Distribution Agreement

In presenting this Thesis as a partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my Thesis in whole or in part in all forms of media, now or hereafter known, including display on the world wide web. I understand that I may select some access restrictions as part of the online submission of this Thesis. I retain all ownership rights to the copyright of the Thesis. I also retain the right to use in future works (such as articles or books) all or part of this Thesis.

_____

Signature of Student Date

IS THERE AN INCREASE IN ALCOHOL CONSUMPTION OF COLLEGE STUDENTS WHO USE SAFE RIDE PROGRAMS

BY

Danny Chan
Degree to be awarded: M.P.H.
Career MPH

Grant Baldwin, PhD — Date
Committee Chair

Adam Barry, PhD — Date
Committee Member

Melissa Alperin, MPH, CHES — Date
Chair, Career MPH Program

IS THERE AN INCREASE IN ALCOHOL CONSUMPTION OF COLLEGE STUDENTS WHO USE SAFE RIDE PROGRAMS

BY

Danny Chan
M.P.H., Emory University, 2011
B.S., Texas A&M University, 2001

Grant Baldwin, PhD

An abstract of
A Thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health in the Career MPH program
2011

ABSTRACT

IS THERE AN INCREASE
IN ALCOHOL CONSUMPTION
OF COLLEGE STUDENTS WHO USE
SAFE RIDE PROGRAMS

By Danny Chan

Safe ride programs used at universities to provide alternative transportation are offered to prevent drinking and driving accidents. However, they might also promote increased levels of drinking. Alcohol consumption, including high levels, can lead to harmful outcomes including: violence and criminal acts, accidents and fatalities, and risky sexual activities. The purpose of the study was to examine if there was an increase in alcohol consumption from students who used the programs. Data was collected from nineteen respondents who filled out an online survey. The survey questions consisted of eligibility, alcohol consumption history, safe ride usage, and demographics. Recruitment of respondents included assistance by Texas A&M University staff, newspaper ads, and flyers posted around the campus.

Out of the respondents who completed the survey (N=15), fourteen students had a higher blood alcohol concentration (BAC) level when they used the safe ride program. Mean BAC after time was 0.05 when they used the safe rides and 0.01 when drinking and driving. There was also a positive correlation at 0.32 between the number of alcoholic drinks consumed when safe rides were used and the amount of times the program was used. There were mixed results when asked about the respondent's belief if they consumed more alcohol when they used safe rides and if the program caused them to increase alcohol consumption.

The quantitative data calculated found that there was an increase in alcohol consumption when safe rides were used. However, the qualitative data revealed mixed results as to whether safe ride programs were the cause of an increase in drinking. Given the limitations of low participation and response rate as well as the self-report nature of the data and use of a convenience sample, these findings can't be generalized to the student population. Further studies are recommended to gain more information and findings into whether safe rides increase alcohol consumption and if the programs are the cause for any increase in alcohol consumption levels.

IS THERE AN INCREASE IN ALCOHOL CONSUMPTION OF COLLEGE STUDENTS WHO USE SAFE RIDE PROGRAMS

BY

Danny Chan
M.P.H., Emory University, 2011
B.S., Texas A&M University, 2001

Grant Baldwin, PhD

A Thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health in the Career MPH program
2011

ACKNOWLEDGEMENTS

I give extreme gratitude and appreciation to those that have assisted me in this project. The following individuals and groups have provided the desired support, so I give thanks to:

My advisors, Dr. Grant Baldwin and Dr. Adam Barry, for their guidance, feedback, commitment, and patience.

Melissa (Moose) Alperin MPH, Dr. Jeff Brizzolara, and Dr. Dabney Evans for their support and review of the survey questions.

Dr. Robert Apsler, Dr. Barry Caudill, Dr. Donald Gieck, Dr. Wayne Harding, and Dr. Brent Moore for their assistance and information in safe ride programs as well as permission to use their content in the survey development.

The Texas A&M University staff for assisting in recruitment or respondents and providing valuable information on the university and CARPOOL program.

All my fellow classmates, friends, and family who have continued to assist, support, and encourage me in this process.

And finally, thanks to all the Texas A&M students who chose to participate in this study.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

Introduction

Alcohol consumption and college can at times seem synonymous. Despite its general acceptance, college students use alcohol in a manner that can lead to harmful outcomes. Students have been shown to consume large amounts of alcohol, which can potentially put them and others at risk for negative consequences. Harmful outcomes that could occur include violence and criminal acts as well as unsafe behaviors such as risky sexual activity and driving after drinking alcohol. These risks can potentially increase with an increase in alcohol consumption and frequency of drinking.

One of those outcomes, drinking and driving, has been shown to cause significant potential harm including death. In an effort to reduce the risk, alternative transportation are in use as an intervention to keep intoxicated students off the road. Alternative transportation programs such as designated drivers and safe rides have shown some success in reducing drinking and driving. However, these programs might create another risk by possibly condoning and encouraging alcohol consumption. Because college students know of their alternative travel arrangements, they may feel empowered and open to drink in higher quantities. Data already shows that alcohol use leads to accidents, fatalities, legal ramifications, and other negative outcomes. An increase in alcohol consumption may exacerbate these negative outcomes.

The purpose of the study is to determine whether college students who use an alternative transportation program drink in greater quantities than those who do not. The significance of the study is that it will be able to provide additional data to determine if there

is an increase in harm due to an increase in alcohol consumption when using the alternative transportation programs.

Problem Statement

In looking at various age populations, college students frequently consume more alcohol than any other group (Sarkar, Andreas, & de Faria, 2005). One study finds that 42.7% of students become intoxicated and 20.7% do it frequently (Timmerman, Geller, Glindemann, & Fournier, 2003). College students have a high rate of drinking including drinking excessively. According to the Centers for Disease Control (CDC), from 1998 to 2007, the percentage of college students that binge drink in the past two weeks is between 39% and 41% (Center for Disease Control and Prevention, 2010). The National Institute of Health (NIH) also shows data from 2001-2002 that 17.7% of eighteen to twenty-four year olds binge drink one to eleven times in the past year and 39.7% binge drink twelve or more times (National Institutes of Health, 2006).

College students are at an increase risk of negative health outcomes due to behaviors such as consuming large amounts of alcohol. Negative effects that associate with drinking include unintentional injuries, violence, and death. In addition, "binge drinking of college students have also been associated with unplanned and unsafe sexual activity, physical and sexual assault, other criminal violations, interpersonal problems, physical or cognitive impairment, and poor academic performance" (Wechsler, Davenport, Dowdail, Moeykens, & Castillo, 1994; Wechsler et al., 2002). In 2001, 599,000 full time college students suffer injuries because of drinking, 97,000 are victims of alcohol-related sexual assault or date rape, and 696,000 are hit or victims of assault by another drinking student (Hingson, Zha, & Weitzman, 2009).

In addition, fatalities of college students involving alcohol is over 1,400 deaths annually in 1998 and has gone up to over 1,800 in 2005 with most of them coming from traffic accidents (Hingson, et al., 2009; Saltz, 2004). One of the negative health outcomes due to consumption of alcohol, impaired driving, is also one of the main causes of car accidents among young adults (Lavoie, Godin, & Valois, 1999). Impaired driving is a significant risk as it has the capacity to not only affect the driver who consumes alcohol, but any passengers, other drivers, or bystanders may also be subject to potential harm including injuries and fatalities.

Although fatalities from alcohol impaired driving is seeing a decline, the percentage of total fatalities of twenty-one to twenty-four year olds remains the same at 16% (National Highway Traffic Safety Administration, 2008). In Table 1, 2007 data show drivers between the ages of twenty-one to twenty-four are involved in fatalities 11% of the time and they have blood alcohol concentration (BAC) levels above .08 18% of the time (National Highway Traffic Safety Administration, 2008).

Drivers Involved in Fatal Crashes and Number and Percentage Who Had BACs=.08+

Age of the Driver	**2006**		**2007**	
	Total	**BAC=.08+**	**Total**	**BAC=.08+**
16-20	7,315 (13%)	1,392 (11%)	6,851 (12%)	1,205 (10%)
21-24	6,480 (11%)	2,143 (17%)	6,256 (11%)	2,160 (18%)
25-34	11,279 (19%)	3,257 (26%)	10,692 (19%)	3,118 (26%)
35-44	10,379 (18%)	2,597 (21%)	9,862 (18%)	2,418 (20%)
45-64	15,128 (26%)	2,522 (20%)	14,993 (27%)	2,563 (21%)

65+	5,996 (10%)	393 (3%)	5,880 (11%)	344 (3%)
Other/Unk	1,269 (2%)	247 (2%)	1,147 (2%)	259 (2%)
Total	57,846 (100%)	12,551 (100%)	55,681 (100%)	12,068 (100%)

Table 1. (National Highway Traffic Safety Administration, 2008)

In a report on Preventing Alcohol-Related Problems on College Campuses, two million out of eight million students state they occasionally drive while intoxicated and more than three million ride with someone who drinks (Saltz, 2004). In the 2001 National Survey of Drinking and Driving, data finds college students are at potentially increased risk from automobile accidents as they are either prone to drinking and driving or riding with someone who is drinking and driving (Royal, 2003). Young adults, especially males, make up a high percentage of drivers who drink within two hours (Royal, 2003). In addition, not only are the drivers putting themselves at risks after drinking, but their passengers are also being subject to possible risks. The study also finds that sixteen to twenty-nine year old age groups are most likely to ride with a driver who possibly has too much to drink to drive safely (Royal, 2003).

Use of designated drivers is one solution to reducing alcohol risks from drinking and driving. While the program can reduce risk, there is also potential for concern. A proportion of college students drink alcohol while being a designated driver (Ditter et al., 2005). In a study by Rivara et al. looking at young adults, 39% of designated drivers drink at least one beverage (Rivara et al., 2007). Yet in another study by Barr et al., over 94% of respondents state that their designated driver consumes alcohol (Barr & MacKinnon, 1998). Also, when passengers offer opinions, 11% of people report that designated drivers do not have to abstain and can consume two or more drinks before driving (Timmerman, et al., 2003).

A designated driver is not necessarily someone who does not consume alcohol. It is possible that they can be someone who drinks less alcohol than others in the group. This thought process shows a flaw in the theory that designated drivers do not consume alcohol, thereby posing a risk. On the other hand, having a designated driver can help moderate the consumption of alcohol of group members if the driver does abstain (Ditter, et al., 2005).

An alternative to designated drivers is the safe ride concept. It is touted as the "theoretically perfect solution to drinking and driving problem" (Caudill, Harding, & Moore, 2001). The reason for the high praise is that while a designated driver might consume alcohol, in the safe ride programs, the driver is completely abstaining and is not a part of the social group, which shields them from peer pressure to drink. Instead of using group members, taxis, buses, limos, tow trucks, and private automobiles are in use to offer rides home. The rides are typically free or low cost and depending on the program, are available either during holidays, weekends or year round. Some even provide rides back to retrieve the drinker's vehicles the next day. Reasons organizations typically start safe ride programs are for community service, benefits of publicity, personal/community tragedies, concerns over legal liability, or other potential motives (Harding, Apsler, & Goldfein, 1988).

Some programs demonstrate an increase in usage and popularity by averaging 100 rides a month when they first start and growing to 2,500 rides a year (Caudill, Harding, & Moore, 2000; Caudill, et al., 2001). One program has even made 56,000 rides in 1993 (Lavoie, et al., 1999). Transportation companies, charitable organizations, government agencies, and non-profit organizations typically provide the programs. In order to gain recognition and use by drinkers, advertisements are used in local media and information pieces located at drinking establishments as well as social marketing techniques are

employed to gain acceptance. Safe ride programs are becoming quite common on college campuses to help reduce the injuries and fatalities of drinking and driving. Dozens are in operation across the United States (Decina, Foss, Tucker, Goodwin, & Sohn, 2009; Safe Ride Programs United, 2010).

Both of these alternative transportation methods show the ability to reduce drinking and driving and increase safety in the community (Mundorf, 2005). The community also accepts them. Nine out of ten individuals at social events serving alcohol believe people should use designated drivers (National Highway Traffic Safety Administration, NDL). However, there is some developing criticism about the negative effects of these programs on the individuals who use them (Barr & MacKinnon, 1998; Glascoff, Knight, & Jenkins, 1994; Rivara, et al., 2007).

Previous studies demonstrate a mix of reviews to the effect of designated drivers on the level of alcohol consumption amongst passengers who use them. Some of the studies point to a larger increase in alcohol consumption than normal for passengers. In one study, a question asks if the college students drink more if they have a designated driver to which 82.5% of students said “Yes” (Barr & MacKinnon, 1998). A study by Glascoff et al. shows 53% of passengers drink more, 43% the same, and 4% less with a designated driver (Glascoff, et al., 1994). The Rivara et al. study findings show that 44% drink more when having a designated driver (Rivara, et al., 2007). While there is a reduction of risk to driving after drinking, the possible risk of other negative outcomes such as risky sexual activity, assaults, criminal acts, and others could increase by the acceptance and increase consumption of alcohol.

