta in Winter of 2016. The secondary analysis study design, analysis, and manuscript preparation was led by Michael Lee with supervision provided and concept formation provided by Dr. Diane Kunyk and Dr. Kara Schick-Makaroff. The manuscript was created for consideration of publication through the journal of *Addictive Behaviors*. Dr. Diane Kunyk and Dr. Kara Schick-Makaroff both assisted in reviewing the statistical analysis and providing manuscript edits.

Dedication

To my late father, Miguel Ang Lee, thank you for all you have done for us. You taught me to be patient and humble when facing adversity and to never judge a situation without understanding it. I hope you would be proud of this project. I miss you and think about you every day.

To my mother, Nancy Te Lee, thank you for the sacrifices you made for us through the years. Your ongoing motivation, support and love have always helped me through tough times. You always inspire me to be kind and mindful towards others and push me to a better person.

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Chapter One

Introduction

College and university student drinking is the top health issue for most colleges and universities, and the most common problem associated with alcohol use is binge drinking (Champion, Lewis, & Myers, 2015). Binge drinking is defined by the National Institute of Alcohol Abuse and Alcoholism (NIAAA) (n.d.) as drinking patterns that cause a blood alcohol concentration of 0.08 g/dL, which is about five drinks for men or four drinks for women within two hours or within one sitting. Alcohol use is common in colleges and universities throughout Canada and the United States as approximately 60-70% of college and university students reported alcohol use within the past month (American College Health Association [ACHA], 2017; Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2015). It is estimated that one in three students in college and university who drink report binge drinking within the past two weeks, meaning a significant proportion of students are at risk of being exposed to negative consequences associated with binge drinking (ACHA, 2017; Johnston et al., 2015). The high prevalence of alcohol use and binge drinking throughout college and university suggests that students may be unaware or dismissive of the health risks associated with binge drinking and that there are gaps for public health professionals to prevent and address problems associated with binge drinking in college and university.

One major contributor to alcohol use and binge drinking in college and university is the perception of social norms surrounding its use. Social norms have a powerful influence on individual behaviours because social norms serve as a reference for individuals to model their own beliefs and behaviours (Martens et al., 2006). Social norms can reveal a great deal about individual and group beliefs around alcohol use and binge drinking, and can therefore be a

reflection of the culture within college and university. Through analyzing the perception of peer alcohol use between groups, we can make some inferences about an individual's or group's identity to better understand who might be at risk of experiencing consequences associated with binge drinking. Therefore, examining the perception of peer alcohol use can be a useful measure within a group setting to assess beliefs around alcohol use, and can further assist public health professionals and university/college administrators to identify at-risk students and monitor environmental interventions to curb hazardous alcohol use.

Studies have consistently shown that students overestimate their peer's alcohol use and this influences individuals to drink more than intended to conform to these norms (King, Borsari, & Chen, 2010; Park, Smith, Klein, & Martell, 2011; Wardell & Read, 2013). Misperceptions surrounding high alcohol use in college and university can lead to risky individual alcohol use especially if there are overestimations of alcohol use by students. King and colleagues (2010) found that college and university students overestimated other student's alcohol use in terms of frequency and quantity, and this perception was significantly correlated to a student's personal quantity and frequency of drinking. In another study by Jun, Agle, Huang and Gassman (2016), the researchers found college and university students overestimated their peer's frequency and quantity of alcohol use and that these misperceptions predicted the presence or absence of binge drinking in an individual. These studies have demonstrated that college and university students perceive high peer alcohol use. However, the majority of these studies about college and university binge drinking are from the United States. For this reason, there is a need to expand this perspective, study this in a Canadian context, and compare previous research findings to Canadian data.

A limited amount of literature is available about Canadian college and university students and the characteristics and perceptions of alcohol use (Arbour-Nicitopolous, Kwan, Lowe, Taman & Faulkner, 2010; Balodis, Potenza, & Olmstead, 2009; Perkins, 2007). Canadian college and university students have overestimated peer alcohol use; however, no researchers have yet examined the extent of these misperceptions between specific groups (Arbour-Nicitopolous et al., 2010; Perkins, 2007). To this writer's knowledge, no study has compared differences in perceived peer alcohol use when grouped by student's frequency of binge drinking within Canada. Therefore, the findings from this study will not only characterize students who binge drink within a Canadian college and university context, but will also determine if perceptions of peer alcohol use are shaped by frequency of binge drinking.

For nurses, public health professionals and university/college administrators, this study provides a Canadian context of the social norms around alcohol use and binge drinking. The findings from this study may provide greater insight for nurses, public health professionals, and university/college administrators to bridge the connection between student's frequency of binge drinking and their perceived peer alcohol use among students. This study adds to the existing literature and demonstrates that college and university students overestimate peer alcohol use and that binge drinking has a role in shaping a student's perception of peer alcohol use. Furthermore, Canadian college and university students are similar to their American and European counterparts in that binge drinking is also problematic in Canada. Finally, the findings from this study support future research implementing a social norms intervention to address college and university binge drinking in Canada to both screen and identify higher risk drinking groups to curb their perception of peer alcohol use with the goal to reduce hazardous binge drinking.

Outline for Thesis

My thesis will be presented in the format of a paper-based thesis prepared for the purpose of submission for publication. The first chapter presents the general problem and the implications of our study. For the remainder of chapter one I will present a review of the literature, the purpose statement, the research question, and the methods used in this study. Chapter two will present the proposed manuscript for submission to the journal of *Addictive Behaviors*, and chapter three will discuss the results and the implications for nursing practice.

Review of the Literature

Characterizing Alcohol Use in Young Adults at College or University

Alcohol use is a major health concern for young adults (aged 18 to 24 years) because there is a five-fold increase in alcohol use, six-fold increase in binge drinking, and nine-fold increase in heavy drinking when young adults transition from adolescence (Substance Abuse and Mental Health Services Administration, 2014). In the United States, 84% of young adults aged 21 to 24 report alcohol use at which are the highest prevalence rates when categorized by age group (Center for Behavioral Health Statistics and Quality, 2015). Similarly in Canada, 83% of young adults aged 18 to 24 self-reported alcohol use within the past year (Canadian Centre of Substance Abuse [CCSA], 2017). In conjunction with the high prevalence of alcohol use, young adults are at the highest risk of experiencing negative consequences associated with excessive alcohol use (Government of Canada, 2015). An estimated 23% of young adults experience short-term consequences from excessive alcohol use, while 29% of young adults are at risk for experiencing long-term impacts as a result of exceeding recommended safe guidelines for alcohol use (Government of Canada, 2015). Taking into account these significant shifts, the high prevalence, and the associated negative consequences of alcohol misuse, it is essential to address issues related to alcohol and the need for public health involvement to address this widely unrecognized health problem for many young adults.

Alcohol-related issues are problematic for colleges and universities because the prevalence and rates of binge drinking are highest within young adults attending college or university (CCSA, 2017; Government of Canada, 2015; Timberlake et al., 2007). According to the Monitoring the Future National Survey conducted in the United States, the 30-day prevalence of alcohol use was moderately higher in adults attending college and university students with

rates at 63% compared to their non-college counterparts whose prevalence was 56% (Johnston et al., 2015). Johnston et al. (2015) also found that rates of binge drinking were at 35% for college and university students compared to 29% for young adults not attending college or university. Finally, another comparison between these two groups revealed that rates of reportedly being drunk within the past 30 days was 43% for college and university students compared to 34% for young adults not attending college or university (Johnston et al., 2015).

In Canada, the prevalence of alcohol use and rates of binge drinking reported by students in college and university are similar. According to American College Health Association [ACHA] (2017), 69% of college and university students reported alcohol use within the past 30 days. Additionally, the ACHA (2017) found that 35% of Canadian college and university students had binged on alcohol within the past two weeks. Almost one in three college and university students in Canada and the United States who drank, engaged in binge drinking and this presents a sizeable proportion of the student population who are at risk of exposing themselves to the negative consequences associated with binge drinking. Rates of alcohol use are consistently higher for young adults attending college and university compared to young adults not attending college or university. Therefore, priority should be given to address alcohol-related problems in this age group within the college and university environment.

College and university is a key setting to address problem drinking because it is a crucial period in which young adults can initiate or increase substance use (Blevins & Khanna, 2016). The transition to college or university is a major developmental transition for young adults and is an entry point into adulthood for almost half the young adult population. In 2012, almost 31.4 million young adults aged 18 to 24 were enrolled in college or university in the United States and in 2013/2014, there were just over 2 million registered students in either college or university

within Canada (National Center for Education Statistics, 2013; Statistics Canada, 2015). For a large segment of the young adult population, college and university represents a key period of development. College and university is associated with greater opportunities of independence, personal growth, and exposure to new social networks which influences an individual's beliefs and values, especially towards alcohol for young adults (Arbour-Nicitopoulous et al., 2010; Boyd, McCabe, Morales, 2005; Windle, 2003). For nurses, public health professionals, and college/university administrators, there is an opportunity to help shape health beliefs and attitudes for many young adults and ensure students can make educated decisions about their drinking in an effort to curb alcohol-related problems.

When examining demographic information on college and university students, there are some cohorts at higher risk of drinking more and experiencing negative consequences associated with binge drinking. Students who are particularly at high risk of binge drinking while in college or university include those who are male, white, involved with fraternities and sororities, involved in collegiate athletics, living in residence, and using other substances (Brown-Rice, Furr, & Jorgensen, 2015; Jones, Oeltmann, Wilson, Brener, & Hill, 2001; Jun et al., 2016; Milroy et al., 2014; Montauti & Bulmer, 2014). Similarly, students in Europe characterized as high risk for binge drinking were identified as students who were male, lived in rented accommodations away from family, played sports, and used other substances (Tavolacci et al., 2016; Wicki, Kuntsche, & Gmel, 2010). In one study, Canadian students who were white and lived away from their parents were at higher risk of self-reported alcohol use (Arbour-Nicitopoulous et al., 2010). There are gaps to characterize what Canadian students who binge drink are like and whether the same factors that predict binge drinking in American and European colleges and universities are similar within a Canadian sample.

Consequences of Alcohol Use for Young Adults and College and University Students

Problematic alcohol use is important to address because of the social costs required to deal with alcohol-related issues. Rehm et al. (2006) defined this as the cost imposed on society that exceeds the cost of the user to obtain the substance. In the United States, the Center for Disease Control and Prevention (CDC) (2014) found that in 2006, excessive alcohol consumption cost Americans \$223.5 billion dollars, with three-quarters of these costs can be attributed to binge drinking. Costs associated with alcohol-related problems in the United States include \$161.3 billion in lost productivity, \$24.6 billion in healthcare costs, \$21.0 billion in enforcement, and \$16.7 billion in other costs such as motor vehicle accidents and property damage (Bouchery, Harwood, Sacks, Simon, & Brewer, 2011). In Canada, problematic alcohol use costs Canadians approximately \$14.6 billion, subdivided into \$7.1 billion in lost productivity and premature death, \$3.3 billion in direct health care costs, and \$3.1 billion in direct enforcement costs (Rehm et al., 2006). For Canadians, approximately 36.6% of the total costs associated with substance abuse is due to alcohol-related problems, and it ranks second to tobacco use in substance-use related costs (Rehm et al., 2006). Despite these dated statistics, these costs are anticipated to take an even higher toll in both Canada and the United States today. This signifies the substantial economic burden of alcohol-related problems within Canada and the United States.

In addition to the societal costs associated with alcohol-related problems, alcohol use is also problematic for individual health. Alcohol use is associated with short-term and long-term problems and follows a dose-response relationship to increasing negative health consequences (Gruenewald, Johnson, Ponicki, & LaScala, 2010). Short-term problems associated with alcohol use include intoxication, altered judgements, unintentional and intentional injuries, violence, risk

of sexually transmitted infections, suicide, overdose, and death. Long-term consequences include possible development of an alcohol use disorder, increased risk of cancer, increased risk of diabetes, cirrhosis, pancreatitis, low birth weight, and fetal alcohol spectrum disorder (Butt, Beirness, Gliksman, Paradis, Stockwell, 2011; CCSA, 2017; CDC, 2017). For young adults, of particular concern are the changes to neurobiological structures involved with executive function, learning and memory, impulse control, affective regulation, and poor visuospatial skills and attention, all of which can have lasting effects as the brain continues to develop through young adulthood (Blevins & Khanna, 2016).

Narrowing the focus to the college and university setting, studies have examined the negative consequences associated with alcohol use, specifically binge drinking. Wechsler, Davenport, Dowdall, Moeykens, & Castillo (1994), examined the negative consequences of college binge drinking in 140 US colleges using self-reported measures of drinking behaviour, alcohol-related health problems, and other problems. The researchers found that students who engaged in binge drinking were seven to ten times more likely to engage in unplanned sexual behaviour, get in trouble with the law, damage property, or get hurt or injured (Wechsler et al., 1994). From the respondents who binged more than three times in a two week period, half were more likely to experience five or more alcohol-related problems, a third reported being injured or hurt, and two in five engaged in unplanned sexual activity (Wechsler et al., 1994). In a more recent study by Townshend, Kambouropoulos, Griffin, Hunt, and Milani (2014), researchers found that those who were greater binge drinkers were associated with greater risk of unplanned sexual behaviour, greater cognitive and behavioural impairment, and increased impulsivity and aggression. These results support Wechsler et al.'s (1994) research, reinforcing the consequences associated with excessive alcohol use and increase binge drinking frequency.

Binge drinking in college and university also effects a student's academic performance. Heavy drinking is associated with increased blackouts and poorer academic performance including missed classes, falling behind in classes, and poorer academic outcomes (White & Hingson, 2013; Windle, 2003). Consequences faced by college and university students associated with alcohol use include hangovers, blackouts, sleep loss and deprivation, driving vehicles while under the influence, relational strains (including arguing and receiving criticism about alcohol use), and increased risk of other substance use. All of these consequences can impede with a student's ability to perform in school and hinder their academic performance (Boyd et al., 2005; Jones et al., 2001; Windle, 2003).

When comparing students who binge drink to their non-binge drinking and abstinent peers in college and university students, Sheffield, Darkes, Del Boca, and Goldman (2005) found that college and university students engaging in binge drinking patterns were at higher risk than their peers. In their study, students who binge drank were three times more likely to experience relationship problems, five times more likely to experience problems associated with their job, and twice as likely to experience legal problems when compared to non-binge drinkers (Sheffield et al., 2005). When students who binge drink were compared to those who abstained from drinking, binge drinkers were eight times more likely to experience relationship problems, seven times more likely to experience problems associated with their job, and six times more likely to experience legal problems (Sheffield et al., 2005). In another study comparing binge drinkers to non-binge drinkers, self-reported binge drinkers reported feeling less drunk, liking the effects of alcohol more, and wanting to drink more than their non-binge drinker counterparts after both groups were given a set amount of alcohol (Balodis et al., 2009). The finding from Balodis et al. (2009) provides some context as to why alcohol use might be more problematic for students who

binge drink and suggests why this group could be more vulnerable to experience negative consequences associated with alcohol use when acutely intoxicated.

Finally, examining the long-term consequences of binge drinking, Martinez, Sher, and Wood (2014) found binge drinking was consistently high in college and university over time and that a notable proportion of college and university students experienced accumulating consequences related to their binge drinking over multiple semesters. According to Martinez et al. (2014), the accumulation of negative consequences and the students' perceptions of these consequences as acceptable suggests there is little insight into the ramifications of binge drinking and could possibly be early indicators for alcohol use disorders in the future. The accumulation of consequences and lack of insight into the problem could reflect how culturally accepted the consequences of binge drinking have become. Therefore, students who binge drink represents a particular area of focus to screen and identify for nurses, public health professionals, and college/university administrators to prevent alcohol-related problems.

Social Norms and the Perception of Alcohol in College and University Students

Social norms and perception about behaviours, such as binge drinking, can have a significant influence on individual behaviour. Research has shown that college and university students overestimate the amount of alcohol consumed by their peers and this has been correlated with greater alcohol consumption (Dejong et al., 2009; Stock et al., 2014). In a study by Wechsler and Kuo (2000), almost half of the students in a 14,000 sample from varying American colleges reported that their definition of binge drinking was 6 drinks for men and 5 drinks for women, which is one drink higher for both genders than the NIAAA's definition of binge drinking. Furthermore, the authors found that students who had higher frequency of binge drinking defined binge drinking at higher quantities, 8 and 6 drinks for men and women

respectively, showing the influence binge drinking has on further skewing perceptions (Wechsler & Kuo, 2000).

Similar findings of the overestimation of peer alcohol use by college and university students has been documented internationally. In a study examining alcohol perception in French college students, researchers found the prevalence of binge drinking was overestimated by almost 60% of students (Franca, Dautzenberg, & McMahon, 2010). These researchers found that social norm measures, such as perceived prevalence of peer binge drinking and perceived quantities consumed by friends, was highly correlated with individual binge drinking and frequency of binge drinking, suggesting a link between perception and individual behaviour (Franca et al., 2010). Similarly, a study on a sample of British university students found that college and university students overestimated the frequency of consumption, quantities consumed on a night out, and the frequency of drunkenness of their peers, further illustrating that misperceptions of peer alcohol use is not confined to just the United States (McAlaney & McMahon, 2007).

From a Canadian standpoint, similar findings have been identified. Perkins (2007) found that up to 76% of students overestimated the quantity of peer alcohol use and that 85% of students overestimated the frequency of peer alcohol consumption. In another study focusing on Canadian college and university students, Arbour-Nicitopolus et al. (2010) revealed perceived alcohol use by students was as high as 95.6% and that students were seven times more likely to consume alcohol if they perceived peers to have used alcohol within the past 30 days. Therefore, the misperceptions of peer alcohol use is an over-arching international problem and more attention needs to be drawn to better align these continuing misperceptions.

To understand what shapes a student's perception towards alcohol use, it is important to understand reasons why college and university students drink. Molnar, Busseri, Perrier and Sadava (2009) found that greater alcohol use was associated with greater social well-being, more frequent positive affect, and less frequent negative affect when they controlled for increased alcohol use and adverse alcohol-related consequences. The findings from Molnar et al. (2009) indicate that the positive effect of alcohol use could be linked to the role alcohol plays in fostering social relationships by promoting socializing and social cohesion, especially for young adults transitioning from high school to college and university life. In another study by Zaso et al. (2016), prior positive consequences associated with binge drinking was associated with greater binge drinking frequency. In their study, Zaso et al. (2016) found that prior negative consequences associated with binge drinking did not deter students from continuing to binge drink thereby creating a position that reinforces problematic alcohol use with poor insight of its fallout.

Despite the evidence about the detrimental effects of binge drinking, students still view alcohol as an integral part of college and university life. In a study by Crawford and Novak (2010), researchers found that those who perceived alcohol abuse as a component of student life in school had a greater association of heavy binge drinking within college and university. In a qualitative study examining female undergraduate's perception of binge drinking, Guise and Gill (2007) found that participants were unable to quantify binge drinking on their own and had overestimated quantities consumed when students binge drink. In their study, Guise and Gill (2007) demonstrated how participants perceived binge drinking as a harmless activity that enhances social interaction in college and university, further establishing social norms around excessive alcohol use and its prominence among college and university students. In a different

qualitative study conducted by Sergist and Pettibone (2009), students were asked to define problematic alcohol use. In this study, the small sample of students believed problematic drinking to be at high quantities (at nine drinks), high frequencies (up to 23 times/per month) and using alcohol alone (Sergist & Pettibone, 2009). The aforementioned examples demonstrate that there are ongoing gaps in how both the literature and students view problematic binge drinking signifying the need to bridge this gap.

An examination of social norms can be a reflection of an individual's beliefs, the beliefs adopted by an individual's surroundings, and how individual and group beliefs interact with one another to show the relationship between the individual and the group. In a study by Stogner, Boman, and Miller (2015), friendship groups who shared similar binge drinking patterns experienced higher quality friendships together when compared to groups who had dissimilar binge drinking patterns. Yanovitzky, Stewart, and Lederman (2006) found that the perception of peer alcohol use by their proximate peers (friends) was a stronger predictor than distant peers (other students) of personal alcohol use suggesting the influence of friends in shaping one's perceptions. In a study by Ross and Jackson (2013), the social facilitation associated by a group's binge drinking beliefs and behaviours was a strong predictor of whether an individual would binge drink when compared to individual perceived self-control. These findings support the powerful influence of an individual's social surroundings in dictating an individual's behaviour. In fact, an individual's group and proximity to others is a strong predictor of social norms around alcohol use and could warrant the importance of identifying an individual's peer group and their pattern of alcohol use in order to better screen and identify for individual problems associated with problem alcohol use (Cho, 2006; Stogner et al., 2015).

To correct some of these misperceptions around college and university binge drinking, social norms interventions have been created. Social norms can be divided into either injunctive or descriptive norms. Injunctive norms target the perception of peer approval towards binge drinking behaviour, while descriptive norms target an individual's perception of the frequency and magnitude of binge drinking (Crawford & Novak, 2010; Talbott, Wilkinson, Moore, & Usdan, 2014). The theory behind social norms interventions is based on the principle that our behaviours are shaped by our environment and this intervention aims to shift individual behaviour by presenting factual information about the population so individuals can adjust their behaviour accordingly (Campo et al., 2003). Campaigns using social norms utilize principles of harm reduction to encourage a culture of moderation, reduce consumption of alcohol by those who overestimate their use, and facilitate ownership over an individual's health to modify behaviours based on their health beliefs (Campo et al, 2003; Stock et al., 2014).

The majority of social norms interventions in the literature have addressed descriptive norms by presenting factual information about peer alcohol use on college and university campuses through campaigns utilizing posters, print advertisements, word of mouth, or social media (Foxcroft, Moreira, Almeida Santimano, & Smith, 2015; Jun et al., 2016; Lombardi & Choplin, 2010; Ridout & Campbell, 2014). Studies support targeting descriptive norms surrounding alcohol use because descriptive norms have a high predictive value for alcohol consumption when compared to injunctive norms (Neighbors, Lee, Lewis, Fossos, & Larimer, 2007). However, the success of social norms interventions has been questionable. Wechsler et al. (2003) found no evidence to support social norms interventions when examining their effectiveness in 37 colleges. Further, the researchers did not find any decrease in alcohol use in schools where social norms interventions were implemented. In a recent Cochrane review of

social norms interventions by Foxcroft, et al. (2015), there was low to moderate quality evidence suggesting that these interventions could be effective. However, the effect of social norms intervention was considered to be small, and that these interventions should be utilized with other interventions to see substantial results.

Continuing to study social norms from a public health standpoint is important because it can be an excellent measure to assess health gaps that need to be addressed by public health professionals. Social norms can indicate what misperceptions surround alcohol use in college and university, and these can be an excellent measure of how well public health professionals are addressing the problem of alcohol use. In an effort to address college and university binge drinking, social norms can be an important indicator of how effective interventions are at reducing overall consumption of alcohol on campus. Social norms can be a reflection of college and university culture and how the environment shapes an individual's perceptions and beliefs about alcohol and their own health (Champion et al., 2015). With limited literature about students who binge drink and the social norms surrounding alcohol use within Canadian college and university students, this study adds to the feasibility of addressing these misperceptions and offering future recommendations regarding the possibility of implementing a social norms campaigns as a method to reduce college and university binge drinking.

Research Questions

1. Are there differences between university student's frequency of binge drinking over a two-week period and their perception of peer alcohol use?

The null hypothesis is that there will be no significant differences between university student's frequency of binge drinking over a two-week period and their perceived peer alcohol use.

The alternative hypothesis is that university students' reporting a higher frequency of binge drinking over a two-week period will have a higher perception of peer alcohol use.

2. Does age, gender, marital status, current living situation, race/ethnicity, involvement with varsity sports, involvement with club sports, involvement with intramural sports, fraternity/sorority membership, and concurrent drug use predict individual alcohol consumption in this Canadian sample?