The option of having alternative transportation can signal to users that they have the opportunity to drink heavily. In a study on binge drinking, 67% of students binge drink when the last time they ride with a designated driver (DeJong & Winsten, 1999). In another study, almost half of respondents report drinking more than usual with half of those having three or more drinks than usual (Rivara, et al., 2007). However, conflicting studies demonstrate no significant differences in blood alcohol levels between respondents who use and did not use designated drivers (Timmerman, et al., 2003).

Currently there are only a few studies that investigate whether there is an increase in alcohol consumption with them. While safe ride programs have similarities with the designated driver concept, because they are becoming more popular, it is necessary to determine if the programs lead to an increase in alcohol consumption too. The studies by Harding et al. (2001) and Caudill et al. (2000) demonstrate slight increases in blood alcohol concentrations (BAC) of college students. However, the interpretation of the data is that it is potentially insignificant when viewing the population who use safe rides and their motivation to do so. The results show a 24% increase of BAC from low risk (below .10) to high risk (above .10) (Harding, Caudill, Moore, & Frissell, 2001). Other studies show no increases resulting in a mix of results amongst studies as to whether alcohol consumption shows a significant increase when able to rely on alternative transportation. More studies are in need to determine if safe rides do in fact cause more alcohol consumption, similar to the designated driver studies, or if the results truly are insignificant.

One of the flaws in promoting alternative transportation means is that there might be an interpretation that an increase in drinking is okay as long as one does not drive. The harm reduction dilemma in communicating not to drink and drive and to utilize alternative

transportation means could pose secondary harm in the outcome. Harm reduction is focusing only on reducing drunk driving by using alternative transportation can possibly result in ignoring other effects of alcohol consumption. Promotion of an increase in alcohol consumption might be a result of obliging drinkers the ability to not worry about transportation. In turn, an increase in drinking can be seen as distinct from drinking and driving (Glascoff, et al., 1994). Also the original message by the Harvard Alcohol Project of the Harvard School of Public Health's Center for Health Communication of "If you choose to drink, drink only in moderation and choose a designated driver who doesn't drink at all" seems to be changing (Reiling & Nusbaumer, 2007). If that truly is the case, then users of the programs could be at risk of negative consequences from increased alcohol consumption.

Theoretical Framework

The theory of reasoned action is comprised of three components illustrated in Figure 1 that influence behavior: intentions, attitudes, and subjective norms. Attitudes include belief of performing a behavior and an evaluation of the behavior's outcomes. Norms is relying on what others think about performing the behaviors and the motivation to follow in those thoughts. Both attitudes and norms lead to intentions, which is the determination to either act or not act on the behavior. In turn, behavior can be predicted by examining the three components (NIOSH, 1996).

Regarding drunk driving, the attitude might be the belief that it can lead to accidents or legal ramifications as well as people might get hurt. The evaluation of those beliefs could then be seen as a negative outcome. Social norms, from friends, family, or society might state that drunk driving is wrong and using alternative transportation is a good thing. Thus, the intention is there to not drink and drive and instead use another means of transportation.

Increasing alcohol consumption in conjunction with safe ride usage might also be viewed in the theory. The belief might be that as long as they are not driving, there are no negative health outcomes to consume more than usual amounts of alcohol. Norms, including from peers, might dictate that increasing drinking is fine as long as you are safe and not putting anyone in harm. Thus the intent to drink more might be there if the focus is on reducing drinking and driving and not contemplating the outcomes and norms of binge drinking.

The theory assists in developing questions to use determine if the behavior of consuming more alcohol occurs due to using safe rides. Attitudes include belief they can drink more if not driving and norms include the acceptance of using the program by peers. Both can lead to a sense of safely consuming alcohol if using a safe ride, thereby possibly leading to an increase in alcohol consumption. In the Carpool section, subjective norms include questions of who contacts Carpool and if the respondent rides by themselves or with others. Questions looking at attitudes toward using the safe ride program include alcohol consumption and reason for using the program. Intentions can be found by the questions regarding planning and influence on drinking.

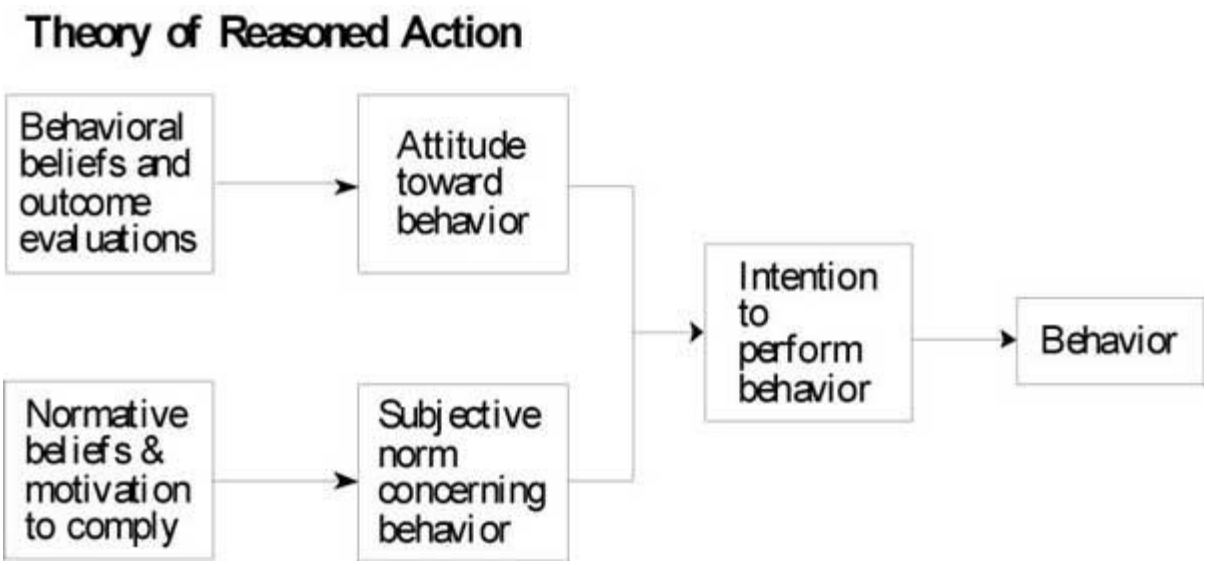

Figure 1. (NIOSH, 1996)

Purpose Statement

The purpose of this study is to examine students' relationship between drinking behaviors and the use of the safe ride program, CARPOOL. The study seeks to determine if there is a change in pattern by using alternative transportation methods. The information available could help guide the development and evaluation of programs with an aim at reducing drinking and driving as well as heavy drinking.

Research Question

The goal of the study is to determine if there is an increase in alcohol consumption among college students who use safe ride programs.

The questions being addressed are:

1. Is there a correlation in the amount of alcohol consumption and use of safe ride programs for college students?
2. What are the motives for college students to use safe rides?
3. Do students drink more because of availability of safe rides?

Significance Statement

The significance of the study is to add to the current limit of data from the few studies available that examine the drinking behavior of individuals who use safe ride programs. In addition, there is a lack of strong evaluation of programs that are available (Mundorf, 2005). The study intends to see if use of safe ride programs by college students promotes an increase in alcohol consumption. Previous studies looking at similar alternative transportation programs show a possible increase in alcohol consumption. While there is a reduction in harm from drinking and driving, there is the potential for an increase in harm in association with alcohol consumption. Safe rides might pose the same risks and harms as the other alternative transportation programs, especially amongst college students.

One family has already put in a suit against a campus-run safe ride program in Wisconsin. In the suit, the claim is made that the program encourages drinking by promoting bars and providing the transportation ("Family Sues Over Safe-Ride Program," 2004; "Family sues school, city over alcohol-related death," 2004). Further evaluation of safe ride programs could lead to changes in the programs to reduce the risk of harm from an increase in consumption of alcohol if it is an outcome of the program.

Definition of Terms

Abstain: Deliberately refraining from consuming alcohol.

Alcoholic drink: A drink with the definition of having a half an ounce of absolute alcohol (e.g., a 12-ounce can or glass of beer or cooler, a 5-ounce glass of wine, or a drink containing 1 shot of liquor).

Alternative transportation: Transportation means where an individual does not drive himself or herself.

Binge drink/excessive drink: Heavy consumption of alcohol over a short period of time.

Blood alcohol concentration (BAC): Concentration of alcohol in an individual's blood.

Body water: All of the water content of an individual's body.

Breath alcohol test/breathalyzer: Method to determine the blood alcohol concentration of an individual using a breath sample.

CARPOOL: Texas A&M University's student-run non-profit safe ride program serving the Bryan/College Station community.

Designated driver: An individual who is part of the current social group drinking alcohol that provides transportation.

Harm reduction: Policies or programs with a design to reduce the harmful consequences of high-risk behaviors or actions.

Intoxicate: State of being physically or mentally impaired.

Legal limit: The state limit for blood alcohol concentration used to determine intoxication.

Metabolism rate: The rate at which an individual's body breaks down alcohol.

Passive recruitment: Recruitment methods that only provide information to potential respondents in an effort to inform but not persuade or mandate to take part in a study.

Safe ride: A program that utilizes drivers who provide transportation. The drivers are abstaining from alcohol and are not part of the current social group drinking alcohol and using the program.

Student: An individual attending a college or university.

Widmark formula: Equation to estimate the blood alcohol concentration.

CHAPTER II

Introduction

In reviewing the literature, a few studies were prominent in describing the population who used safe ride programs, alcohol consumption outcomes, and behaviors and motivations in regards to drinking and using the programs. The studies were selected due to the safe ride programs and populations they used as well as the questions they sought to answer.

Articles and figures were also researched to gain further understanding of the program and statistical information on drunk driving and alcohol consumption. Organizations including the Centers for Disease Control and Prevention, National Highway Traffic Safety Administration, National Institute on Alcohol Abuse and Alcoholism, and National Institute of Health along with various safe ride program websites provided content. In addition, studies on drinking history and behavior of college students in conjunction with drinking and driving were also reviewed to look at similarities and contrasts of other alternative transportation programs.

Review of Literature

Safe ride programs were developed as an alternative transportation means to combat drunk driving. In a survey funded by the National Highway Traffic Safety Administration in 1986, 325 safe ride programs were verified nationwide (Aspler, 1988). The programs had an array of varying differences including who they targeted, what timeframe they were available, who ran the program and funding sources. The intent of these programs, however, remained constant in the reduction of the number of accidents and fatalities associated with drinking and driving. It was common to find programs at universities all over the nation with

some located in Arizona, Colorado, Georgia, Kansas, Michigan, Missouri, New Mexico, New York, Oklahoma, Texas, Virginia, and Wisconsin (Safe Ride Programs United, 2010).

Population

The characteristics of individuals who used safe ride programs was an important factor as it could assist in demonstrating possible determinants for any increase in alcohol consumption. Studies have looked at who uses the safe ride programs to determine if they were targeted at the high-risk individuals. In a study by Caudill et al., they sought to define who used the programs and if they were at risk for DWI (Caudill, et al., 2000). The sample was taken from a Maryland community and incorporated any individual who was legal to consume alcohol, thus it allowed for generalization to other similar communities. Compared to respondents who did not use safe ride programs, safe ride users were more likely to drive while they felt intoxicated, had ridden with an intoxicated driver, been arrested for DWI, and used a designated driver (Caudill, et al., 2000).

Safe ride users were also more likely to be heavy drinkers. Breath tests were also conducted that demonstrated that 79% of safe ride users tested were above the legal limit of 0.08% BAC (Caudill, et al., 2000). Recurrent traits of users of the programs were young males who also were heavy drinkers. That would coincide with results from the 2001 National Survey of Drinking and Driving, where a significant portion of problem drinkers were young males (Royal, 2003).

In a Sarkar et al. study, again the population was examined as to who used safe ride programs. This time, however, two communities were used at two different time periods. San Diego and Sacramento were used as the locations for the study and they allowed the target population to include individual's outside of legal age to consume alcohol to participate.

Findings showed users were in the heavier drinker range with an average estimated level of 0.15 (SD=11) (Sarkar, et al., 2005). The high-risk drinkers mirrored other studies showing young males as the primary individuals.