The null hypothesis is that there will be no significant prediction of individual alcohol consumption by age, gender, marital status, race/ethnicity, current living situation, involvement with varsity sports, involvement with club sports, involvement with intramural sports, fraternity/sorority membership, and concurrent drug use.

The alternative hypothesis is that there will be a significant prediction of individual alcohol consumption by age, gender, marital status, current living situation, race/ethnicity, involvement with varsity sports, involvement with club sports, involvement with intramural sports, fraternity/sorority membership, and concurrent drug use.

3. Does age, gender, marital status, race/ethnicity, current living situation, involvement with varsity sports, involvement with club sports, involvement with intramural sports, fraternity/sorority membership, concurrent drug use, and binge drinking status predict the perception of peer alcohol use in this Canadian sample?

The null hypothesis is that there will be no significant prediction of the perception of peer alcohol use by age, gender, marital status, race/ethnicity, current living situation, involvement with varsity sports, involvement with club sports, involvement with intramural sports, fraternity/sorority membership, concurrent drug use, and binge drinking status.

The alternative hypothesis is that there will be a significant prediction of the perception of peer alcohol use by age, gender, marital status, race/ethnicity, current living situation, involvement with varsity sports, involvement with club sports, involvement with intramural sports, fraternity/sorority membership, concurrent drug use, and binge drinking status.

Purpose Statement

The purpose of this secondary analysis is threefold: to examine whether there are differences between university student's frequency of binge drinking over the past two weeks and their perception of peer alcohol use, to examine predicted individual alcohol use, and to examine predictor variable of the perception of peer alcohol use within this Canadian sample.

The first analysis tested whether there are greater perceptions in perceived peer alcohol use in student's who report more frequent episodes of binge drinking. The independent variable used was the frequency of binge drinking reported by university students and is defined as the number of times a student drank five or more drinks over two weeks (categorized as: Abstainers, Non-binge drinkers, Infrequent binge drinkers, and Frequent binge drinkers). The dependent variable measured was the perception of peer alcohol use, defined by the quantity of drinks that respondents think a typical student had consumed the last time he/she "partied"/socialized (recorded numerically from 0-99).

The second analysis tested if predictors found from the literature review were able to predict alcohol consumption in this Canadian sample. The predicting variables included age, gender, marital status, race/ethnicity, current living situation, involvement with varsity sports, involvement with club sports, involvement with intramural sports, fraternity/sorority membership, and concurrent drug use. The dependent variable was individual alcohol use which was recorded numerically from 0-99 and referred to the respondent's answer the last time he/she drank the last time they "partied"/socialized.

Finally, the third analysis tested if predictors could predict the perception of peer alcohol use in this Canadian sample. Similar to the second research question, the same predicting variables were tested, with the addition of binge drinking status as an additional predictor. The

dependent variable was the perception of peer alcohol use which was recorded numerically from 0-99 and referred to what respondents think quantitatively the last time a student had drank the last time they "partied"/socialized.

Methods

Type of Research Design

With permission from the University of Alberta (U of A) Wellness Centre, data from the American College Health Association - National College Health Assessment II (ACHA-NCHA II) questionnaire was utilized to answer the research questions; therefore, this study was a secondary analysis of existing data. A secondary analysis was chosen for this project because the data was current and accessible, and previously unexamined. Out of respect for participants' contributions, and a moral responsiveness to build knowledge based on students' responses and explore problems relating to substance use within college and university, examination of the data was undertaken to assess if alcohol use and the perception of peer alcohol use is an issue within this Canadian sample.

Population, Sample, and Participants

The population examined in this study were undergraduate and graduate students attending the U of A in the 2015-2016 academic year. At the time, the U of A consisted of 33,593 full-time students and 3,229 part-time students which included 29,625 undergraduate and 7,204 graduate students. From this population, a random sample of 5,000 students were invited by Office of the Registrar to participate in the ACHA-NCHA II confidential web survey. Inclusion criteria for the ACHA-NCHA II sample were any students attending at least one class at the U of A. Those excluded from the sample/study were students who were completing courses through long distance learning or students away on exchange programs with other campuses. A total of 965 surveys were completed and returned for a response rate of 19%.

Data Collection Instruments, Recruitment, Variables, and Materials

The survey used to collect the data was the ACHA-NCHA II. The ACHA-NCHA II is a comprehensive questionnaire consisting of 66 questions that assesses various health issues concerning college and universities that include alcohol, tobacco, and drug use, sexual health, weight, nutrition, exercise, mental health, personal safety, and violence (ACHA, 2014). The ACHA-NCHA II uses a combination of questions in its survey resulting in dichotomous variables, ordinal scales, and ratio scales. The end of the survey asks demographic questions from participants. The University's Wellness Services administered the ACHA-NCHA II in three year waves, and began using the ACHA-NCHA II in 2010. Past ACHA-NCHA II surveys had 1600 respondents in 2010 and 1462 respondents in 2013. For the purpose of this study, the most recent installment of the ACHA-NCHA II survey was used, which was administered in Winter 2016.

The ACHA-NCHA II is a voluntary, confidential, cross-sectional questionnaire administered to students at the college and university level to assess population trends. U of A students who were randomly selected to participate in the survey were provided with a unique ID, embedded within the web-survey link. To maintain the anonymity of the participants, data were not linked between email addresses, unique ID, and survey responses. The U of A Wellness Centre and the ACHA-NCHA worked together in administering the survey. Data was stored with the ACHA-NCHA, and raw data was provided to the U of A Wellness Centre once data collection was completed.

The ACHA-NCHA II data sets have been shown to be valid and reliable as the survey has yielded similar trends to other nationally representative surveys including the CDC 1995 National College Health Risk Behaviour Survey, the Harvard School of Public Health 1999

College Alcohol Study, and the United States Department of Justice: The National College Women Sexual Victimization Study of 2000, the ACHA-NCHA 1998, ACHA-NCHA Spring 1999 and Fall 1999 pilot, and the ACHA-NCHA Spring 2000 (Leino, 2014; Moorhouse, Soule, Parker Hinson, & Barnett, 2014). The results from the ACHA-NCHA are difficult to generalize to all colleges and universities because colleges and universities self-select themselves to use and participate in the ACHA-NCHA II (Leino, 2014). Due to the lack of generalizability for all colleges and universities, the ACHA provides data from a set of schools to allow college and university administrators to compare data and make decisions based on the provided reference group data (Leino, 2014).

Questions 8 – 17 from the ACHA-NCHA II were analyzed for this study as these focus on the frequency of individual alcohol use, frequency of student alcohol use, quantification of individual use, quantification of peer alcohol use, and frequency of binge drinking. Questions 8-17 are shown in appendix A for reference. A sample of the entire ACHA-NCHA II survey can be viewed on the ACHA website for additional reference (<http://www.acha-ncha.org/survey.html>) (ACHA, 2014).

To answer the first research question, the independent variable (binge drinking) was assessed by the respondent's answer to question 13. This variable is measured at an ordinal level of measurement and asked respondents how frequently had they binge drank over the past two-weeks. The response provided from question 13 was transformed and students stratified in four groups either as abstainers (having not consumed alcohol in the past year), non-binge (students who drank but did not binge in the past 2 weeks), infrequent binge (students who binge drank once or twice within the past 2 weeks), and frequent binge (students who binge drank more than twice within the past 2 weeks). These four categories were used by Weschler et al. (1994) and

Weschler & Kuo (2000) to group binge drinkers into smaller categories to provide more robust groups for analysis.

The dependent variable (perception of peer alcohol use) was assessed in question 12. Respondents were able to quantify drinks consumed by their peers to assess peer alcohol use. The variable is at ratio level of measurement asking respondents to quantify alcohol in quantities ranging from 0-99 drinks to what respondents thought typical students drank the last time they "partied"/socialized. Descriptive statistics and frequencies were obtained from the sample to provide a baseline for comparison of the quantities of alcohol consumed and the perception of peer alcohol use. An independent t-test was used to characterize and compare gender differences between the amount of alcohol consumed and the perceptions of peer alcohol use.

To answer the second and third research questions, common predictors noted within the literature were tested to examine if they could predict individual alcohol consumption and the perception of peer alcohol use within this Canadian sample. To answer the second research question, predictive variables included age (Question 46), biological gender (Question 47), marital status (Question 57), race/ethnicity (Question 54), living arrangements (Question 58), varsity sports involvement (Question 64A), club sports involvement (Question 64B), intramural sports involvement (Question 64C), fraternity/sorority membership (Question 59), and concurrent substance use (Question 8). To answer the third research question, the same predicting values were used as research question two with the addition of the variable binge drinking status.

For the purpose of the second and third research question, concurrent substance use was simplified as students who reported either cigarette, smokeless tobacco, e-cigarettes, marijuana, cocaine, methamphetamine, other methamphetamine, sedatives, hallucinogens, anabolic steroids,

opiates, inhalants, MDMA, other club drugs, or illegal drug use for at least six days within the last 30 days. For the third research question, a binge drinker was considered to be any student who self reported drinking five or more drinks of alcohol at a sitting within the past 2 weeks.

The data was accessed with permission from the U of A's Wellness Service through a confidential shared Google Drive accessible only with permission from U of A Wellness Centre administrators. All data was analyzed using SPSS version 24.

Data Analysis Procedure

A one-way ANOVA analysis was used to compare the differences between student's frequency of binge drinking over the past two weeks and their perceived peer alcohol use. Subsequent Scheffe's post-hoc tests were performed to assess for significant differences in the perception of peer alcohol use to examine which groups of students differed in their perception of peer alcohol use based on their reported frequency of binge drinking over two weeks. Pairwise deletions were performed in the analysis to manage missing data points and maximize the use of the data. Although a listwise deletion would ensure homogeneity of the sample, missing data from the dependent variable only accounted for 2.5% of the sample which was deemed to be insignificant to skew the results. In a practical guide to dealing with missing data, Newman (2014) recommends using all the data and use pairwise deletions if partial respondents consisted of less than 10% which was indeed the case for this analysis.

A one-way ANOVA was selected to be the most appropriate test to perform because there was one categorical independent variable, transformed into four groups (Abstainers, Non-binge drinkers, Infrequent binge drinkers, Binge drinkers) and one continuous dependent variable (perception of peer alcohol use). For the purpose of comparing groups, a one-way ANOVA allowed the comparison of multiple groups and tested for statistical significance

between groups without losing alpha level and increasing the chance of type I error with multiple t-tests. A Scheffe's post-hoc test was chosen for this study as this was the most flexible and most cautious, and allowed identification of which specific groups differed in their perception of peer alcohol use when grouped according to a student's frequency of binge drinking over the past two weeks (Norman & Streiner, 2014; Pallant, 2010).

A stepwise multiple linear regression analysis was performed for the second and third research question until a model was provided that explained the greatest amount of variance and had all significant independent variables for predicting individual alcohol use and predicting the perception of peer alcohol use.

Ethical Considerations

Request forms provided by the U of A's Wellness Services were completed to acquire permission and allow the release of the data from the U of A's Wellness Services for the purpose of this research. It was agreed that only myself, my supervisors, and the administrators at the U of A's Wellness Services would have access to view the data for the allotted time to complete this project. Data was shared through a secured online folder through Google Drive. Access to the secure folder can only be given with permission from the administrators from the U of A's Wellness Services to prevent unauthorized distribution of the data. Once authorization to access the data was provided by the U of A's Wellness Services, files were downloaded onto a designated computer for the purpose of analysis, and deleted after project completion. Results will be kept for five years, as per University of Alberta policy, and then deleted afterwards as there are no plans for further analysis.

An application was submitted for ethical approval to the U of A Research Ethics Board (REB) 2, which reviews all research involving interventional research and research where the

primary concern is privacy and confidentiality (University of Alberta, 2016). As the data set used the ACHA-NCHA II provides participants with a unique ID for student participants in the survey, we obtained ethics approval for concerns of confidentiality through the U of A REB 2.