Outcomes

Outcomes of the studies in examining if alcohol concentration levels increased when using safe ride programs showed mixed results. The Harding et al. study showed that BAC levels were greater when safe rides were used than other times respondents drank outside the home. Using a paired t test, the study found BAC levels when using safe rides was at $t(33) = 2.63$, $P<.01$ (Harding, et al., 2001). However, in contrast, the study by Gieck et al. showed that a majority of respondents indicated frequency and quantity of alcohol consumption did not increase due to availability of safe rides, a key difference in comparison to the Harding study, and BAC levels did not differ between those who drank more and those with no change in behavior (Gieck & Slagle, 2010). Another study by Rothschild et al. using qualitative data from focus groups also stated that there wasn't an increase in alcohol consumption. A common comment regarding the lack of increase was that the men were "already drinking as much as they could" (Rothschild, 2003; Rothschild, Mastin, & Miller, 2006).

Midwestern University conducted a preliminary assessment on its students to gather more information on how their alternative transportation program affected behavior. The Elam et al. study conducted focus groups consisting of members from the Vice Chancellor's Advisory Group, Residential Advisor Advisory Council, and the Residence Halls Association Presidents' Council. One item to note is that only eleven of the fifty-three members of the focus group had actually used the program (Elam, McKaig, Jacobs, Whitlow, & Gros Louis,

2006). The study found that 41% of the group felt the program decreased the likelihood of drinking and driving and promoted safety (Elam, et al., 2006). When asked if the program made drinking more acceptable or encouraged consumption, 54% said it did (Elam, et al., 2006).

In addition, perceived purpose of the program and the advantages and disadvantages were evaluated. One disadvantage option, promotes drinking, netted a 38% response (Elam, et al., 2006). Comments relating to the disadvantage choice included promoting acceptance of underage drinking and alcohol abuse, causing disruptions when large groups are dropped off together, and giving people of illegal drinking age a way to get out to bars (Elam, et al., 2006). The focus group was split on the viewpoints of the program with the Vice Chancellor's Group who supported the stance that the program had no effect on drinking behaviors while the other two groups believed that it "made drinking more acceptable, encouraged drinking, or led to less responsible drinking" (Elam, et al., 2006).

The Caudill et al. study not only looked at BAC levels, but also looked at drinking patterns of users and nonusers of safe rides while consuming alcohol at home versus outside the home (Caudill, et al., 2000). The study also found that safe ride users drank more often outside the house, seventy-two times compared to thirty-eight, as well as having higher estimated "usual BAC" when drinking outside of the home, .10 BAC for safe ride users compared to .05 BAC for non-users (Caudill, et al., 2000). Heavy drinkers also used safe rides significantly more than light or moderate drinkers; 81% of safe ride users were heavy drinkers compared to 42% who did not use safe rides (Caudill, et al., 2000).

Behaviors and Motives

The data from the Harding et al. study indicated there were two possible interpretations in regards to the increase in alcohol consumption from use of the program. The interpretations included safe rides encouraged passengers to drink more and sometimes people planed to drink more, which in turn they arranged for a safe ride (Harding, et al., 2001).

In the Sarkar et al. study, 44% of passengers reported they would drive themselves home without a safe ride being available (Sarkar, et al., 2005). Also, drivers with passengers were more likely to use the program for the first time. A key point in the study was whether the individuals called the safe ride themselves or friends and drinking establishment staff called. That designation could have implications on motivation for driving or not driving while intoxicated. A Lavoie et al. study sought to answer that question by surveying individuals as to what percentage of drivers called a safe ride program versus what percentage of passengers. The study found that passengers who suggested to the driver to call was at 69% in intention and 36% in actual scenarios; drivers were at 52% in intention and 17% in actual scenarios (Lavoie, et al., 1999).

A report by Mundorf et al. evaluated student opinion of an alternative transportation program they began for the University of Rhode Island. In it, they produced two sets of data at separate points in time as to why the students used the program. The first set revealed the primary reason that was listed was convenience at 49%, followed by friends using the transport at 22%, 11% selecting safety, and 13% selecting all three (Mundorf, 2005). A more recent data set listed avoidance of riding with an intoxicated driver, avoidance of DWI, and safety as primary motivators (Mundorf, 2005).

The Gieck et al. study asked whether respondents felt that safe rides influenced drinking behaviors, to which 19% indicated they consumed more alcohol while 81% stated usage of the program had no effect on drinking behavior (Gieck & Slagle, 2010). Common qualitative data included statements such as "I would drink anyway" which could indicate that alcohol consumption behavior might not change with the program (Gieck & Slagle, 2010). Regarding motivation to use safe rides, 75% indicated it was to avoid drunk driving while 19% used it for transportations (Gieck & Slagle, 2010). Secondary motivational factors included 16% of respondents used it due to weather conditions and 34% because friends used the service (Gieck & Slagle, 2010).

Summary

Strengths and limitations of the studies reviewed revealed that more evaluations were needed in not only identifying whether BAC levels increased when using safe ride programs, but also what possibly caused any increase in alcohol consumption. While most studies did compare BAC levels, the fact there were mixed results needed further examination as other factors such as the amount of data, type of population, and categorization of population could have had an effect. Caudill et al. and Gieck et al. have shown conflicted information in regards to if safe rides increased alcohol consumption, however, the target populations were different. Methods of when to collect data were split between prior and after consumption of alcohol, which, in itself could have varying effects to the data. In addition, motivational factors and behaviors could provide added support to whether the safe ride programs caused the increase in alcohol consumption or is a simple byproduct of another factor.

The overall strengths of the literature reviewed included usage of questionnaires to gain data. The surveys used could provide privacy and cost minimal time to the respondent.

Use of eligibility requirements also assisted in filtering down to collect data from the target respondents. In regards to BAC, despite being less accurate than a breathalyzer, the Widmark equation instead of a breathalyzer was a proper choice given that a breath alcohol test would have required taking a sample after consumption of alcohol, which in turn could cause unreliable responses to the questions when answering the survey.

The overall weaknesses of the literature reviewed included the limited amount of data in identification of motivations for use of safe ride programs. In addition, determination of if the safe ride program caused an increase in alcohol consumption or if an increased was already preplanned was undetermined. Finally, the question of whether safe ride programs caused an increase in alcohol consumption is still undetermined.

The proposed project planned to address these weaknesses by the addition of more data to determine if there is an increase in alcohol consumption from an untested population. The project also planned on following the other studies in using a questionnaire to obtain data potentially prior to consuming alcohol to avoid risk of potential invalid responses to the questions. The questions devised also addressed motivations that influenced the use of safe rides as well as whether safe ride programs caused an increase in BAC if an increase in alcohol consumption was calculated.

CHAPTER III

Introduction

The project was accomplished by defining a target population with access to a consistent safe ride program. In addition, an online survey was chosen for data collection given that it allowed flexibility of an unrestricted timeframe of when respondents can participate while gaining the necessary information desired. Use of assistance from Texas A&M University (TAMU) staff and student organizations to help provide information of the project to the student body was chosen in attempts to increase participation. The instrument's contents were put together with assistance from other studies and organizations to gain similar results to compare with. Data analysis plans included comparisons of respondent's alcohol consumption when and when not using the safe ride programs.

Population and Sample

The site of the study was located in College Station, Texas where Texas A&M University's main campus is located, thus being classified as a flagship university. The student population consisted of over 49,000 enrolled undergraduates and graduates and ranked as the nation's sixth largest university in enrollment in 2010 (Texas A&M University, 2010). As of 2010, the city of College Station's population was over 93,000 individuals (City of College Station, 2010). The students made up over half the total population of the city. According to Bryan-College Station Convention and Visitors Bureau, the city had thirty-four bars and clubs (Bryan-College Station Convention and Visitors Bureau, 2010).

The student body had slightly more males (53%) than females (47%) (Texas A&M University, 2010). In 2009, White-Non-Hispanics made up a majority of the students with 69%, followed by Hispanics who made up the second highest group at 13%, and

International students were at 9% (Texas A&M University, 2010). Sixty-one percent of students were eighteen to twenty-one years of age and 25% of students were twenty-one to twenty-five years old (Texas A&M University, 2010).

Texas A&M University was selected since it had a long-standing safe ride program available for college students and the high rate of rides given. The safe ride program, titled CARPOOL, had maintained operation during its eleven-year existence in the Fall and Spring semesters. They gave between fifty-six to 454 rides a night, averaging 292 rides, during the 2009 Spring semester and forty-nine to 560 rides a night, averaging 258 rides, in the Fall semester (CARPOOL, 2008). To date, through the Spring of 2009, they had given almost 169,000 rides (CARPOOL, 2008). The program operated three nights a week from Thursday through Saturday.

The target respondent was determined to be eligible for the study if the individual was a current college student at Texas A&M University in College Station, eighteen years or older, drank an alcoholic beverage in the last twelve months, driven a motor vehicle in the last twelve months, and ridden in CARPOOL in the last twelve months. The target population included undergraduate and graduate students.

Students of only Texas A&M in College Station were included to ensure that they had a chance of being exposed to the safe ride option. The CARPOOL program had been around since 1999, which allowed for students an opportunity to be exposed to the program. Consumption of an alcoholic beverage was vital in that the project sought to gain responses from individuals who drank alcoholic beverages and had the possibility of being excessive or binge drinkers. Having driven a motor vehicle was also an important component in looking at the ability to use an alternative to the safe ride program instead of relying on CARPOOL for

transportation regardless of how much alcohol was consumed. A twelve-month period was used to mimic previous studies using the same timeframe.

Research Design

The study‘s aim was to examine college student’s alcohol consumption behavior in relation to usage of safe ride programs. Specifically, the study sought to determine if there was an increase in alcohol consumption and if the program caused the increase. The research used a cross-sectional retrospective study design. The study used an online survey through Survey Monkey. Online survey was the chosen method of data collection due to the potential access to computers that students had and their educational status that included knowledge of use of computers. In addition, the method required minimal time and cost to the study respondents. The self-administered survey guided the respondent through the online questionnaire. The estimated time to complete the survey was fifteen minutes.

The study took place at locations where the respondent had access to a computer, including personal and university computers. Locations potentially included respondent’s residence, at school, or any other locale that provided Internet access.

At the end of the survey, respondents that wanted to enter the incentive drawing had the opportunity to click on a hyperlink that directed them to a second Survey Monkey survey. The second survey contained one question that asked for the respondent to input their e-mail address. The e-mail addresses did not link to the first survey’s data. At the end of the data collection, all e-mail addresses were grouped and four were randomly chosen to receive the incentive. Contact was made to the four respondents for information to send the incentive to them by mail. Respondents were eligible to receive ITunes gift cards in the amount of $25. Four gift cards were available for the drawing and entrance was voluntary.

Procedures

A convenience sample was used in the selection of respondents. Recruitment was conducted through Texas A&M University staff. Staff provided passive recruitment when they provided information on the study with a web address to the online survey. Instructions were given to them in the recruiter letter, listed in Appendix A, on their role and what information to provide to the target population. Also included were instructions to reinforce that the study was voluntary and had no bearing to their academic standing with the university. Contact information to the principal investigator was included for any need for further clarification. Contact with potential respondents was made through flyers, newspaper ads, and direct contact.

Direct contact was made in the classrooms at the university and at the student health center by university staff. Teachers provided flyers through handouts and a PowerPoint presentation slide, found in Appendix B, which displayed information that included study description, contact information, and the web address needed to access the survey. Also, Texas A&M University student health center staff posted and provided flyers to students who entered the center. Texas A&M University Student Activities and student organizations were contacted to also provide direct contact recruitment but were unable to provide any assistance.

Newspaper ads in the Battalion, the Texas A&M University newspaper, contained the same information as the direct contact flyer with the description of the study, contact information for more information, and a web address/hyperlink directing to the survey on the Internet. In addition, flyers were displayed on open bulletin boards around campus.

Information provided stated that study participation was voluntary and that participating did not have any effect on current or future grades or academic standing. Respondents were given the opportunity to not answer any question of the survey except for the consent form question. In addition, they could withdraw at any time during the survey. There was not any direct benefit to the students from the study.

Instruments

A survey questionnaire was designed with assistance from previous survey questions from the National Institute on Alcohol Abuse and Alcoholism (NIAAA), Behavioral Risk Factor Surveillance System (BRFSS), Caudill and Harding et al. studies, Gieck et al. study, and Sarkar et al. study. Portions of the questions were replicated exactly from the sources listed with a few of them developed from multiple sources. Table 2 showed the breakdown of the number of questions that each source provided in each section of the survey. The BRFSS provided four questions in the eligibility, alcohol, and demographics section. The Caudill and Harding et al. studies provided the majority at twenty-five questions located in the eligibility, alcohol, safe ride, and the demographics section. The Gieck et al. study provided eight questions in the alcohol history, safe ride, and demographics section. The NIAAA provided three questions in the alcohol history section. Two questions in the safe ride section were developed from Sarkar et al. Eight questions were original in their development and were located in the eligibility and safe ride sections. The study's question timeframe of twelve months was derived from Caudill and Harding et al, Gieck et al., NIAAA, and BRFSS.

Source	**Eligibility**	**Alcohol History**	**Safe Ride**	**Demographics**
BRFSS	1	1	0	2

Caudill and Harding et al.	4	14	5	2
Gieck et al.	0	2	5	1
NIAAA	0	3	0	0
Sarkar et al.	0	0	2	0
No source	1	0	7	0

Table 2.

The survey consisted of forty-two questions with topics including eligibility, alcohol consumption history, safe ride usage, and demographics. It is located in Appendix C along with the consent. Nineteen of the questions were open ended: one in the eligibility section, twelve in the alcohol history section, six in the safe ride section, and one in the demographics section. There were twenty-three closed ended questions with two that used ordinal scale located in the alcohol section. The other twenty-one used nominal scale with five located in the eligibility section, thirteen in the safe ride section, and three in the demographics section.

The survey tool was pretested using cognitive interviewing and expert review. Pilot testing was done for two weeks using a convenience sample of the target population after approval from the institutional review board (IRB) was received. The IRB approval letter, lay summary, and protocol are listed in Appendix D, E, and F respectively. A sample of the college students of the target population was used from the Department of Health and Kinesiology. Texas A&M University staff assisted in passive recruitment by providing information about the study.

After the pilot, an evaluation took place to look at the questions themselves and the method of delivery to determine readability and understanding. The rate of participation and

eligibility qualification were also reviewed. Any needed modifications were made. Afterwards, the actual study was conducted for four weeks.

Informed consent was obtained prior to when they answered the survey questions. Consent was presented on the first page of the online survey along with a check box for respondents to agree or disagree to the consent. If disagree was chosen, they were automatically transferred to the thank you page of the survey. If agree was chosen, they were able to go onto the next page to continue the survey. Principal investigator and Emory IRB contact information was available on the consent form for any questions respondents might have had. They also had the ability to print a copy of the form for their viewing and records.

In addition, the first question section of the survey consisted of five questions to determine respondent eligibility. Those with responses indicating ineligibility were forwarded automatically to the thank you page and were not able to complete the rest of the survey.

Respondents had the opportunity to discontinue the survey at any time. Survey Monkey did save the responses that were given prior to exiting the survey. Also, at the end of the survey, respondents were given an opportunity to be directed to a second Survey Monkey survey where they could input their e-mail address if they wanted to register for the drawing. The drawing was for incentives for those that had taken the survey and was voluntary. The drawing took place after the survey had been closed and winners that were selected were contacted.

While they had taken the online survey, Internet protocol (IP) addresses were masked. Names or other personal identifiers were not obtained from the study survey. Age was asked, however, date of birth was not asked for.

Once open timeframe to take the survey had been closed, data was collected. Survey Monkey had tools available to view and configure data on its website as well as export the data in Excel format. After data was collected and exported, a random identifier was assigned to each respondent's group of answers

Plans for Data Analysis

The desired sample size chosen was N=1,045, which was rounded up from the result of the equation used by Dillman et al. This was derived from using the equation below that provided a +/- 3% margin of error for a 50/50 split at a 95% confidence level (Dillman, Smyth, & Christian, 2009).

$N = ((50{,}000)(.5)(.5)) / ((50{,}000-1)(.03/1.96)^2 + (.5)(.5)) = 1{,}044.83$

Univariate analyses that consisted of quantitative data were conducted and included frequency distribution, central tendency, and dispersion. The questions used scales of measure and open-ended questions with some additional areas asking for brief explanations to provide data.

In addition, BAC levels were calculated using the revised Widmark equation used by Caudill et al. and the National Highway Traffic Safety Administration on the respondents who answered the question on weight (Caudill, et al., 2000; National Highway Traffic Safety Administration, 1994). The revision included the total body water and metabolism rate of respondents. The average total body water percentage for males (58%) and females (49%), the 80.6% water in the blood, and average metabolism rate of .017 per hour decline were used. Paired t tests were used to compare BAC levels when safe rides were used and when they were not used.

Statistical analysis was conducted using Survey Monkey, Excel spreadsheets, and EpiInfo. Results were displayed in text, charts, and graph formats.

All data were stored on the Survey Monkey server and on a password-protected computer. Only the principal investigator had access to the data. In addition, secure socket layer (SSL) encryption were used while respondents were responding to the questions. The level of SSL encryption was VeriSign certificate Version 3,128 bit encryption.

Limitations and Delimitations

Limitations of the study included the lack of generalized data of the sample to the overall population. Use of a convenience sample also contributed to the lack of generalization. Also, given that it was a retrospective study, recall failure could have occurred when responding to the surveys. In addition, self-reported data could lead to response bias. Respondent's lack of trust in the security of providing information over the Internet might have caused untruthful responses on sensitive questions. Respondents could have also answered the survey multiple times.

In addition, there were limitations in obtaining respondents. Inability to acquire student organization support reduced avenues to attract students by way of having a physical presence on campus (required student organization endorsement) as well as additional people to serve as recruiters. Low participation and response rate as well as high ineligible respondent rate were also limiting factors.

Delimitations included the calculation of BAC that was estimated using an equation rather than a true measure by use of a Breathalyzer. In addition, direct contact from the investigator was not made in attempts to gain participation.

Summary

Data collected from the online survey were used to examine the questions of whether students using safe ride programs had an increased level of alcohol consumption. Questions in the survey focused on alcohol drinking history, safe ride usage, and demographics. Once data was gathered, BAC comparisons were made between times when safe rides were used and when they were not. In addition, data was also gained into the patterns of usage of safe rides and the beliefs students had of alcohol consumption in relation to the program.

CHAPTER IV

Introduction

The key research question relates to whether students drink more when using safe rides and what the motivations are for using the program. The findings reveal that there is an increase in alcohol consumption when using safe ride programs in comparison to when drinking and driving. In addition, there is also data examining alcohol history along with comparisons to safe ride usage. There are also reviews of motivations to determine if safe ride programs cause an increase in drinking. However, in looking at the limitations, the findings are a challenge to generalize to the student body.

Findings

Forty-three respondents attempt to take the survey, however, only nineteen are eligible. Out of the twenty-four that are ineligible, two disagree with the consent, one doesn't finish the eligibility section, and twenty-one are not eligible because they do not use CARPOOL during the past twelve months. Of those that are eligible, fifteen respondents answer every question.

When comparing the respondents of the study to the student body of Texas A&M University in College Station, the respondents are somewhat similar to the student body. In looking at gender, there are a higher percentage of female respondents, fifty-nine percent for the study versus forty-seven of the student body, where as males are in greater numbers at the university. This is shown in Figure 2. Figure 3 shows that respondents do not represent as highly as the population in the study when comparing races and ethnicities. White, non-Hispanics account for eighty-eight percent of the study population while sixty-nine percent of the respondents are White, non-Hispanics. There is one Asian or Pacific Islander respondent

in the study that is classified into other due to a lack of comparison percentage available to the university's student body. However, that individual could also possibly be categorized as an international student.

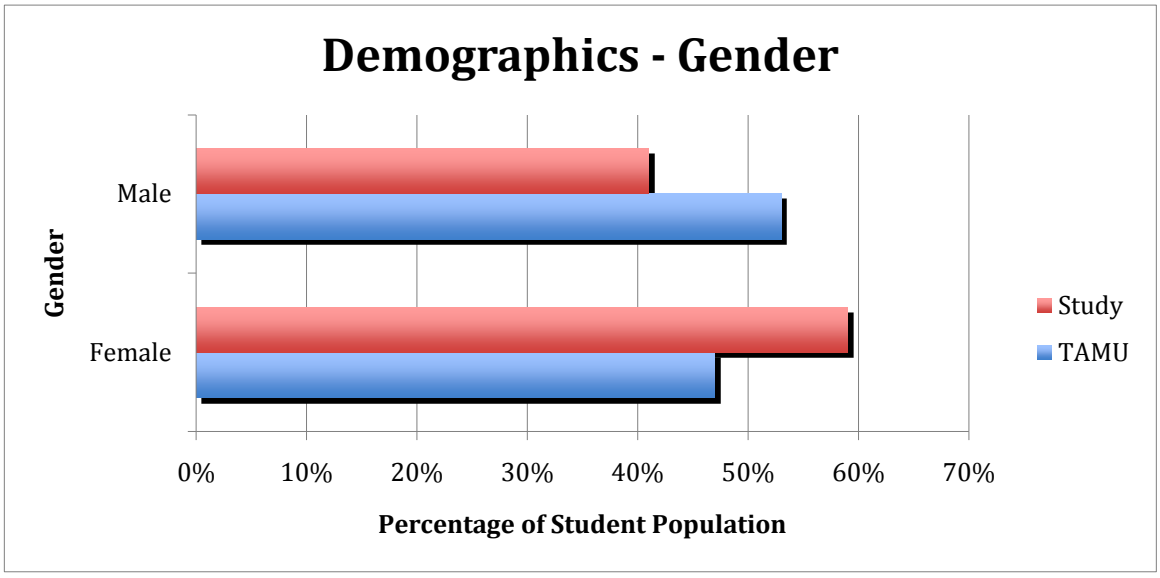

Figure 2.

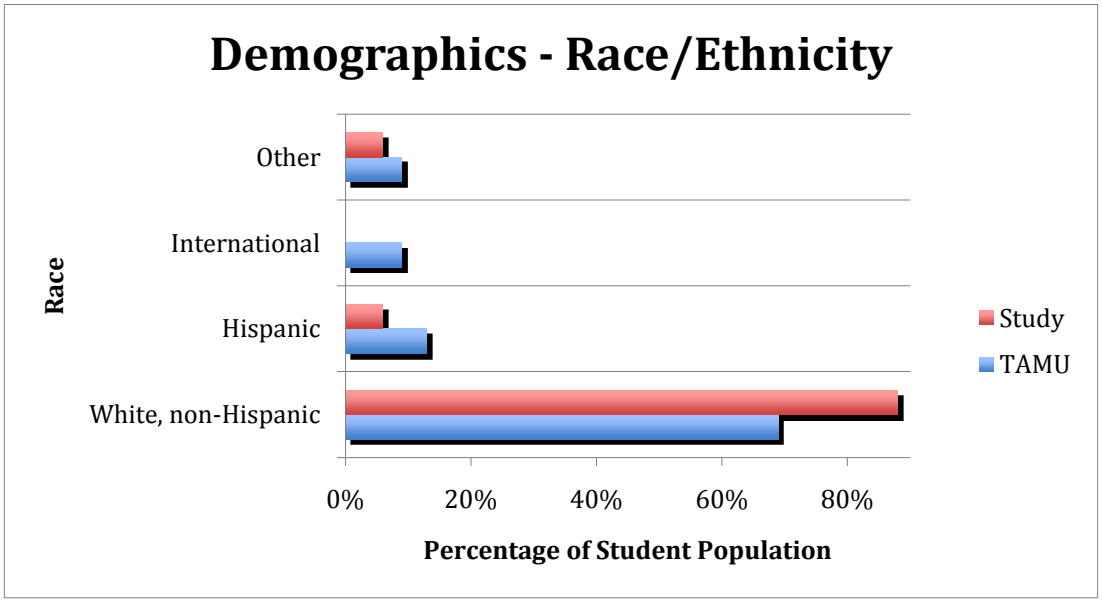

Figure 3.

In looking at alcohol consumption history among respondents, all of them drink alcohol at least monthly with most drinking once or twice a week as shown in Figure 4. The

mean number of drinks per sitting on average is 4.67 (±2.45). For the largest number of drinks per sitting, the mean is 9.21 (±5.23) and the median is 8. All of the respondents consume an average of at least two drinks with a high of twelve per sitting. The largest number of drinks is twenty-five per sitting.

There is a positive correlation of safe ride usage and number of drinks per sitting. Comparing average number of drinks netted 0.22 while comparing largest number of drinks is at 0.40. As respondents consume more drinks, there is an increase in safe ride usage.