Given that this research project was a secondary analysis, informed consent was already obtained in the initial data collection of the ACHA-NCHA II and included the possibility of secondary analysis. Ethics for the original survey for the 2016 University of Alberta ACHA-NCHA II survey was obtained through the Health Research Ethics Board at the University of Alberta and complied with the University of Alberta Standards and for the protection of Human Research Participants (Appendix B). There were minimal risks associated with the completion of the online survey because participants were protected from identification, the survey assessed the well-being of students on campus, and there was no intervention provided to participants.

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Chapter Two

Manuscript

Abstract

Problematic alcohol use, such as binge drinking, has been garnering more attention as a public health issue in the United States and Canada. Problem binge drinking has been well documented within many colleges and universities, and overestimation of peer alcohol use in college and university has been demonstrated as contributing to increased individual alcohol use. The extant literature has focused on the misperceptions of alcohol use and the dangers of binge drinking within the United States with few studies to provide an international perspective. Using data obtained from a Western Canadian university through the ACHA-NCHA II survey, a one-way ANOVA test was used to compare the differences in the perception of peer alcohol use after grouping students by their frequency of binge drinking. We found that greater binge drinking frequency increases the reported amount of alcohol consumed by an individual, and that binge drinkers had significantly higher perceptions of peer alcohol use than their non-binge drinking and abstinent peers. Factors that were significant to predict increased individual alcohol use include being of white race/ethnicity, being involved with intramural sports, and reporting concurrent substance use, while factors that predicted increased perception of peer alcohol use include binge drinking status and varsity sports involvement. The findings from our study not only highlight problem drinking, but may also provide direction to future work exploring the feasibility of using perceptions of peer alcohol to screen for at-risk students and social norms campaigns to curtail dangerous drinking behaviour within Canadian colleges and universities.

Highlights

- Binge drinkers have greater misperceptions of peer alcohol use than their peers
- Being of white ethnicity, playing intramural sports, and concurrently using substances is predictive of increased individual alcohol use
- Binge drinking status and playing varsity sports increases the perception of peer alcohol use
- Predictors of individual alcohol consumption appears to be culturally dependent

Abbreviations

American College Health Association (ACHA), American College Health Association - National College Health Assessment II (ACHA-NCHA II), Center for Disease Control and Prevention (CDC), Canadian Centre of Substance Abuse (CCSA), National Institute of Alcohol Abuse and Alcoholism (NIAAA),

Keywords

College Students, University Students, Young Adults, Adults 18-24, Binge Drinking, Heavy Episodic Drinking, Social Norms, Descriptive Norms, Canada

1. Introduction

Problematic alcohol use is a growing problem within North America. Of particular concern is the ongoing problem of alcohol misuse and binge drinking among college and university students, an issue often overlooked by most of the general public (Scott & Kaner, 2014). Binge drinking is defined by the NIAAA (n.d.) as drinking 4 drinks for women or 5 drinks for men within 2 hours or one sitting, and yet college and university students continue to drink far beyond these guidelines. As it stands, the majority of the literature is reflective of the problem of college and university binge drinking within the United States and few have examined this problem internationally. Our study aids in expanding this perspective beyond the United States, into Canada, so that greater attention can be made towards problematic alcohol use internationally to reduce hazardous alcohol consumption in college and university.

1.1 Problematic Alcohol Use and the Young Adult and College and University Population

Alcohol misuse has large overarching effects ranging from individual to social harms. Most problems associated with alcohol use are primarily due to the overconsumption of alcohol, especially when consumed in a binge pattern (Centers for Disease Control and Prevention [CDC], 2014). When last measured in Canada, alcohol misuse cost both the government and industry \$14.6 billion dollars, which was 36.6% of the cost to manage substance use, coming second behind tobacco-related societal costs (Rehm et al., 2006). For Americans, alcohol-related problems cost approximately \$223.5 billion dollars in lost productivity, healthcare costs, law enforcement, and other associated costs, and three-quarters of this cost was attributed to binge drinking (Bouchery, Harwood, Sacks, Simon, & Brewer, 2011; CDC, 2014).

Young adults, defined as adults aged 18 to 24, are at highest risk of experiencing problems associated with alcohol use. When examining substance use data from the past 40

years, the prevalence of binge drinking was highest among young adults (Schulenberg, Johnston, O'Malley, Bachman, Miech, & Patrick, 2017). Of particular concern are young adults who attend college or university which is a sizeable proportion of young adults. Almost 57% and 41% of young adults in Canada and the United States respectively were enrolled in post-secondary institutions (Berger, Motte, & Parkin, 2009; National Center for Education Statistics, 2013). When comparing young adults who attend college or university versus those not attending, rates of binge drinking are far higher in young adults in college or university signifying this subpopulation is particularly at risk of the harms associated with binge drinking (Canadian Centre of Substance Abuse [CCSA], 2014; Government of Canada, 2015; Timberlake et al., 2007).

Targeting interventions at the college and university level are crucial because this is a key period where students initiate or increase substance use (Blevins & Khanna, 2016). College and university represents a time of increased independence, personal growth, and exposure to new social circles that can shape an individual's beliefs about alcohol and their health (Arbour-Nicitopolous, Kwan, Lowe, Taman, & Faulkner, 2010; Boyd, McCabe, Morales, 2005; Windle, 2003). Furthermore, young adults undergo development of important neurobiological structures at this age, and excessive alcohol use can hinder neurobiological development with lasting implications (Blevins & Khanna, 2016).

Predictors of binge drinking include being male, being of white ethnicity, living away from home, being involved with sports and athletics, being a fraternity/sorority member, and reported concurrent substance use (Brown-Rice, Furr, & Jorgensen, 2015; Jones, Oeltmann, Wilson, Brener, & Hill, 2001; Jun et al., 2016; Milroy et al., 2014; Montauti & Bulmer, 2014). When examining the effects of alcohol use and binge drinking, short-term problems of alcohol

use include intoxication and poisoning, increase risky behaviour, and possible accidents and injury, while long-term problems include the risk of cancer, cirrhosis, pancreatitis, and possible development of an alcohol use disorder (Butt, Beirness, Gliksmans, Pardis, Stockwell, 2011; CCSA, 2014). For college and university students specifically, binge drinking has been associated with poorer functional outcomes including blackouts and poorer academic performance, relational strains, legal problems, and problems associated with work (Sheffield, Darkes, Del Boca, & Goldman, 2004; White & Hingson, 2013; Windle, 2003). Despite these findings about binge drinking, college and university students continue to binge drink, and it is imperative to examine how beliefs and norms surrounding alcohol use influence college and university students.

1.2 The Norms Around Alcohol Use in College and University

College and university students overestimate peer alcohol use and this has been correlated with greater alcohol consumption (Dejong et al., 2009; Stock et al., 2014). Studies have shown that college and university students have defined binge drinking at higher quantities, overestimated the prevalence of alcohol use, and overestimated the quantity of alcohol consumed by their peers within college and university (Arbour-Nicotopolous et al., 2010; Franca, Dautzenberg, & McMahon, 2010; McAlaney & McMahon, 2007; Perkins, 2007). Of particular concern are students who binge drink because they have greater misperceptions of peer alcohol use (Weschler & Kuo, 2002). For some students, this perception that alcohol misuse continues to be a part of the college and university experience highlights the need to address these misperceptions to curb dangerous alcohol use (Crawford & Novak, 2010).

Alcohol use in college and university students has been associated with greater social well-being and greater positive affect which draws attention to the substantial role that alcohol

plays in promoting socialization and social cohesion among students (Molnar, Busseri, Perrier, & Sadava, 2009). Zaso et al. (2016) found that prior positive effects from binge drinking often outweigh its negative consequences associated suggesting a reason for continued alcohol use despite its repercussions. Qualitative studies have found that students believe binge drinking is a harmless activity that promotes social cohesion, and define problem drinking beginning when an individual consumes alone and in large quantities at higher frequencies (Guise & Gill, 2007; Sergist & Pettibone, 2009). One study found evidence to suggest that consequences associated with binge drinking accumulated over multiple semesters demonstrating how normalized and accepted the consequences of binge drinking have become (Martinez et al., 2014).

One way to correct these misperceptions are through social norms campaigns which present factual information regarding peer alcohol use (Foxcroft, Moreira, Almeida Santimano, & Smith, 2015; Jun et al., 2016; Lombardi & Choplin, 2010; Ridout & Campbell, 2014). Information that aims to correct an individual's perception of the frequency and magnitude of binge drinking, known as descriptive norms, have shown promise because of the high predictive value descriptive norms have on individual alcohol consumption (Crawford & Novak, 2010; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007; Talbott, Wilkinson, Moore, & Usdan, 2014). Presenting descriptive norms to college and university students provides an opportunity for students to reevaluate their alcohol consumption and facilitates modifications of their own behavior in order to match that of their peers (Campo et al., 2003; Stock et al., 2014). Social norm campaigns have shown low to moderate quality evidence in effectively addressing problematic alcohol use, however it has been recommended as an adjunct for addressing college and university binge drinking (Foxcroft et al., 2015).

With alcohol-related problems continuing to persist within colleges and universities, in this study we demonstrate that problematic alcohol use within college and university students is not just an American phenomenon, but one that also reverberates with Canadian college and university students. Therefore, the purpose of this study was to assess differences in the perception of peer alcohol use when grouping students based on their frequency of binge drinking and assess whether predictors from the literature review predicted individual alcohol use and the perception of peer alcohol use within this Western Canadian sample. The hypothesis was that there are significant differences in the perception of peer alcohol use when students were grouped based on their binge drinking frequency, and that increased frequency of binge drinking increases the perception of peer alcohol use. Moreover, it was hypothesized that the predictive variables from the literature review would predict individual alcohol use and the perception of peer alcohol use within this Western Canadian sample.

2. Methods and Materials

2.1 Methods and Materials

A secondary analysis was performed from existing data obtained from a Western Canadian university. Permission to use the data was provided through the university's health and wellness services. Ethical approval was obtained through the university's own research ethics board.

The survey obtained was the most recent wave of the ACHA-NCHA II survey that was administered in 2016. A sample of the ACHA-NCHA II survey instrument can be obtained through the ACHA website (<http://www.acha-ncha.org/survey.html>)(ACHA, 2014). The ACHA-NCHA II data sets have been validated and deemed reliable reflecting similar trends to other nationally representative surveys (Leino, 2014; Moorhouse, Soule, Parker Hinson, & Barnett,

2014). To maintain anonymity, participants were provided with a unique ID embedded within the web-survey link, and data between emails, unique IDs, and survey responses were not linked. SPSS Version 24 was the software used for the data analysis.

2.2 Participants

Participants in the survey were both undergraduate and graduate students attending a Western Canadian university. Five thousand students were randomly selected by the university's Registrar from the 36,822 enrolled students in the 2015/2016 school year. Inclusion criteria included being registered in at least one class at the university and exclusion criteria included students who were completing courses through distance or away on exchange programs with other campuses. A total of 965 surveys were completed and returned (19% response rate).

2.3 Measures

Questions used for the analysis were demographic information (questions 46-66) and questions that pertained to substance use (questions 8-17) from the ACHA-NCHA II survey. The data was transformed to group students into four categories based on their self-reported binge drinking frequency. Similar groupings were performed by Weschler et al. (1994) and Weschler & Kuo (2000) to group binge drinkers into smaller categories to provide more robust groups for analysis. The four groups included abstainers (students who have not consumed alcohol in past year), non-binge drinkers (students who drank but did not binge in the past two weeks), infrequent binge drinkers (students who binge drank once or twice within the past two weeks), and frequent binge drinkers (students who drank more than twice within the past two weeks). We performed a pairwise deletion for the analysis to manage missing data and maximize the use of data. Missing data accounted for 2.5% and was not deemed significant enough to skew the results.

2.4 Analysis

A one-way ANOVA and a subsequent Scheffe's post-hoc test was performed to examine differences in the perception of peer alcohol use between groups. We performed two separate multiple linear regression analyses to examine predictors previously identified to predict individual alcohol consumption and perception of peer alcohol use in this sample. In the multiple linear regression analyzing perception of peer alcohol use, we included binge drinking status to the model to analyze if this had an influence on perception. Other analyses included using a one-way ANOVA to examine difference in alcohol consumption between these groups and using an independent t-test to examine for gender differences between individual alcohol consumption and perception of peer alcohol use. For the purpose of the multiple regression, concurrent substance use was defined as any reported substance use over the past 30 days that was as equal to or greater than six days. A stepwise analysis was performed for both multiple linear regressions until all independent variables were significant and had the highest variance explained by the model.