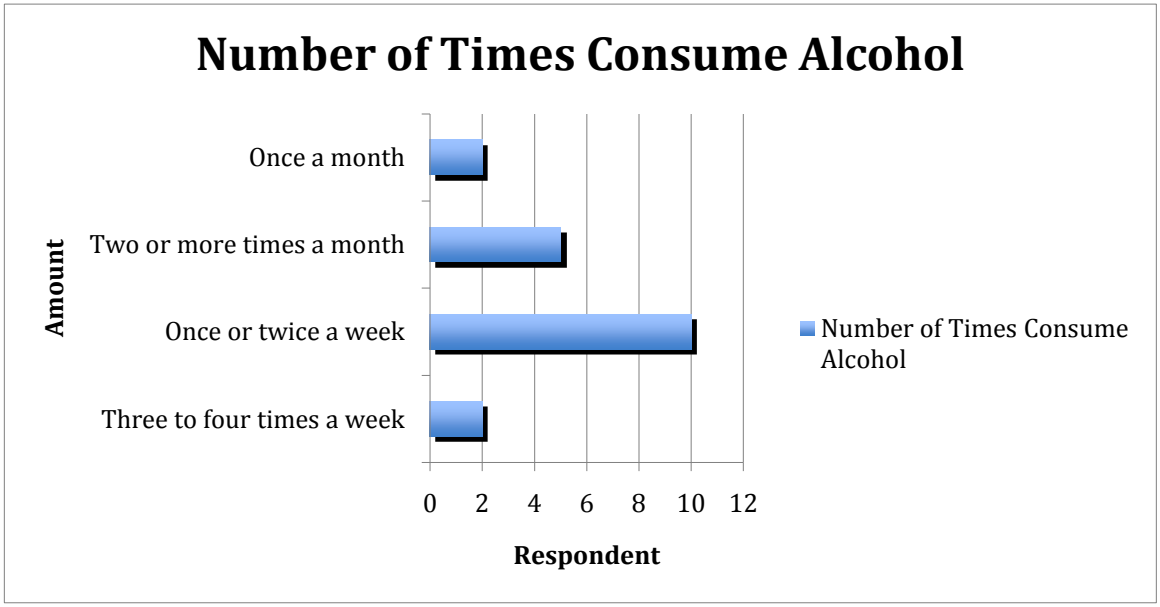

Figure 4.

In addition to levels of alcohol consumption, alcohol use and driving is also in examination. All of the respondents reply that they do not have a driving while intoxicated (DWI) or driving under the influence (DUI) conviction. Six out of fifteen respondents have a BAC level between .001 and .098 when drinking and driving after time is factored in. However, in looking at the BAC levels of the six, only one has a level above the legal limit of 0.08 in Texas.

All nineteen respondents provide answers regarding how many times in the past year they drive while drinking. There is a mean amount of times of 3.95 (±5.23) when they drive but do not feel intoxicated. The mean amount of times when they drove and did feel intoxicated is 0.74 (±1.05). Figure 5 shows how confident they feel driving safely while feeling intoxicated. None of the respondents feels confident to drive safely and only five feel somewhat confident to drive safely.

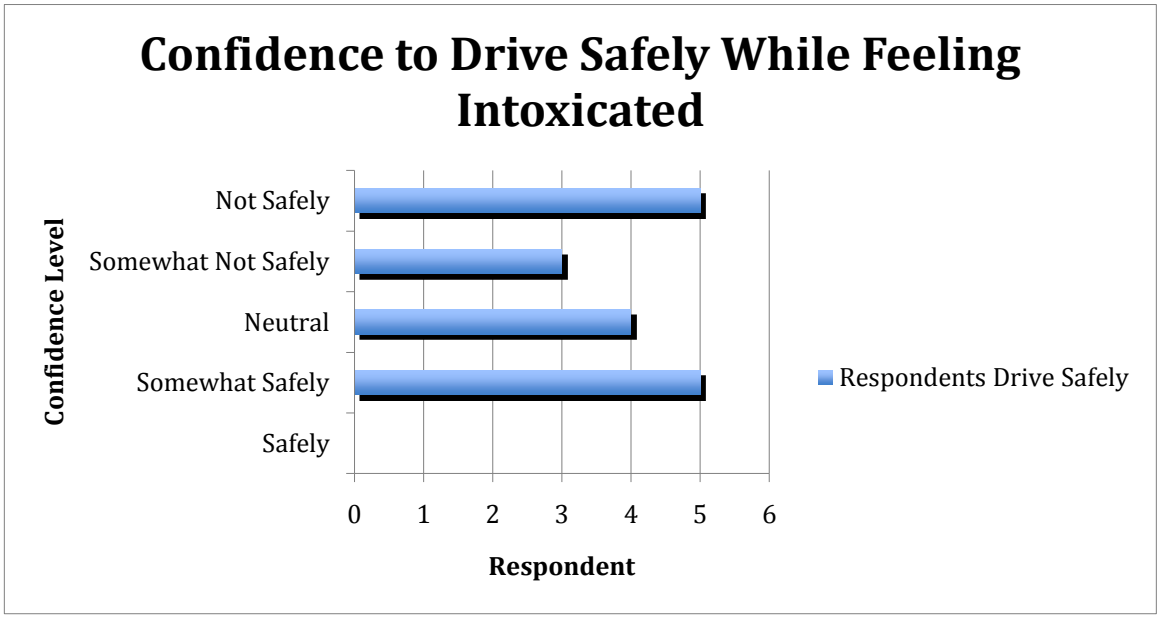

Figure 5.

On average, respondents drive an average of 7.41 miles (±11.62) after consuming any alcohol. Number of drinks they consume and miles they drive, exhibit a positive correlation (0.37). Thus as one consumes more drinks, so does the number of miles they drive. Also comparing BAC after time and miles, there is also a positive correlation (0.34). To answer the question of if individuals drink more when using safe ride programs, BAC levels are given as total BAC and BAC after time to account for BAC levels at the time of using transportation. Three categories are given: BAC levels when consuming alcohol outside the

home, levels at sittings where the respondent drinks and drives, and levels at sittings where the respondent uses CARPOOL. Table 3 shows the total BAC level per sitting of each individual. Table 4 Shows the BAC after accounting for time per sitting of each individual.

BAC			
Respondent	**Calc Outside Home**	**Calc Drink & Drive**	**Calc Safe Ride**
1	0.127	0.000	0.170
2	0.073	0.073	0.110
3	0.043	0.022	0.064
4	0.274	0.200	0.299
5	0.153	0.061	0.153
6	0.075	0.050	0.125
7	0.110	0.110	0.110
8	0.083	0.000	0.138
9	0.135	0.054	0.108
10	0.073	0.073	0.183
11	0.100	0.100	0.150
12	0.052	0.069	0.120
13	0.065	0.033	0.065
14	0.189	0.189	0.063
15	0.098	0.065	0.098

Table 3.

BAC after time span			
Respondent	**Calc Outside Home**	**Calc Drink & Drive**	**Calc Safe Ride**
1	0.059	0.000	0.084
2	0.039	0.005	0.042
3	0.000	0.000	0.000
4	0.189	0.098	0.163
5	0.085	0.000	0.085
6	0.007	0.000	0.023
7	0.042	0.008	0.008
8	0.032	0.000	0.070
9	0.084	0.000	0.057
10	0.005	0.000	0.098
11	0.032	0.015	0.048
12	0.001	0.001	0.052
13	0.000	0.000	0.000
14	0.070	0.053	0.000
15	0.064	0.000	0.013

Table 4.

For nearly all respondents, the BAC levels when using CARPOOL for transportation are higher in both the total BAC per sitting as well as BAC after accounting for time span. In addition, the BAC levels after time show that there are more respondents above the legal limit when using safe rides with four individuals compared to only one when driving. Table 5 shows a paired t test and Table 6 shows descriptive statistics of BAC levels for sittings where individual's drive and where safe rides are in use.

A calculation of a paired t test determines if there is an increase in the highest BAC level while using safe ride programs. The mean change in alcohol consumption (M=0.06, SD=0.07, N=15) is statistically significant, t=-3.272, two-tail p=0.0056, providing evidence that there is an increase in alcohol consumption. The 95% CI of the mean increase in alcohol consumption is (0.02, 0.10).

A separate calculation of a paired t test determines if there is an increase in BAC level after time (at time of transport) from using safe ride programs. The mean change in alcohol consumption (M=0.04, SD=0.04, N=15) is statistically significant, t=-3.524, two-tail p=0.0034, providing evidence that there is an increase in alcohol consumption while using safe rides. The 95% CI of the mean increase in alcohol consumption is (0.01, 0.06).

Paired T Test		
BAC - Drink & Drive/Safe Ride		
	BAC - Drink & Drive	**BAC - Safe Ride**
Mean	0.073	0.130
Variance	0.003	0.004

Observations	15	15
Pearson Correlation	0.340	
Hypothesized Mean Difference	0	
df	14	
t Stat	-3.272	
P(T<=t) one-tail	0.003	
t Critical one-tail	1.761	
P(T<=t) two-tail	0.006	
t Critical two-tail	2.145	
BAC After Time - Drink & Drive/Safe Ride		
	BAC - Drink & Drive	**BAC - Safe Ride**
Mean	0.012	0.050
Variance	0.001	0.002
Observations	15	15
Pearson Correlation	0.458	
Hypothesized Mean Difference	0	
df	14	
t Stat	-3.524	

P(T<=t) one-tail	0.002	
t Critical one-tail	1.761	
P(T<=t) two-tail	0.003	
t Critical two-tail	2.145	

Table 5.

Descriptive Statistics	
BAC - Diff SR-D&D	
Mean	0.057
Standard Error	0.018
Median	0.052
Mode	#N/A
Standard Deviation	0.068
Sample Variance	0.005
Kurtosis	3.355
Skewness	-1.113
Range	0.296
Minimum	-0.126
Maximum	0.169
Sum	0.857
Count	15

Confidence Level(95.0%)	0.038
95% CI	(0.020 , 0.095)
BAC After Time - Diff SR-D&D	
Mean	0.038
Standard Error	0.011
Median	0.037
Mode	0
Standard Deviation	0.041
Sample Variance	0.002
Kurtosis	0.013
Skewness	-0.507
Range	0.151
Minimum	-0.053
Maximum	0.098
Sum	0.563
Count	15
Confidence Level(95.0%)	0.023
95% CI	(0.015 , 0.060)

Table 6.

Figure 6 and Figure 7 shows a comparison of each respondents BAC levels when drinking outside of the home, on sittings where they will drive, and on sittings where they will use safe rides. In looking at the figures, BAC levels are higher when using safe rides. Also visible are where the BAC level is 0.00 for some respondents due to not drinking and driving, as seen in Figure 6's respondent one and eight. In figure 7, it can be seen that only five respondents still had alcohol in their system when they drove. There is a positive correlation at 0.32 between number of alcoholic drinks with using safe rides and amount of usage of safe rides. There is a positive correlation at 0.26 when looking at respondents who use other alternative transportations (designated drivers) in comparison with individuals who use safe rides, showing users of safe rides also tend to use other alternative transportation methods.

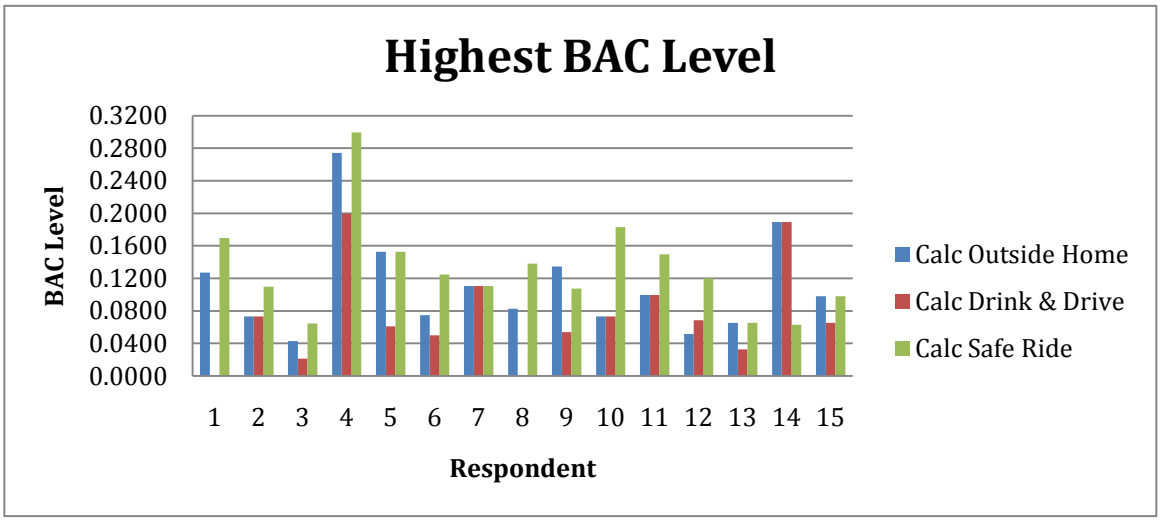

Figure 6.