3. Results

3.1 Descriptive Data and Statistics

Data about the university's population in the 2015/2016 school year is presented in Table 1. Descriptive statistics of the 965 respondents are shown in Table 2. The mean age of participants completing the survey was 23.3 ($SD= 5.93$) with ages ranging from 18 to 61.

3.2 Alcohol Use on Campus

We found 68.3% ($n = 659$) of students reported consuming alcohol within the past month. The mean number of drinks consumed by students at the university was 3.59 ($n = 952$, $SD = 4.02$) with the median being reported at 2 drinks. Examining gender differences between

individual alcohol consumption, we found males drank an average of 3.73 ($n = 324$, $SD = 4.44$) drinks and females drank 3.52 drinks ($n = 621$, $SD = 3.81$) the last time they partied or socialized, however the mean difference was not significant ($t(574) = 0.74$, $p > 0.05$, 95% CI = -0.78 to 0.36). The frequency of alcohol use over the last 30 days is presented in Table 3.

3.3 Perception of Peer Alcohol Use on Campus

Students perceived that the average student consumed 5.03 drinks the last time they partied/socialized ($n = 950$, $SD = 3.02$). Further, they thought that 70.3% of students at the university consumed alcohol within the past month ($n = 942$, $SD = 20.21$). Males perceived that the average student consumed 4.83 drinks ($n = 323$, $SD = 3.37$) the last time a student partied or socialized, and females perceived the average student consumed 5.12 drinks ($n = 620$, $SD = 2.82$); however, the difference was not significant ($t(941) = 1.42$, $p > 0.05$, 95% CI = -0.11 to 0.70). The frequency of students' perception of frequency of peer alcohol use over the past 30 days is presented in Table 3.

3.4 Perception of Peer Alcohol Use by Frequency of Binge Drinking

The distribution of students based on frequency of binge drinking is presented in Table 4. We performed a one-way ANOVA and found that there were significant differences in the perception of peer alcohol use when grouping students ($n = 949$) based on their frequency of binge drinking ($F = 36.93$, $df = 3, 945$, $p = 0.00$). The perceptions of each group is shown in Table 5. A Scheffe's post-hoc test found there was significant differences in the perception of peer alcohol for all groups, except between infrequent binge drinkers and frequent binge drinkers. The results are provided in Table 6 and Figure 1.

3.5 Differences in Individual Alcohol Use by Frequency of Binge Drinking

Quantity of alcohol consumed by each group based on frequency of binge drinking is shown on Table 5. A Scheffe's post-hoc test found significant differences in individual alcohol use between all groups and results are summarized in Table 7.

3.6 Multiple Linear Regression on Individual Alcohol Use and Perception of Peer Alcohol Use

A stepwise multiple linear regression model explaining individual alcohol use was significant ($F = 19.77$, $df = 5$, $p < 0.05$) and explained 9.3% of variance for individual alcohol use. The Pearson correlation table for individual alcohol use can be found in Table 8A, Table 8B, and Table 8C. The coefficients significant for this multiple linear regression model can be found in Table 9.

A second stepwise multiple linear regression model explaining the perception of peer alcohol use was significant ($F = 27.28$, $df = 4$, $p < 0.05$) and explained 10.3% of the variance for the perception of peer alcohol use. The Pearson correlation table for perception of peer alcohol use can be found in Table 10A, Table 10B, and Table 10C, and the significant coefficients for this multiple linear regression model can be found in Table 11.

4. Discussion

Our results found that there are significant differences in the perception of peer alcohol use between groups of students in this sample. Three groups with significant differences in perspective included the abstainers, the non-binge drinkers, and students who binge drink (both infrequently and frequently). The abstainer group was closest in predicting how much alcohol a student consumed the last time they had partied/socialized. Both non-binge drinkers and the

binge drinking groups overestimated peer alcohol use by about 1.5 drinks and 2.5 drinks respectively.

Our results suggest that alcohol use has a role in predicting overestimations of peer alcohol use given that both non-binge drinkers and students who binge drink overestimated peer alcohol use. This finding supports earlier work by Hustad, Pearson, Neighbors, and Bosari (2014) who found that students who drink perceived higher peer alcohol use than their abstinent peers. Expanding upon this concept, Park, Smith, Klein, and Martell (2011) also found that students who binge drink had greater overestimations and greater misperceptions of peer alcohol use than their non-binge drinking counterparts. Further, our findings support the work by Park et al. (2011) who determined that students who binge drink, both infrequently and frequently, had overestimated peer alcohol use by almost one drink more than their non-binge drinking peers. Based on this, alcohol use appears to influence overestimations of peer alcohol use, but binge drinking status appears to further skew perceptions of peer alcohol use which puts this group at further risk of experiencing alcohol-related problems. One possible explanation as to why perceptions of peer alcohol by students who binge drink are greater than their non-binge drinking peers is because binge drinking behaviour is associated with greater risk taking suggesting high sensitivity to reward with greater disregard of negative consequences (Ragnhild, Billieux, & Landro, 2016). Therefore, their perception is reflective of the disregard of consequences associated with excessive alcohol use (Ragnhild et al., 2016).

What is unclear however, is whether binge drinking frequency has an effect on the misperception of alcohol peer alcohol use. Our findings found no direct relationship between frequency of binge drinking and the perception of peer alcohol use. Looking at Figure 1, we can see that increasing alcohol consumption increases perceptions of peer alcohol use, but

overestimations of peer alcohol use begin to plateau once binge drinking status is introduced. Students who binge drink consume more alcohol and have greater misperceptions of peer alcohol use. It has been suggested the assessment of perception of peer alcohol use could be one way to screen for students who binge drink and who could benefit from individualized social norm interventions which has shown evidence to reduce overall alcohol consumption and binge-drinking episodes (Dotson, Dunn, & Bowers, 2015).

When comparing our results to other findings from the literature, our sample of Western Canadian students appear similar to other college and university students with regards to prevalence of binge drinking. Our study found that 36.2% of students who binge drank, a rate comparable to others in the literature ranging from 33% to 47% (Clinkinbeard & Johnson, 2013; Luquiens, Falissard, & Aubin, 2016; Montauti & Bulmer, 2014). Persistent high rates of binge drinking suggest that there is little insight into the problems associated with binge drinking, and further interventions are required to address this problem. Clinkinbeard and Johnson (2013) found that 37% of students met the criteria for binge drinking despite 22% self-reporting themselves as binge drinkers. To these researchers, this indicated an inability for students to identify that their own behaviour could be classified as problematic or risky and more needs to be done to bring attention to this issue (Clinkinbeard & Johnson, 2013). With rates of binge drinking within a our Western Canadian university sample being similar to American samples, Canadian college and university students are likely to experience negative consequences associated with binge drinking, and would likely benefit from interventions to address this issue.

Looking at the multiple linear regression, predictors of increased alcohol consumption from our sample included being white, being involved with intramural sports, and reported concurrent substance users. Our results are similar to what we found in the literature where the

factors of being male, being white, having concurrent substance use, living away from home, being involved with sports and being a fraternity/sorority member increases alcohol use (Akmatov, Mikolajczyk, Meier, & Kramer, 2011; Jones et al., 2001; Montauti & Bulmer, 2014; Sheppard, Usdan, Higginbotham, & Cremeens-Matthews, 2016). Fraternity/sorority membership was not considered a predictor in alcohol use in our sample. This could be explained by the low rate of fraternity/sorority membership within Canada whereas other rates of fraternity membership in some samples ranged between 11-23% which are far higher (Champion, Lewis, & Myers, 2015; Neighbors et al., 2007; Rinker & Neighbors, 2013). Another predictor noted in the literature but not our model was current residence. Our sample had almost 40% of our sample living with their parents or guardian which is considerably high. Rates of Canadian students living away from home range from 40-70% whereas almost 70-80% of American college students live away from home or on campus, perhaps highlighting some cultural differences between Canadian and American college and university students (Arbour-Nicitopolous et al., 2010; Demers, Kairouz, Adalf, Gilksman, Newton-Taylor, & Marchand, 2002; King, Bosari, & Chen, 2010; Page & O'Hegarty, 2007).

5. Conclusions

Canadian college and university students share many similarities with their American counterparts with regards to overestimating peer alcohol use and the high prevalence of students engaging in binge drinking. Our results found that students continue to overestimate peer alcohol use and that students who use alcohol and binge drink have greater misperceptions of peer alcohol use. Unlike their American counterparts however, gender, fraternity/sorority membership and current residence did not appear to be predictive in increasing alcohol consumption in our sample.

Addressing misperceptions of peer alcohol use should be prioritized because of the role perceptions play in influencing one's behaviour, and our study provides some support of the value of social norms interventions. In light of our findings, we suggest that public health professionals and college and university administrators may identify at-risk students who binge drink by attending to perceptions of peer alcohol use and, in response, they may offer support for continuing to tackle misperceptions to reduce problematic alcohol use.

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Chapter Three

Discussion

Our findings identify that Canadian college and university students are similar to international students who all overestimate peer alcohol use. With young adults being more prone to alcohol-related problems and more than half of young adults attending post-secondary within Canada, there is a mounting need to provide adequate screening and interventions within colleges and universities to reduce alcohol-related harms (Berger, Motte, & Parkin, 2009). The results from our findings bring to the forefront the problematic use of alcohol in Canadian colleges and universities. This in turn presents an opportunity for nurses to become more aware of the issues and partake in solutions to better address this problem.

All nurses need to be aware of the implications problematic alcohol use has in order to deliver competent care (Donnelly, Kent-Wilkinson, & Rush, 2013). Problems associated with alcohol use percolate into every practice setting, and nurses need to be knowledgeable about how to approach and treat people experiencing alcohol-related issues. In an article by Donnelly et al. (2013), the authors provide clinical reasoning for nurses to be aware of the patient's symptoms associated with alcohol intoxication, and the ensuing appropriate management. The authors teach nurses that there is a high incidence of trauma, dehydration, internal organ damage, and neurobiological pathophysiology that explain the behaviours and progression of symptoms associated with alcohol intoxication and why nurses need to take this seriously rather than writing these patients off as "just another drunk" (Donnelly et al., 2013).

Another important consideration nurses can take away from our findings is the role the environment plays in shaping our beliefs and behaviours on health. Our findings demonstrate that perceived norms and social influences affect individual behaviour in college and university,

and that the continued misperception of peer alcohol use creates a discrepancy for students to assume how prevalent alcohol use is in post-secondary institutions (Ickes, Haider, & Sharma, 2015). The fallout of these misperceptions is seen by the continued high rates of dangerous alcohol use in college and university and serve as an example for nurses how one's environment influences an individual's health. Using a public health approach, nurses can be part of the solution through creating key community partnerships in order to tackle this problematic issue. In a review of public health interventions by Kelly-Weeder, Phillips, and Rounseville (2011), community-based interventions have shown significant and positive outcomes that involve many sectors in the community including individual drinkers, vendors and sellers of alcohol, medical personnel, law enforcement, schools, churches, and business organizations to support a public health campaign.

Another component of college and university binge drinking is understanding the mental health and stressors at this stage of development. Young adults attending college and university face a daunting task of transitioning into college and university life coupled with decreased adult supervision and peer pressure to conform to drinking behaviour (Kazemi, Levine, Qi, & Dmchowski, 2015). Students face many reasons to consume alcohol including social pressure, emotional relief, and young adults may be still learning and developing refusal skills (Ehret, Ghaidarov, & LaBrie, 2013). It is important for nurses to understand how students feel about alcohol consumption within college and university in order to be an effective practitioner. Collaborative partnerships better align health priorities between the nurse and the patient and is vital for building a therapeutic relationship so that mutual health goals can be met.

There are good examples of how nurses can be involved to curb harm associated with college and university binge drinking. In one program, teaching protective behavioural strategies

(slow/modify speed of drinking, limit setting, and offsetting negative consequences) and drinking refusal skills (skills to say no) showed promise to empower students to reduce the harms associated with alcohol use (Ehret et al., 2013). Another underutilized intervention that nurses can spearhead is the use of SBIRT (Screening, Brief Intervention, and Referral to Treatment) in the community. College and university students rarely identify themselves as having problems relating to alcohol (Monti, Tevyaw, & Bosari, 2005). Naegle, Himmel, and Ellis (2013) recognized that young adults were rarely screened for alcohol use and described a nurse-led intervention to roll out an interdisciplinary pilot screening project which looked to adopt SBIRT into their workflow. This nurse-led initiative not only integrated SBIRT into primary and secondary care within two university clinics, it also created links with community agencies to improve communication, facilitate referrals, and provide appropriate follow up to better serve the student population (Naegle et al., 2013).

A final intervention nurses can partake in to reduce college and university binge drinking is motivational-based programs. Motivational-based programs have shown strong evidence to support its effectiveness towards college and university students (Kelly-Weeder et al., 2011). Motivational-based therapies allow a student to work with a professional through the decision-making process to assess motivation and commitment to change (Hagger, Lonsdale, & Chatzisarantis, 2012). College and university students value brief feedback and interventions regarding their alcohol use, and principles of motivational techniques (such as reflective listening and empathy) are skills nurses emulate and can help patients to work through their ambivalence regarding alcohol use (Monti et al., 2005). One criticism of this intervention however, is that the effects of these interventions do not last unless there is accountability and follow-up. Researchers have noted the value in periodically reinforcing brief feedback when carrying out this type of

intervention (Ickes et al., 2015; Kazemi et al., 2015; Monti et al., 2005). Considering that nurses comprise the largest health professional groups in Canada and given their wide skill set, nurses could screen, reinforce feedback regarding alcohol use, and provide the needed follow-up to continually assess individual alcohol use and ultimately, reduce college and university binge drinking.

Limitations

Due to the nature of a secondary analysis, I worked with data that was already collected and had no control over the survey design and data collection process. I had to be mindful of the items used in the ACHA-NCHA II survey to ensure that the survey instrument was adequate to answer my research question. Therefore, the depth of characterizing alcohol use and the perception of peer alcohol use was limited to the survey items. It is worth noting that the complicated nature of alcohol consumption makes characterizing alcohol use through survey questions very difficult. Thinking about biological differences between individuals, timing of drinks, and the lack of standardization of alcohol content in beverages makes it difficult to generalize standard definitions and perhaps the relevance of this problem to some individuals.

Another limitation for this secondary analysis is the use of survey data and not having an experimental design to test and measure for one's alcohol use. The survey relied on students' self-reports and it can be difficult for students to correctly estimate their alcohol consumption due to their perceptions of others and the effects of alcohol on memory. Furthermore, students may have different definitions of problematic alcohol use, or may not view themselves as problematically binge drinking thus causing misreporting. The number of students who binge drink may be underrepresented, and the extent of the problem may be different than our results reveal. Another implication of this gap is that there may be differences between researchers and

participants in their view of the problem, and this can create an ineffective research outcome or resistance from the target population.

A final limitation of our findings is that the sample may not be representative of the population. In the sample, graduate students and full-time students were overrepresented. Further, it is typically known that females are usually overrepresented in self-administered surveys. Factors such as age and being female may have been protective in reporting alcohol use within this sample. Furthermore, the results obtained from this study are reflective of our Western Canadian sample and may not be representative of the problem throughout Canada. What this means is that our results may not be reflective of the full problem of binge drinking at the university and throughout Canada and this warrants careful consideration when interpreting the results.

Future Directions

Looking at our results from the ACHA-NCHA II data, future studies can use the same survey instrument at a different college or university to assess if the findings are replicable. By using data from another college or university, future researchers can assess whether these findings can be further generalized among other colleges and universities, especially from a Canadian college and university context.

Another direction for future examination is the role of advertising and marketing towards young people and how this influences perceptions of peer alcohol use. A systematic review by Smith and Foxcroft (2009) suggest that there is an association between exposure to alcohol advertising and alcohol consumption in young people. There would be value to see how alcohol advertising is directed towards college and university students and to what degree this shapes perception of peer alcohol use. In a review by Stautz, Brown, King, Shemilt, and Marteau

(2016), researchers note that alcohol advertisements may cause increased alcohol consumption but to different degrees between genders, and future studies may examine this predictor.

Finally, using longitudinal data, future researchers can also monitor changes in the perception of peer alcohol use and assess its relationship with reported alcohol consumption. Future research can assess for trends in the perception of peer alcohol use and monitor if interventions targeted at the perception of peer alcohol at a broad level use has an effect in lowering individual alcohol consumption.

Conclusion

From our results, Canadian college and university students overestimate peer alcohol use, and this misperception of peer alcohol use continues to be problematic. Alcohol use influences student's perceptions of peer alcohol use and binge drinking further skews this perception. The evidence generated from this study suggests these misperceptions of peer alcohol use can lead to increased individual consumption. Further, a greater perception of peer alcohol use was found to be predicted by being a binge drinker and being involved in varsity sports. Our results also found that being white, being a concurrent substance user, and being involved in intramural sports increased individual alcohol use. Some differences among between Canadian and American college and university students are that gender, fraternity/sorority membership, and living situation do not appear to be predictive of increased alcohol use and this could be reflective of cultural differences between these countries.

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Tables and FiguresTable 1 - Population Data for the 2015/2016 School Year

		<i>n</i>	%
Year of Study			
	Undergraduate	29625	80.4
	Graduate	7204	19.6
Enrollment Status			
	Full-Time	33593	91.2
	Part-Time	3229	8.8

Table 2 - Sample Descriptive Statistics

		<i>n</i>	%
Gender			
	Female	628	65.1
	Male	327	33.9
	Missing	10	1.0
Years of Study			
	1st year undergraduate	148	15.3
	2nd year undergraduate	164	17.0
	3rd year undergraduate	173	17.9
	4th year undergraduate	150	15.5
	5th year undergraduate or more	81	8.4
	Graduate or Professional	221	22.9
	Not seeking a degree	4	0.4
	Other	6	0.6
	Missing	18	1.9
Enrollment Status			
	Full-Time Student	907	94.0
	Part-Time Student	44	4.6
	Other	4	0.4
	Missing	10	1.0
Marital Status			
	Single	770	79.8
	Married	151	15.6
	Separated	2	0.2
	Divorced	6	0.6
	Other	19	2.0
	Missing	17	1.8
Current Residence			
	Campus Residence Hall	102	10.6
	Fraternity/Sorority House	3	0.3
	Other College/University Housing	19	2.0
	Parent/Guardian's Home	392	40.6
	Other Off-Campus Housing	365	37.8
	Other	71	7.4
	Missing	13	1.3
Fraternity/Sorority Member			
	Yes	26	2.7
	No	923	95.6
	Missing	16	1.7
Varsity Sports Involvement			
	Yes	25	2.6
	No	916	94.9
	Missing	24	2.5
Club Sports Involvement			
	Yes	88	9.1

	No	853	88.4
	Missing	24	2.5
Intramural Sports			
	Yes	148	15.3
	No	797	82.6
	Missing	20	2.1
Race/Ethnicity			
	White	693	71.8
	Black or African American	21	2.2
	Hispanic or Latino/a	28	2.9
	Asian or Pacific Islander	189	19.6
	American Indian, Alaskan Native, Native Hawaiian	39	4.0
	Biracial or Multiracial	42	4.4
	Other	16	1.7

Table 3 - Frequency of Alcohol Use and Perception of Frequency of Peer Alcohol Use Over the Last 30 Days

		<i>n</i>	%
Frequency of Alcohol Use			
	Never Used	153	15.9
	Have Used, but not in last 30 days	149	15.4
	1-2 Days	213	22.1
	3-5 Days	193	20.0
	6-9 Days	125	13.0
	10-19 Days	86	8.9
	20-29 Days	31	3.2
	Used Daily	11	1.1
	Missing	4	0.4
Perception of Frequency of Peer Alcohol Use			
	Never Used	38	3.9
	Have Used, but not in last 30 days	14	1.5
	1-2 Days	57	5.9
	3-5 Days	154	16.0
	6-9 Days	216	22.4
	10-19 Days	281	29.1
	20-29 Days	108	11.2
	Used Daily	78	8.1
	Missing	19	2.0

Table 4 - Distribution of University of Alberta Students Based on Frequency of Binge Drinking

	<i>n</i>	%
Abstainer	203	21.1
Non-Binge Drinker	483	50.3
Infrequent Binge Drinker	239	24.9
Frequent Binge Drinker	35	3.6
Missing	5	0.5

Table 5 - Quantity of Drinks Consumed and Perception of the Number of Drinks Consumed by Students at the University of Alberta Grouped by Gender and Frequency of Binge Drinking

		Number of Drinks Consumed the Last Time an Individual Partied/Socialized	Perception of the Number of Drinks Consumed the Last Time Students Partied/Socialized
UofA Students		3.59	5.03
Gender			
	Male	3.73	4.83
	Female	3.52	5.12
Frequency of Binge Drinking			
	Abstainers	0.24	3.50
	Non-Binge Drinkers	3.02	4.95
	Infrequent Binge Drinkers	6.79	6.22
	Frequent Binge Drinkers	8.54	6.69

Table 6 - Scheffe's Post-Hoc Comparison of Mean Differences of Perception of Peer Alcohol Use by Frequency of Binge Drinking

	Mean Difference of Perceived Peer Alcohol Use	Standard Error	<i>p-value</i>
Abstainers vs. Non-Binge Drinkers	-1.46	0.24	0.00
Abstainers vs. Infrequent Binge Drinkers	-2.73	0.28	0.00
Abstainers vs. Frequent Binge Drinkers	-3.19	0.53	0.00
Non-Binge Drinkers vs. Infrequent Binge Drinkers	-1.28	0.23	0.00
Non-Binge Drinkers vs. Frequent Binge Drinkers	-1.73	0.50	0.00
Infrequent Binge Drinkers vs. Frequent Binge Drinkers.	-0.46	0.52	0.85

Table 7 - Scheffe's Post-Hoc Comparison of Mean Differences of Individual Alcohol Use by Frequency of Binge Drinking

	Mean Difference of Individual Alcohol Use	Standard Error	<i>p-value</i>
Abstainers vs. Non-Binge Drinkers	-2.79	0.27	0.00
Abstainers vs. Infrequent Binge Drinkers	-6.56	0.31	0.00
Abstainers vs. Frequent Binge Drinkers	-8.31	0.59	0.00
Non-Binge Drinkers vs. Infrequent Binge Drinkers	-3.77	0.25	0.00
Non-Binge Drinkers vs. Frequent Binge Drinkers	-5.52	0.56	0.00
Infrequent Binge Drinkers vs. Frequent Binge Drinkers.	-1.75	0.58	0.00

Table 8A - Pearson Correlation Table for Individual Alcohol Consumption

	Individual Alcohol Use	Age	Gender	Married	Separated	Divorced	Other Relationship	White Ethnicity	Black Ethnicity	Latino/a Ethnicity
Individual Alcohol Use										
Age	-0.111**									
Gender	0.034	0.053**								
Married	-0.121**	0.528**	0.000							
Separated	-0.007	0.066**	-0.034	-0.020						
Divorced	-0.059**	0.210**	-0.058**	-0.035	-0.004					
Other Relationship	0.006	-0.034	-0.008	-0.062**	-0.007	-0.012				
White Ethnicity	0.202**	-0.017	-0.022	0.029	-0.024	-0.011	0.003			
Black Ethnicity	-0.080**	0.174**	0.082**	0.061**	0.153**	0.080**	-0.022	-0.228**		
Latino/a Ethnicity	-0.042	0.123**	0.007	0.151**	-0.008	0.069**	-0.024	-0.199**	0.021	
Asian Ethnicity	-0.170**	-0.130**	-0.003	-0.117**	-0.023	-0.040	0.025	-0.705**	-0.054**	-0.065**
Indigenous Ethnicity	0.045	0.022	-0.065**	0.005	-0.010	-0.017	0.087**	-0.049	0.007	0.000
Biracial Ethnicity	0.009	-0.016	-0.041	-0.032	-0.010	-0.017	0.081**	-0.122**	0.041	0.030
Other Ethnicity	-0.020	0.007	0.063**	-0.034	-0.006	0.092**	-0.019	-0.143**	0.094**	0.029