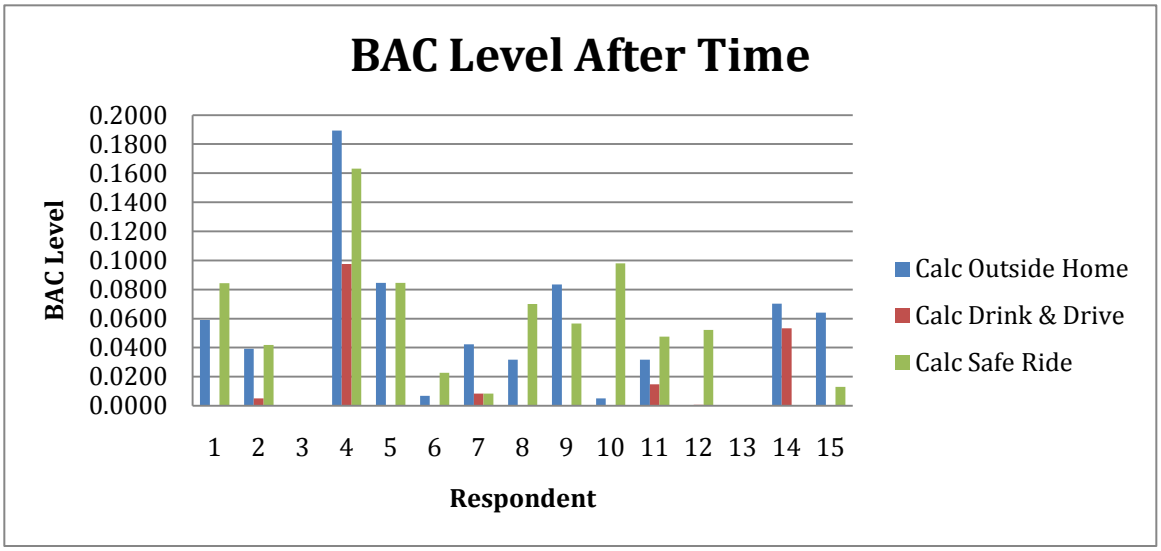

Figure 7.

Safe ride usage results are also showing comparison with alcohol consumption as well as reasons for usage, who uses it, and if the respondents think it has an effect on alcohol. The mean number of safe ride uses is 3.94 (±4.60) and the median is 2.5 per year. The individuals use safe ride predominantly as groups with only one individual riding by themselves. Out of N=17, twelve of the respondents call for the safe ride themselves while five of them have friends who call. Of those who have friends call CARPOOL, three will not call if their friends will not. Also, twelve would use safe rides by themselves while four don't. The results on usage possibly show that for most of the respondents, friends do not serve as a motivation for using safe ride programs. However, they typically ride with their friends.

CARPOOL is predominantly even of where they pick up passengers as shown in Figure 8. No one selects restaurants or any other sites where they receive rides. Site pickups don't reveal any motivating factors for using safe rides.

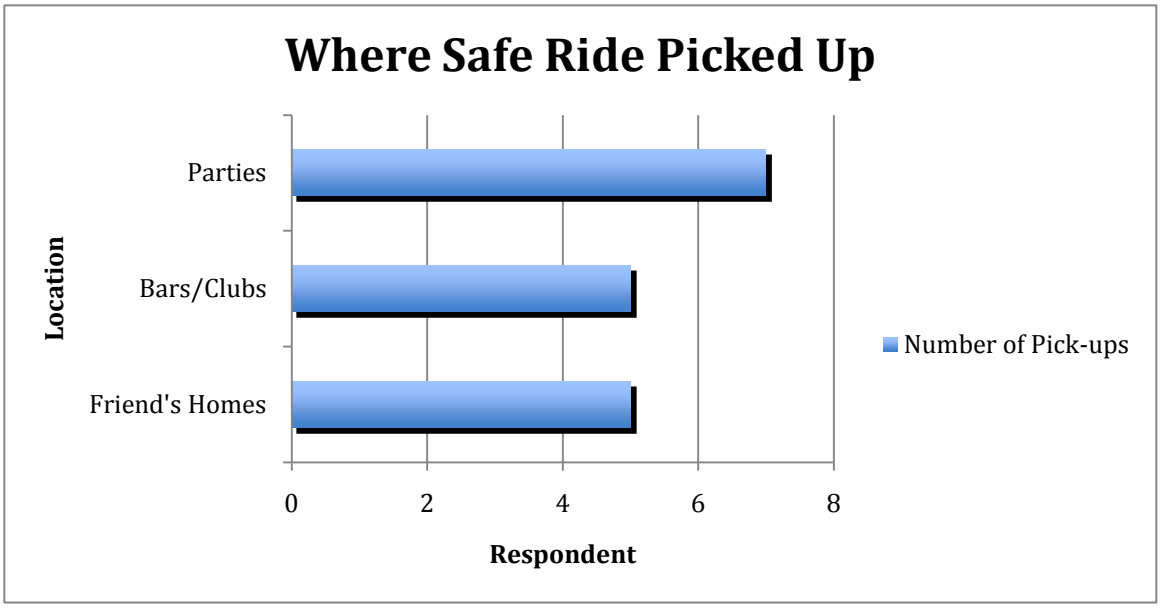

Figure 8.

Reasons respondents use safe rides include not having a vehicle, consuming alcohol, and weather as shown in Figure 9. Saving gas and money, other options on the questionnaire, are not among the selections as reasons for using CARPOOL. Consuming alcohol is the unanimous choice as the most important reason for choosing to use the safe ride program, which can indicate that alcohol is the primary motivating factor to use CARPOOL.

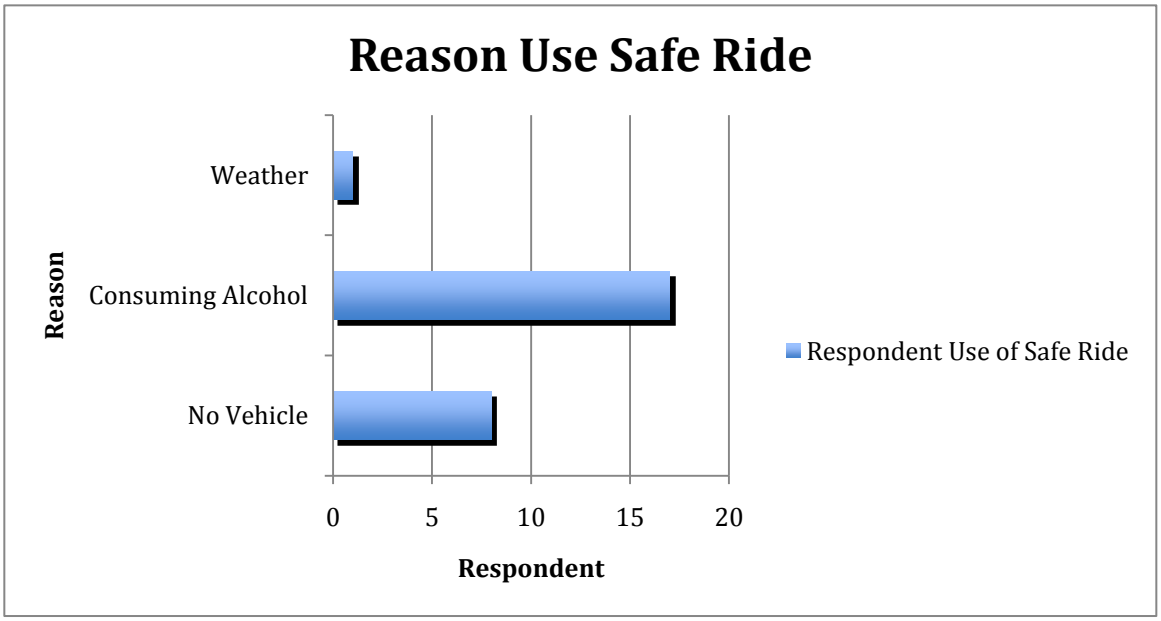

Figure 9.

Respondents also use safe ride when they don't consume alcohol. Eight out of seventeen individuals use safe rides when they don't drink with a mean amount of times at 1.375 (±0.74) per year. Results of CARPOOL use show alcohol is not the only motivating factor to use the service. Not having a vehicle might be a secondary factor as to why the service is in use when not consuming alcohol. In fact, the times respondents use safe rides for not alternative transportation might be seen as program abuse. In a report back in 1988 by Harding et al., there are five types of safe ride program abuse: riders without a car, riders who are not intoxicated, riders who would use other alternative transportation means if safe ride is not available, riders who use the service to bar-hop, and frequent repeat users (Harding, et al., 1988). However, part of the mission of CARPOOL is to offer rides to anyone to a home destination whenever in service, including those who might abuse the program.

Respondents also respond to four behavioral questions looking at whether safe rides impact alcohol consumption. Given that CARPOOL is available, does that influence you to drink is one question to look at if safe rides influence respondents to drink at all. Ten individuals say it does not while seven says it does. Results regarding if plans on drinking are altered if safe rides are not available, twelve individuals say no while five say yes. Additional comments from those who said yes include deciding to not drink as much and using alternative transportation means, showing that those who are affected by CARPOOL tend to revise their drinking patterns.

A key question of asking about respondent's belief if they consume more alcohol when they use safe rides than times they don't use the program. Eleven say no while five say

yes. Again, comments include increasing alcohol consumption due to safe ride availability and that it allows for “less inhibition” are given by the yes answers. Finally, asking when they already plan on drinking more alcohol, do they then choose to use CARPOOL, four say no while twelve say yes possibly indicating the safe ride was thought of after already deciding to consume more alcohol than usual.

Other Findings

An interesting finding is the age range of respondents. The ranges are from eighteen to twenty-two. A majority of the respondents are under twenty-one years of age, below the legal drinking age limit in Texas. While it does not have any bearing on the ability to drive oneself or use the safe ride program, it might have an effect on drinking and driving.

While determining if there is a correlation, the result of calculating between age and drinking outside of home is at -0.06 and between age and drinking and driving BAC over time is at -0.07, thus showing a negative correlation. As the respondent’s age is increases, the amount of consuming alcohol decreases as well as the BAC level decreases when drinking and driving.

Age	**Number of Respondents**
Eighteen	1
Nineteen	4
Twenty	8
Twenty-one	2
Twenty-two	4

Table 7.

Another interesting finding is that none of the student volunteer members of the CARPOOL program took part in the study even though it is stated that they not only provide the service, but also use it.

Summary

Alcohol consumption and either drinking and driving or using other alternative transportations is routine. When calculating BAC levels, results show that levels are higher when using safe rides thereby potentially confirming that there is a change in alcohol consumption with use of the program.

When looking at safe ride usage, individuals typically call and are willing to use the program showing friends are not likely a motivating factor. Pickup locations are evenly spread thus not providing any solid reasoning for usage due to sites. However, alcohol is unanimously considered a motivating factor for using safe rides. It isn't the only reason though, considering a portion of respondents use it when they don't consume alcohol.

In review of the results looking at alcohol use and safe rides, it seems that for a segment of the respondents, safe ride does motivate the respondents to consume alcohol. However, they would drink regardless of having the program and a majority of them do not believe they increase consumption above normal levels given they already plan to drink more before even deciding to use CARPOOL. While a segment of the respondents don't believe that safe ride has an effect on increasing alcohol consumption, the BAC levels prove otherwise.

CHAPTER V

Introduction

Alcohol consumption can lead to negative health consequences including physical, mental, emotional, and social. While drinking in moderation is seen as acceptable, an increase can be counter-productive. College students are highly susceptible to not only consuming alcohol, but also large quantities of alcohol. In addition, students have a high rate of drinking and driving, a risk factor that can lead to multiple consequences.

Alternative transportation methods exist as programs to reduce the risks of drinking and driving. While these methods have shown some success in reducing accidents, fatalities, and DWI//DUI, the potential is there to create other risks by increasing alcohol consumption. By increasing alcohol consumption, even though not driving, other negative consequences can occur. Safe rides, one of the alternative transportation methods, are a popular program amongst colleges and universities.

Summary of Study

The study seeks to identify if safe ride programs do change alcohol consumption patterns and if so, does it increase drinking thereby increasing the amount of risks. In addition, it examines motivational factors of using the safe rides as they could help identify the reason for change in behavior toward consuming alcohol. Development of an online survey to obtain these answers and various recruitment efforts were made to gain participation. However, the amount of participation does not meet the expected volume.

Data from nineteen respondents is available and statistical tests using univariate analysis are in use. Calculating BAC levels using a revision of the Widmark equation and comparisons amongst when student’s drive and when they use safe rides are in examination.

Measures or distribution, central tendency, dispersion, and correlation are also accessible. Results show that BAC levels are higher when safe rides are in use.

Conclusion

The findings find that there is a correlation in amount of alcohol consumption and the use of safe rides. In addition the amount of alcohol that respondents consume increases with safe rides in comparison to drinking and driving. The number of drinks and BAC level are higher when safe rides are in use. Also, when the respondents drink and drive, they typically wait till they are sober or below the legal limit before driving; there are five respondents above the legal limit when not accounting for time and only one when time is a factor. That is different from when safe rides are in use in that there are higher BAC levels and more respondents above the legal limit; twelve respondents are above the legal limit when looking at total BAC and five are above the limit when time is a factor. This could indicate that behavior is in change when using safe rides as there is a greater decrease in the number of individuals with BACs above the legal limit when they know they will drive.