	Individual Alcohol Use	Age	Gender	Married	Separated	Divorced	Other Relationship	White Ethnicity	Black Ethnicity	Latino/a Ethnicity
Campus Residence	-0.014	-0.092**	-0.015	-0.068**	-0.016	0.016	0.000	-0.109**	0.070**	-0.014
Fraternity / Sorority Residence	-0.004	-0.025	0.080**	-0.024	-0.003	-0.005	-0.008	-0.008	-0.009	-0.010
Other University Residence	0.004	0.000	-0.043	-0.034	-0.006	0.092**	-0.019	-0.031	-0.020	0.080**
Parent / Guardian Residence	-0.018	-0.380**	0.000	-0.307**	-0.040	-0.014	0.016	0.018	-0.051	-0.061**
Other Off-Campus Residence	0.056**	0.293**	0.001	0.239**	0.011	-0.008	0.012	0.054**	-0.009	0.048
Other Residence	-0.050	0.299**	0.017	0.247**	0.078**	-0.022	-0.040	0.025	0.046	0.006
Varsity Sports Involvement	0.070**	-0.055**	0.021	-0.053	-0.008	-0.014	-0.024	0.027	-0.025	0.054**
Club Sports Involvement	0.045	-0.053**	0.131**	-0.093**	-0.015	-0.026	-0.020	-0.027	-0.047	0.016
Intramural Sports Involvement	0.124**	-0.076**	0.134**	-0.115**	-0.020	-0.035	-0.020	0.097**	-0.002	-0.053
Fraternity / Sorority Membership	-0.017	0.041	0.064**	0.003	-0.008	0.069**	-0.024	-0.048	0.113**	-0.028
Concurrent Substance Use	0.165**	0.035	0.044	-0.025	-0.014	0.126**	-0.043	-0.011	-0.044	0.025

** - Indicates significance with $p < 0.05$

Table 8B - Pearson Correlation Table for Individual Alcohol Consumption

	Asian Ethnicity	Indigenous Ethnicity	Biracial Ethnicity	Other Ethnicity	Campus Residence	Fraternity / Sorority Residence	Other University Residence	Parent / Guardian Residence	Other Off-Campus Residence	Other Residence		
Individual Alcohol Use												
Age												
Gender												
Married												
Separated												
Divorced												
Other Relationship												
White Ethnicity												
Black Ethnicity												
Latino/a Ethnicity												
Asian Ethnicity												
Indigenous Ethnicity											-0.045	
Biracial Ethnicity											0.017	0.119**
Other Ethnicity											-0.023	0.100**
Campus Residence	0.118**	-0.016	-0.056**	0.008								
Fraternity / Sorority Residence	-0.028	-0.012	-0.012	0.138**	-0.020							
Other University Residence	-0.002	0.015	0.012	-0.018	-0.046	-0.008						

	Asian Ethnicity	Indigenous Ethnicity	Biracial Ethnicity	Other Ethnicity	Campus Residence	Fraternity / Sorority Residence	Other University Residence	Parent / Guardian Residence	Other Off-Campus Residence	Other Residence
Parent / Guardian Residence	0.041	-0.028	0.078**	0.005	-0.293**	-0.049	-0.113**			
Other Off-Campus Residence	-0.067**	0.068**	-0.057**	-0.002	-0.270**	-0.045	-0.104**	-0.667**		
Other Residence	-0.093**	-0.057**	0.024	-0.037	-0.095**	-0.016	-0.037	-0.235**	-0.217**	
Varsity Sports Involvement	-0.048	0.000	-0.036	0.029	-0.014	-0.010	0.080**	0.007	-0.021	0.006
Club Sports Involvement	0.026	-0.046	0.006	0.015	0.001	-0.018	0.131**	-0.002	-0.015	-0.029
Intramural Sports Involvement	-0.056**	-0.057**	-0.047	-0.011	0.099**	0.029	-0.011	-0.124**	0.102**	-0.071**
Fraternity / Sorority Membership	0.002	0.000	-0.036	0.131**	0.008	0.342**	0.080**	-0.020	-0.035	-0.020
Concurrent Substance Use	-0.063**	0.042	0.036	0.053**	-0.023	0.054**	-0.008	-0.038	0.035	0.029

** - Indicates significance with $p < 0.05$

Table 8C - Pearson Correlation Table for Individual Alcohol Consumption

	Varsity Sports Involvement	Club Sports Involvement	Intramural Sports Involvement	Fraternity / Sorority Membership	Concurrent Substance Use
Individual Alcohol Use					
Age					
Gender					
Married					
Separated					
Divorced					
Other Relationship					
White Ethnicity					
Black Ethnicity					
Latino/a Ethnicity					
Asian Ethnicity					
Indigenous Ethnicity					
Biracial Ethnicity					
Other Ethnicity					
Campus Residence					
Fraternity / Sorority Residence					
Other University Residence					
Parent / Guardian Residence					

	Varsity Sports Involvement	Club Sports Involvement	Intramural Sports Involvement	Fraternity / Sorority Membership	Concurrent Substance Use
Other Off-Campus Residence					
Other Residence					
Varsity Sports Involvement					
Club Sports Involvement	0.179**				
Intramural Sports Involvement	0.021	0.179**			
Fraternity / Sorority Membership	0.013	0.086**	0.021		
Concurrent Substance Use	0.000	-0.038	0.020	0.000	

** - Indicates significance with $p < 0.05$

Table 9 - Multiple Linear Regression Model Coefficients for Individual Alcohol Use

Independent Variable	<i>b</i>	Std. Error	Standardized <i>b</i>
Constant	2.18	0.26	
White Race / Ethnicity	1.81	0.29	0.20
Concurrent Substance Use	2.59	0.48	0.17
Married	-1.30	0.36	-0.12
Intramural Sports Involvement	0.96	0.36	0.09
Divorced	-4.02	1.6	-0.08

Table 10A - Pearson Correlation Table for Perception of Peer Alcohol Use

	Perception of Peer Alcohol Use	Age	Gender	Married	Separated	Divorced	Other Relationship	White Ethnicity	Black Ethnicity	Latino/a Ethnicity
Perception of Peer Alcohol Use										
Age	-0.154**									
Gender	-0.038	0.059**								
Married	-0.138**	0.520**	0.003							
Separated	-0.024	0.066**	-0.034	-0.020						
Divorced	-0.037	0.211**	-0.058**	-0.034	-0.004					
Other Relationship	0.045	-0.034	-0.007	-0.062**	-0.007	-0.012				
White Ethnicity	0.129**	-0.018	-0.023	0.034	-0.024	-0.011	0.003			
Black Ethnicity	-0.086**	0.182**	0.073**	0.066**	0.157**	0.083**	-0.021	-0.238**		
Latino/a Ethnicity	-0.014	0.129**	-0.002	0.158**	-0.008	0.071**	-0.024	-0.207**	-0.024	
Asian Ethnicity	-0.139**	-0.126**	-0.009	-0.116**	-0.023	-0.040	0.025	-0.711**	-0.071**	-0.080**
Indigenous Ethnicity	0.042	0.023	-0.065**	0.006	-0.010	-0.017	0.087**	-0.049	-0.030	-0.034

FREQUENCY OF BINGE DRINKING AND ALCOHOL PERCEPTION

	Perception of Peer Alcohol Use	Age	Gender	Married	Separated	Divorced	Other Relationship	White Ethnicity	Black Ethnicity	Latino/a Ethnicity
Biracial Ethnicity	0.025	-0.013	-0.049	-0.029	-0.010	-0.017	0.083**	-0.127**	0.007	-0.001
Other Ethnicity	-0.034	0.012	0.053	-0.031	-0.006	0.096**	-0.019	-0.153**	0.042	-0.021
Campus Residence	0.042	-0.089**	-0.012	-0.066**	-0.016	0.016	0.000	-0.112**	0.075**	-0.011
Fraternity / Sorority Residence	0.005	-0.025	0.080**	-0.024	-0.003	-0.005	-0.008	-0.008	-0.008	-0.009
Other University Residence	0.000	0.001	-0.043	-0.033	-0.006	0.092**	-0.019	-0.031	-0.019	0.083**
Parent / Guardian Residence	0.001	-0.375**	-0.009	-0.305**	-0.040	-0.014	0.016	0.022	-0.062**	-0.070**
Other Off-Campus Residence	-0.002	0.293**	0.002	0.245**	0.011	-0.008	0.011	0.048	-0.004	0.053**
Other Residence	-0.048	0.286**	0.029	0.229**	0.079**	-0.022	-0.040	0.032	0.050	0.009
Varsity Sports Involvement	0.117**	-0.055**	0.021	-0.052	-0.008	-0.014	-0.024	0.027	-0.024	0.056**
Club Sports Involvement	0.028	-0.052	0.136**	-0.094**	-0.015	-0.026	-0.020	-0.033	-0.046	0.018
Intramural Sports Involvement	0.084**	-0.075**	0.134**	-0.113**	-0.020	-0.035	-0.019	0.097**	0.002	-0.051
Fraternity / Sorority Membership	-0.050	0.042	0.064**	0.003	-0.008	0.069**	-0.024	-0.048	0.117**	-0.027
Concurrent Substance Use	0.092**	0.036	0.044	-0.024	-0.014	0.126**	-0.043	-0.011	-0.043	0.028

	Perception of Peer Alcohol Use	Age	Gender	Married	Separated	Divorced	Other Relationship	White Ethnicity	Black Ethnicity	Latino/a Ethnicity
Binge Drinking Status	0.258**	-0.087**	0.042	-0.132**	-0.030	-0.022	0.008	0.180**	-0.076**	-0.060**

** - Indicates Significance $p < 0.05$

Table 10B - Pearson Correlation Table for Perception of Peer Alcohol Use

	Asian Ethnicity	Indigenous Ethnicity	Biracial Ethnicity	Other Ethnicity	Campus Residence	Fraternity / Sorority Residence	Other University Residence	Parent / Guardian Residence	Other Off-Campus Residence	Other Residence	
Perception of Peer Alcohol Use											
Age											
Gender											
Married											
Separated											
Divorced											
Other Relationship											
White Ethnicity											
Black Ethnicity											
Latino/a Ethnicity											
Asian Ethnicity											
Indigenous Ethnicity											-0.058**

FREQUENCY OF BINGE DRINKING AND ALCOHOL PERCEPTION

	Asian Ethnicity	Indigenous Ethnicity	Biracial Ethnicity	Other Ethnicity	Campus Residence	Fraternity / Sorority Residence	Other University Residence	Parent / Guardian Residence	Other Off-Campus Residence	Other Residence
Biracial Ethnicity	0.006	0.094**								
Other Ethnicity	-0.041	0.061**	-0.027							
Campus Residence	0.121**	-0.016	-0.054**	0.012						
Fraternity / Sorority Residence	-0.028	-0.012	-0.012	0.143**	-0.020					
Other University Residence	-0.002	0.015	0.013	-0.017	-0.046	-0.008				
Parent / Guardian Residence	0.030	-0.039	0.073**	-0.005	-0.290**	-0.049	-0.113**			
Other Off-Campus Residence	-0.058**	0.066**	-0.055**	0.004	-0.270**	-0.045	-0.105**	-0.670**		
Other Residence	-0.091**	-0.034	0.027	-0.035	-0.094**	-0.016	-0.036	-0.233**	-0.216**	
Varsity Sports Involvement	-0.048	0.000	-0.035	0.031	-0.013	-0.010	0.080**	0.007	-0.022	0.007
Club Sports Involvement	0.033	-0.046	0.007	0.018	0.001	-0.018	0.130**	-0.005	-0.012	-0.028
Intramural Sports Involvement	-0.056**	-0.057**	-0.045	-0.007	0.101**	0.029	-0.011	-0.123**	0.099**	-0.069**
Fraternity / Sorority Membership	0.003	0.000	-0.035	0.137**	0.008	0.342**	0.080**	-0.020	-0.036	-0.020
Concurrent Substance Use	-0.063**	0.042	0.038	0.057**	-0.021	0.054**	-0.008	-0.038	0.033	0.030