Motives for using safe rides are also available in conjunction with alcohol use behaviors. While there is not a singular motive, the primary factor according to the data, is that alcohol consumption is the reason for using the program. Interpersonal factors, at least at time of choosing transportation, doesn't seem to have an effect as a majority of riders call the service themselves and would ride by themselves. When the survey asks, what are the reasons for using the program, respondent's state: alcohol consumption, no vehicle, and weather. Not having a vehicle could be the reason why respondents also use the service when they do not drink. If alcohol consumption is the only motive, then it could stand to reason from the evidence that safe rides do alter drinking behavior as seen by the increase in alcohol

consumption. However, since other potential motivating factors are available, more investigation is in need.

The third question seeks to determine if safe rides change behavior to where the respondents not only drink, but drink more simply because of the availability of the service. A little less than half says it does influence the desire to consume alcohol, however, when the survey asks if safe rides are not available, would that change plans to drink, a majority said no. So, while safe rides might encourage students to drink, they would more than likely drink anyways. In asking if the respondents thought they drink more when using safe rides, a majority believe that they do not. That was in contradiction with what the results of the BAC calculations state. It might be that they don't realize that they do consume more alcohol when they use the program or, due to self-report, bias might be the reason for the discrepancy. Finally, a majority of students plan on consuming more alcohol than usual before even selecting the mode of transport. That could indicate that the safe ride service doesn't necessarily increase consumption, but instead, an increase in consumption is a factor that leads students to select alternative transportation methods.

While there is data to attempt to answer these questions, some factors have to be taken into account. Given the low participation and response rate of respondents, it could state that the population isn't representative of college students let alone the student body of Texas A&M University. In addition, the population being a convenience sample also gives further evidence that the respondents aren't representative. Secondly, there might be flaws in the data. Self-report in filling out the survey can lead to biases in the answers. Also, given the times span of twelve months, recall failure can occur. Plus, a few singular individuals could alter the results to one conclusion or another due to having a small sample size. Knowing

these potential consequences of the data collection process and outcomes, view the results as furthering the information available, but not as conclusive.

Implications

The implications of this study is that safe rides as an alternative transportation strategy might need further evaluation to see areas for improvement in reducing not only the risk factors with drinking and driving, but also an increase in alcohol consumption. Programs that are solely developed to tackle the drunk driving health issue might need to increase objectives to include reducing drinking. A multi-tiered program to change behaviors of alcohol consumption and use could provide the balance to reduce multiple risk factors of populations consuming alcohol.

In addition, programs should conduct an evaluation to see whether there is any abuse. As shown, inappropriate use of the program by using it when not consuming alcohol could disrupt the mission of reducing drinking and driving by taking away resources, such as finances and manpower, which programs could use more efficiently. Also, those rides given could be taking away the availability of rides from other individuals who the program is targeting.

Recommendations

In review of the data and process of the study, it is recommended to conduct further studies to gain more data to add to the current and past studies in determining if alcohol consumption does increase with safe ride programs, what population sees a change, and if safe rides are the motivating factor for any behavior change. The following recommendations for future studies are: using breathalyzers to gain accurate BAC levels, increasing the amount

of data points of BAC levels, and possibly delving deeper into behaviors and motivations of safe ride usage and alcohol consumption.

The use of breathalyzers would negate the lack of accuracy of using equations. The flaws of equations are self-description of data, which can lead to inaccurate calculations due to recall failure and bias on responses. In addition, gaining multiple BAC level readings per individual instead of asking for an average of drinks per sitting can give a clearer idea of if there is a change in alcohol consumption, when do those changes occur and what factors lead to that change. In order to gain multiple data points, an avenue is to conduct a cohort study to follow respondents and their alcohol consumption over time.

To gain information as to if behavior change occurs and what the respondent's motivations are, conducting focus groups could assist in gaining richer data through qualitative means. Having the ability to ask multiple questions and get deeper into the responses can provide more comprehensive findings. The data could also help identify what factors lead to any change in alcohol consumption. All of the recommendations have the aim of increasing accuracy and validate or not the conclusions of this as well as previous other studies. The recommendations can help determine if safe rides do change drinking patterns and if they increase alcohol consumption.

REFERENCES

Aspler, R. (1988). *Transportation Alternatives for Drinkers*. Paper presented at the Surgeon General's Workshop on Drunk Driving: Background Papers.

Barr, A., & MacKinnon, D. P. (1998). Designated driving among college students. *J Stud Alcohol, 59*(5), 549-554.

Bryan-College Station Convention and Visitors Bureau. (2010). Nightlife and Bars. 2010, from http://www.visitaggieland.com/Things-to-Do/Entertainment/Nightlife-and-Bars

CARPOOL. (2008). Statistics. 2010, from http://carpool.tamu.edu/stats/index.asp

Caudill, B. D., Harding, W. M., & Moore, B. A. (2000). At-risk drinkers use safe ride services to avoid drinking and driving. *J Subst Abuse, 11*(2), 149-159.

Caudill, B. D., Harding, W. M., & Moore, B. A. (2001). DWI prevention: profiles of drinkers who use designated drivers. *Addict Behav, 26*(2), 155-166.

Center for Disease Control and Prevention. (2010). DATA 2010. 2010, from http://wonder.cdc.gov/data2010/

City of College Station. (2010). Fast Facts. 2010, from http://www.cstx.gov/index.aspx?page=3429

Decina, L. E., Foss, R., Tucker, M. E., Goodwin, A., & Sohn, J. (2009). *Alternative Transportation Programs: A Countermeasure for Reducing Impaired Driving* (Final Report No. DOT HS 811 188). Chapel Hill: Highway Safety Reseach Center, University of North Carolina.

DeJong, W., & Winsten, J. A. (1999). The use of designated drivers by US college students: a national study. *J Am Coll Health, 47*(4), 151-156.

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2009). *Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method* (3rd ed.). Hoboken: John Wiley & Sons, Inc.

Ditter, S. M., Elder, R. W., Shults, R. A., Sleet, D. A., Compton, R., & Nichols, J. L. (2005). Effectiveness of designated driver programs for reducing alcohol-impaired driving: a systematic review. *Am J Prev Med, 28*(5 Suppl), 280-287.

Elam, C., McKaig, R. N., Jacobs, B., Whitlow, M., & Gros Louis, K. R. R. (2006). Examining a Safe Ride Program: An Assessment of the Midnight Special Late Night Bus Service. *NASPA Journal, 43*(2).

Family Sues Over Safe-Ride Program. (2004). *Perspective, 19*(11).

Family sues school, city over alcohol-related death. (2004). *Alcoholism and Drug Abuse Weekly, 16*(35).

Gieck, D. J., & Slagle, D. M. (2010). Examination of a University-Affiliated Safe Ride Program. *Journal of Alcohol and Drug Education, 54*(1), 37-55.

Glascoff, M. A., Knight, S. M., & Jenkins, L. K. (1994). Designated-driver programs: college students' experiences and opinions. *J Am Coll Health, 43*(2), 65-70.

Harding, W. M., Apsler, R., & Goldfein, J. (1988). *A Users' Guide to Ride Service Programs*. Winchester: Harold Russell Associates, Inc.

Harding, W. M., Caudill, B. D., Moore, B. A., & Frissell, K. C. (2001). Do drivers drink more when they use a safe ride? *J Subst Abuse, 13*(3), 283-290.

Hingson, R. W., Zha, W., & Weitzman, E. R. (2009). Magnitude of and Trends in Alcohol-Related Mortality and Morbidity Among U.S. College Students Ages 18-24, 1998-2005. *Jounal of Studies on Alcohol and Drugs, 16*, 12-20.

Lavoie, M., Godin, G., & Valois, P. (1999). Understanding the use of a community-based drive-home service after alcohol consumption among young adults. *J Community Health, 24*(3), 171-186.

Mundorf, N. (2005). *Creating Safe Transportation Options for College Students - Change Strategies for Safe Transportation Behaviors*. Kingston: University of Rhode Island, Dept. of Communication Studies.

National Highway Traffic Safety Administration. (1994). *Computing a BAC estimate*. Washington D.C.

National Highway Traffic Safety Administration. (2008). *2007 Traffic Safety Annual Assessment - Alcohol-Impaired Driving Fatalities* (No. DOT HS 811 016). Washington, DC: National Highway Traffic Safety Administration.

National Highway Traffic Safety Administration. (NDL). Designated Driver / Safe Ride Program. 2010, from http://nhtsa.gov/people/injury/alcohol/designateddriver/index.html

National Institutes of Health. (2006). *Alcohol Use and Alcohol Use Disorders in the United States: Main Findings from the 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions*. Bethesda.

NIOSH. (1996). Preventing Occupational Hearing Loss - A Practical Guide. In NIOSH (Ed.), *NIOSH* (Vol. 96-110): NIOSH.

Reiling, D. M., & Nusbaumer, M. R. (2007). An exploration of the potential impact of the designated driver campaign on bartenders' willingness to over-serve. *Int J Drug Policy, 18*(6), 458-463.

Rivara, F. P., Relyea-Chew, A., Wang, J., Riley, S., Boisvert, D., & Gomez, T. (2007). Drinking behaviors in young adults: the potential role of designated driver and safe ride home programs. *Inj Prev, 13*(3), 168-172.

Rothschild, M. L. (2003). *Road Crew Research Report*.

Rothschild, M. L., Mastin, B., & Miller, T. W. (2006). Reducing alcohol-impaired driving crashes through the use of social marketing. *Accident Analysis and Prevention*(1335), 1-13.

Royal, D. (2003). *National Survey of Drinking and Driving Attitudes and Behavior: 2001* (Final Report No. DOT HS 809 549-551). Washington, DC: The Gallup Organization.

Safe Ride Programs United. (2010). Programs. 2010, from http://srpu.org/programs

Saltz, R. (2004). Preventing Alcohol-Related Problems on College Campuses—Summary of the Final Report of the NIAAA Task Force on College Drinking. 2010, from http://pubs.niaaa.nih.gov/publications/arh284/249-251.htm

Sarkar, S., Andreas, M., & de Faria, F. (2005). Who uses safe ride programs: an examination of the dynamics of individuals who use a safe ride program instead of driving home while drunk. *Am J Drug Alcohol Abuse, 31*(2), 305-325.

Texas A&M University. (2010). About Texas A&M University. Retrieved 2010, from http://www.tamu.edu/home/aboutam/

Timmerman, M. A., Geller, E. S., Glindemann, K. E., & Fournier, A. K. (2003). Do the designated drivers of college students stay sober? *J Safety Res, 34*(2), 127-133.

Wechsler, H., Davenport, A., Dowdail, G., Moeykens, B., & Castillo, S. (1994). Health and Behavioral Consequences of Binge Drinking in College: A National Survey of Students at 140 Campuses. *JAMA, 272*(21).

Wechsler, H., Lee, J. E., Kuo, M., Seibring, M., Nelson, T. F., & Lee, H. (2002). Trends in College Binge Drinking During a Period of Increased Prevention Efforts: Findings From 4 Harvard School of Public Health College Alcohol Study Surveys: 1993-2001. *Journal of American College Health, 50*(5).

APPENDIX A

February 2011

Dear Texas A&M Faculty:

My name is Danny Chan and I am a MPH student at Emory University. I am writing to ask for your assistance in recruiting respondents for a research study I am conducting that examines alcohol consumption among Texas A&M University students who use CARPOOL.

PURPOSE

The purpose of this study is to examine students' relationship between drinking behaviors and the use of the safe ride program, CARPOOL. The study seeks to determine if a change in pattern is achieved by using alternative transportation methods. The information gained could help guide the development and evaluation of programs aimed at reducing drunk driving as well as heavy drinking.

RESEARCH DESIGN

The study is a cross sectional retrospective study design. The study will use an online survey through Survey Monkey. The self-administered survey will guide the respondent through the online questionnaire. The estimated time to complete the survey is 15 minutes.

Included with this letter is a flyer with information on the study description, contact information and the web address needed to access the survey. I am asking Texas A&M University staff and student organizations to relay this information by passing out the flyer to students as well as sending the information out in newsletters and e-mails.

RECRUITER ROLE

Your role in assisting in recruiting will consist of providing the information to students and directing them to contact myself for any information. You are being asked to conduct passive recruitment and will not provide the survey or be involved in data collection and analysis.

Please inform students that the survey is voluntary and participation would enhance the knowledge regarding alcohol consumption amongst college students. Also, inform them that participation in the study will have no effect on their grades and academic standing.

CONTACT

For any questions or information, please feel free to contact me at dchan3@sph.emory.edu or 281-636-1032. The Emory University Institutional Review Board has approved the research study. They can be contacted at 404-712-0720 or 877-503-9797 or irb@emory.edu.

Thank you for your assistance.