	Asian Ethnicity	Indigenous Ethnicity	Biracial Ethnicity	Other Ethnicity	Campus Residence	Fraternity / Sorority Residence	Other University Residence	Parent / Guardian Residence	Other Off- Campus Residence	Other Residence
Binge Drinking Status	-0.175**	-0.009	0.020	-0.026	0.008	0.005	0.043	-0.048	0.067**	-0.062**

** - Indicates Significance $p < 0.05$

Table 10C - Pearson Correlation Table for Perception of Peer Alcohol Use

	Varsity Sports Involvement	Club Sports Involvement	Intramural Sports Involvement	Fraternity/Sorority Membership	Concurrent Substance Use	Binge Drinking Status
Perception of Peer Alcohol Use						
Age						
Gender						
Married						
Separated						
Divorced						
Other Relationship						
White Ethnicity						
Black Ethnicity						
Latino/a Ethnicity						
Asian Ethnicity						

	Varsity Sports Involvement	Club Sports Involvement	Intramural Sports Involvement	Fraternity/Sorority Membership	Concurrent Substance Use	Binge Drinking Status
Indigenous Ethnicity						
Biracial Ethnicity						
Other Ethnicity						
Campus Residence						
Fraternity / Sorority Residence						
Other University Residence						
Parent / Guardian Residence						
Other Off-Campus Residence						
Other Residence						
Varsity Sports Involvement						
Club Sports Involvement	0.177**					
Intramural Sports Involvement	0.022	0.177**				

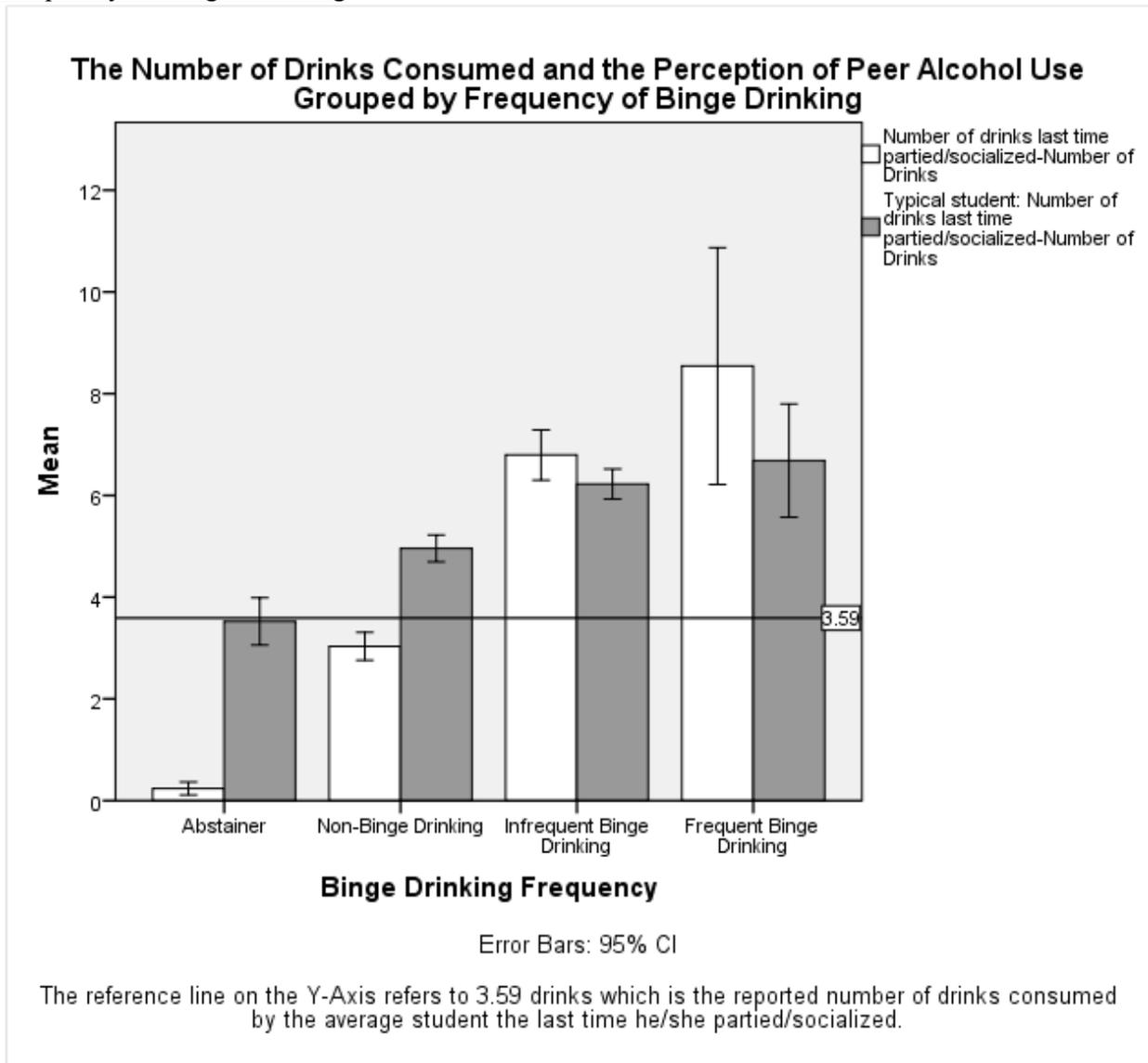
	Varsity Sports Involvement	Club Sports Involvement	Intramural Sports Involvement	Fraternity/Sorority Membership	Concurrent Substance Use	Binge Drinking Status
Fraternity / Sorority Membership	0.013	0.085**	0.022			
Concurrent Substance Use	0.000	-0.038	0.020	0.000		
Binge Drinking Status	0.025	0.060**	0.120**	0.025	0.228**	

** - Indicates Significance $p < 0.05$

Table 11 - Multiple Linear Regression Model Coefficients for Perception of Peer Alcohol Use

Independent Variable	<i>B</i>	Std. Error	Standardized <i>b</i>
Constant	6.46	0.41	
Binge Drinking Status	1.48	0.21	0.22
Age	-0.07	0.02	-0.14
Asian Race/Ethnicity	-0.87	0.25	-0.11
Varsity Sports Involvement	1.81	0.58	0.10

Figure 1 - The Number of Drinks Consumed and the Perception of Peer Alcohol Use Grouped by Frequency of Binge Drinking



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One drink of alcohol is defined as a 12 oz. can or bottle of beer or wine cooler, a 4 oz. glass of wine, or a shot of liquor straight or in a mixed drink

10.) The last time you "partied"/socialized how many drinks of alcohol did you have? (If you did not drink alcohol, please enter 0)

___ Number of Drinks

11.) The last time you "partied"/socialized, over how many hours did you drink alcohol? (If you did not drink alcohol, please enter 0)

___ Number of Hours

12.) How many drinks of alcohol do you think the typical student at your school had the last time he/she "partied"/socialized? (If you think the typical student at your school does not drink alcohol, please enter 0)

___ Number of Drinks

13.) Over the last two weeks, how many times have you had five or more drinks of alcohol at a sitting?

- | | |
|----------------------------------------|----------------------------------------|
| <input type="radio"/> N/A, don't drink | <input type="radio"/> 5 times |
| <input type="radio"/> None | <input type="radio"/> 6 times |
| <input type="radio"/> 1 time | <input type="radio"/> 7 times |
| <input type="radio"/> 2 times | <input type="radio"/> 8 times |
| <input type="radio"/> 3 times | <input type="radio"/> 9 times |
| <input type="radio"/> 4 times | <input type="radio"/> 10 or more times |

14.) Within the last 30 days, did you: (Please mark the appropriate column for each row)

	N/A, don't drive	N/A, don't drink	No	Yes
Drive after drinking any alcohol at all				
Drive after drinking five or more drinks of alcohol				

15.) During the last 12 months, when you "partied"/socialized, how often did you: (Please mark the appropriate column for each row)

	N/A, don't drink	Never	Rarely	Sometimes	Most of the time	Always
Alternate non-alcoholic with alcoholic beverages						
Avoid drinking games						
Choose not to drink alcohol						
Determine, in advance, not to exceed a set number of drinks						
Eat before and/or during drinking						
Have a friend let you know when you have had enough						
Keep track of how many drinks you were having						
Pace your drinks to 1 or fewer per hour						
Stay with the same group of friends the entire time you were drinking						
Stick with only one kind of alcohol when drinking						
Use a designated driver						

16.) Within the last 12 months, have you experienced any of the following when drinking alcohol? (Please mark the appropriate column for each row)

	N/A, don't drink	No	Yes
Did something you later regretted			
Forgot where you were and what you did			
Got in trouble with the police			
Someone had sex with me without my consent			
Had sex with someone without their consent			
Had unprotected sex			
Physically injured yourself			
Physically injured another person			
Seriously consider suicide.			

17a.) Within the last 30 days, what percent of students at your school used cigarettes? State your best estimate.

___ Percent of Students

17b.) Within the last 30 days, what percent of students at your school used alcohol? State your best estimate.

___ Percent of Students

17c.) Within the last 30 days, what percent of students at your school used marijuana? State your best estimate.

___ Percent of Students.

Appendix B

Introductory Page of UofA NCHA 2016 Survey

Welcome to the U of A Campus Wide Health Assessment. University Wellness Services, with support from the American College Health Association (ACHA), is conducting the survey using the Canadian version of the National College Health Assessment Web survey, developed by the ACHA. This survey typically takes about 20-30 minutes to complete, and we encourage you to complete the survey in one sitting.

Why should you participate?

Your participation is completely voluntary and confidential. The information you provide will assist in informing health promotion planning at the University of Alberta as well as health and wellness service delivery for our student community.

What is the survey about?

This survey includes questions on:

- Health, health education and safety
- Alcohol, tobacco, and drugs
- Sex behavior, perceptions, and contraception,
- Weight, nutrition and exercise,
- Mental and physical health
- Impediments to academic performance
- Demographics

There may be some personal discomfort with the content of certain questions. For example, there are questions regarding illegal behaviors such as illegal substance use and sexual behavior. If you would like to talk to someone about the issues addressed in the survey, you may contact Kevin Friese the Executive Director of University Wellness Services at wellness@ualberta.ca.

How will we protect your confidentiality?

Your name or email address will never be associated with your responses. You have been assigned an ID number in order for a secure Internet server to manage your online survey input. This number is imbedded in your URL address to access the survey. When you submit the survey, your responses will be housed at the ACHA. To ensure confidentiality and privacy, the link between student e-mail addresses, unique ID numbers, and survey responses are destroyed before data are compiled and shared with the UofA. Furthermore, data transmission is encrypted and firewall securities are in place. At any point during the survey you may choose to answer only some questions, or you may choose not to participate in the survey at all.

Prizes

By participating in this study, you will be entered to win a prize of \$20 to the UofA Bookstore. Based on the anticipated number of responses, you have approximately a 1/10 chance of winning. The ACHA will randomly select the winners. Participant contact information for this draw is kept separate from survey responses. The University Wellness Services Study Team will contact winners via e-mail at the end of March.

Whom can you contact about this study?

Should you have any questions about this survey or how it will be used, or if you would like to obtain survey results, please contact Kevin Friese the Executive Director of University Wellness Services at wellness@ualberta.ca or phone at (780) 492-0769.

Has ethics approval been granted for this study?

This study has been reviewed for its adherence to ethical guidelines and approved by the Health Research Ethics Board (HREB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the HREB c/o (780) 492-0302.

The study team will comply with the University of Alberta Standards for the protection of Human Research Participants.

If you agree to participate in this survey, please click on “go to next question” button below to begin. By clicking this button, you are acknowledging that you are consenting to participate in the NCHA-Web Survey.

[Insert button here]

Thank you for your participation!