Sincerely,

Danny Chan

APPENDIX B

Volunteers Needed

Be part of an important alcohol consumption research study. The purpose of this study is to examine students' relationship between drinking behaviors and their use of the safe ride program, CARPOOL. The information gained could help guide the development and evaluation of programs aimed at reducing drunk driving as well as heavy drinking.

We are seeking:

- Current Texas A&M University students
- Individuals 18 years old and over
- Individuals who have consumed alcohol in the past 12 months
- Individuals who have driven a motor vehicle in the past 12 months
- Individuals who have used CARPOOL in the past 12 months

Eligible respondents will answer an online survey on Survey Monkey. The survey will ask questions on demographics, alcohol consumption history and safe ride usage. The survey will take approximately 15 minutes to complete. Participating in the survey will have no effect on your grades or academic standing.

To participate, you may access the survey at any location with an Internet connection using the web address below.

https://www.surveymonkey.com/s/emoryalcohol

You will have a chance to enter to win one of four $25 ITunes gift cards whether you participate or not.

The study is being conducted by Emory University. Please contact Danny Chan at dchan3@sph.emory.edu for more information.

APPENDIX C

Consent to be a Research Subject

Title: Is there an increase in alcohol consumption of college students who use safe ride programs?

Principal Investigator: Danny Chan, Emory University – Rollins School of Public Health, Atlanta, GA

Introduction: You are being asked to volunteer in a research study because you are a Texas A&M University student who has used the CARPOOL safe ride program. We are asking you to volunteer because we are interested in the history and behaviors of students while consuming alcohol. We plan to survey 1,045 undergraduate and graduate students.

Purpose: The purpose of this study is to examine students' relationship between drinking behaviors and their use of the safe ride program, CARPOOL. The study seeks to determine if a change in pattern is achieved by using alternative transportation methods. Results will be provided in aggregate form and no personal identifying information will be shared.

Procedures: We are asking students to fill out a brief 43 question online survey through Survey Monkey. It will take approximately 15-20 minutes to complete. You do not have to participate in this study if you do not wish to. If you agree to participate, you will be asked to check a box stating you have read and understood the consent form. Once the survey has

been completed, your part in the study will be over. All identifying information will be kept confidential.

Risks and Discomforts: There is minimal foreseeable risk or discomforts associated with this study. You have the right to decline to answer any question, for any reason. You have a right to stop the survey or withdraw from the study at any time.

Benefits: This study is not designed to benefit you directly. This study is designed to learn more about students' drinking patterns in conjunction with the use of safe ride programs.

Compensation: You will not be paid for your participation in this study. There will be no costs to you for participating in this study. You will have an opportunity to enter in a drawing for 1 of 4 $25 ITunes cards whether you participate in the study or not.

Confidentiality: Certain offices and people other than the researchers may look at study records. Government agencies and Emory employees overseeing proper study conduct may look at study records. These offices include the Emory Institutional Review Board and the Emory Office of Research Compliance. Emory will keep any research records produced private to the extent we are required to do so by law.

A study number rather than your name will be used on study records wherever possible. Your name and other facts that might point to you will not appear when we present this study or publish its results.

Withdrawal from the Study: Your participation in this study is completely voluntary and you have the right to refuse or leave the study at any time without penalty. You can stop at any time after giving consent. This decision will not affect in any way your current or future grades or academic standing.

Questions: Contact Danny Chan at dchan3@sph.emory.edu:

- If you have any questions about this study or your part in it, or
- If you have questions, concerns or complaints about the research

If you have questions about your rights as a research subject or if you have questions, concerns or complaints about the research, you may contact the Emory Institutional Review Board at 404-712-0720 or 877-503-9797 or irb@emory.edu.

Consent: You may print a copy of this consent form to keep. Do not agree to this consent form unless you have had a chance to ask questions and get answers that make sense to you.

Nothing in this form can make you give up any legal rights. By agreeing to this form you will not give up any legal rights. You are free to take home an unsigned copy of this form and talk it over with family or friends.

ELECTRONIC CONSENT: Please select your choice below.

Clicking on the "agree" button below indicates that:

- You have read the above information
- You voluntarily agree to participate
- You are at least 18 years of age

If you do not wish to participate in the research study, please decline by clicking the "disagree" button.

☐ Agree

☐ Disagree *(Skip to Thank You)*

Eligibility Section

1. Are you currently a Texas A&M University student?

Yes

No *(Skip to Thank You)*

2. Are you 18 years of age or older?

Yes *(Skip to 2.1)*

No *(Skip to Thank You)*

2.1 What is your age in years?

_____

3. Have you driven a vehicle in the past 12 months?

Yes

No *(Skip to Thank You)*

CARPOOL is a student-run non-profit organization serving the Bryan/College Station community with free rides home every Thursday, Friday, and Saturday night from 10 pm to 3 am during the Spring and Fall semesters at Texas A&M.

4. Have you used Texas A&M University's safe ride program, CARPOOL, within the past 12 months?

Yes

No *(Skip to Thank You)*

A drink is defined as having a half an ounce of absolute alcohol (e.g., a 12-ounce can or glass of beer or cooler, a 5-ounce glass of wine, or a drink containing 1 shot of liquor).

5. During the past 12 months, have you had at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor?

Yes

No *(Skip to Thank You)*

Alcohol History Section

A drink is defined as having a half an ounce of absolute alcohol (e.g., a 12-ounce can or glass of beer or cooler, a 5-ounce glass of wine, or a drink containing 1 shot of liquor).

6. During the past 12 months, how often did you usually have any kind of drink containing alcohol?

Once a day

Nearly every day

Three or four times a week

Once or twice a week

Two or more times a month

Once a month

Less than once a month but at least once a year

A drink is defined as having a half an ounce of absolute alcohol (e.g., a 12-ounce can or glass of beer or cooler, a 5-ounce glass of wine, or a drink containing 1 shot of liquor).

7. During the past 12 months when you drank alcohol, how many alcoholic drinks did you have on a typical occasion?

_____

A drink is defined as having a half an ounce of absolute alcohol (e.g., a 12-ounce can or glass of beer or cooler, a 5-ounce glass of wine, or a drink containing 1 shot of liquor).

8. During the past 12 months, what is the largest number of alcoholic drinks you had on any occasion?

_____

A drink is defined as having a half an ounce of absolute alcohol (e.g., a 12-ounce can or glass of beer or cooler, a 5-ounce glass of wine, or a drink containing 1 shot of liquor).

9. During the past 12 months, when you drank outside your home…

9.1 How many alcoholic drinks did you usually have on average per occasion?

_____

9.2 On average, how many hours did you usually drink per occasion?

_____

For the next few questions, the study is looking at student's drinking history in relation to driving.

10. During the past 12 months, how many times (if any) did you drive, but when you did not feel intoxicated (state of being physically or mentally impaired) after drinking?

_____

11. During the past 12 months, how many times (if any) did you drive when you felt intoxicated (state of being physically or mentally impaired) after drinking?

_____

A drink is defined as having a half an ounce of absolute alcohol (e.g., a 12-ounce can or glass of beer or cooler, a 5-ounce glass of wine, or a drink containing 1 shot of liquor).

12. During the past 12 months, if you drove after drinking alcohol…

12.1 How many alcoholic drinks did you usually have on average per occasion?

_____

12.2 On average, how many hours did you usually drink per occasion?

_____

12.3 How many hours have usually passed between the time you stopped drinking and when you drove?

_____

12.4 How many miles did you usually drive?

_____

13. During the past 12 months, how many times did you ride with a driver who you thought was intoxicated (state of being physically or mentally impaired)?

_____

14. On a scale of 1 to 5, how confident are you that you can drive safely when you feel intoxicated (state of being physically or mentally impaired)? 1 means you are certain you cannot drive safely when you feel intoxicated. 5 means you are certain you can drive safely. 3 means you are not leaning one way or the other.

Confidence	1	2	3	4	5
	Can not drive safely		Neutral	Can	drive safely

15. How many times (if any) have you ever been convicted for driving under the influence (DUI) or driving while intoxicated/impaired (DWI)?

_____

CARPOOL Section

In this section, this study is looking at students' utilization of CARPOOL.

16. In the past 12 months, how many times have you used CARPOOL?

_____

A drink is defined as having a half an ounce of absolute alcohol (e.g., a 12-ounce can or glass of beer or cooler, a 5-ounce glass of wine, or a drink containing 1 shot of liquor).

17. Think again about occasions during the past 12 months when you drove to where you drank and you received a safe ride from the CARPOOL program home. On these occasions…

17.1 How many alcoholic drinks did you usually have on average per occasion?

_____

17.2 On average, how many hours did you usually drink per occasion?

_____

17.3 How many hours have usually passed between the time you stopped drinking and the time you received a ride home from CARPOOL?

_____

18. When you have used CARPOOL, who usually contacted CARPOOL for the ride home?

Yourself *(Skip to 19)*

Friends *(Skip to 18.1)*

Drinking establishment *(Skip to 18.1)*

Other (please specify) _____ *(Skip to 18.1)*

18.1 Would you have contacted CARPOOL for the ride home if someone else did not call for you?

Yes

No

19. When you have used CARPOOL, did you ride by yourself or with a group?

Yourself *(Skip to 20)*

Group *(Skip to 19.1)*

19.1 Would you have used CARPOOL if just riding by yourself?

Yes

No

20. When you have used CARPOOL, where has CARPOOL normally picked you up?

Bars/Clubs

Restaurants

Parties

Friend's homes

Other (please specify) _____

21. Since CARPOOL is available, does that influence you drinking alcohol?

Yes

No

If Yes, how so? (please specify) _____

22. If CARPOOL were not available, would that alter your plans of consuming alcohol?

Yes

No

If Yes, how so? (please specify) _____

23. Have you used CARPOOL when you have not consumed alcohol?

Yes *(Skip to 23.1)*

No *(Skip to 24)*

23.1 How many <u>times</u> in the past 12 months have you used CARPOOL when you have not consumed alcohol?

_____

24. Please select all of the reasons you have utilized CARPOOL. (Choose all that apply)

No vehicle

Consuming alcohol

Weather

Save gas

Money

Other (please specify) _____

25. Please select the most important reason you have utilized CARPOOL.

No vehicle

Consuming alcohol

Weather

Save gas

Money

Other (please specify) _____

26. Do you believe that you consume more alcohol when using CARPOOL?

Yes

No

If Yes, how much? (please specify) _____

27. If you already had planned on drinking more alcohol than on a typical occasion, did you then decide to use CARPOOL instead of driving?

Yes

No

28. Have you ever served as a member/driver for CARPOOL?

Yes

No

Demographics Section

29. What is your gender?

Female

Male

30. About how much do you weigh in pounds?

_____

31. Which of the following groups best describes you?

White, non-Hispanic

Black or African-American, non-Hispanic

Hispanic

Native American

Asian or Pacific Islander

Other (please specify) _____

32. Do you live on or off campus?

On campus

Off campus

Thank you for participating in this survey.

If you would like to be eligible for the drawing, please click the "Done" button below and you will be redirected to another survey where you can enter your e-mail address. Otherwise, you can close your Internet browser window.

Done

New Survey Opened

Incentive Drawing Form

Please enter your e-mail address to be eligible for the chance to win a $25 ITunes gift card for participating in this study. Entering the drawing is voluntary.

_____

Done

APPENDIX D

EMORY UNIVERSITY

Institutional Review Board

TO: Danny Chan

Principal Investigator

DATE: November 29, 2010

RE: **Notification of Exempt Determination**

IRB00047728

Is There an Increase in Alcohol Consumption of College Students Who Use Safe Ride Programs?

Thank you for submitting an application in eIRB. We reviewed the application and determined on **11/29/2010** that it meets the criteria for exemption under 45 CFR 46.101(b)(2) and thus is exempt from further IRB review.

This determination is good indefinitely unless something changes substantively in

the project that affects our analysis. The PI is responsible for contacting the IRB for clarification about any substantive changes in the project. Therefore, please do notify us if you plan to:

• Add a cohort of children to a survey or interview project, or to a study involving the observation of public behavior in which the investigators are participating.
• Change the study design so that the project no longer meets the exempt categories (e.g., adding a medical program or accessing identifiable and potentially damaging data)
• Make any other kind of change that does not appear in the list below.

Please do not notify us of the following kinds of changes:

• Change in personnel, except for the PI
• Change in location
• Change in number of subjects to be enrolled or age range for adults
• Changes in wording or formatting of data collection instruments that have no substantive impact on the study design

For more information about the exemption categories, please see our Policies & Procedures at www.irb.emory.edu. In future correspondence about this study, please refer to the IRB file number, the name of the Principal Investigator, and the study title. Thank you.

Sincerely,

Carol Corkran, MPH, CIP

Senior Research Protocol Analyst

This letter has been digitally signed

Emory University

1599 Clifton Road, 5th Floor - Atlanta, Georgia 30322

Tel: 404.712.0720 - Fax: 404.727.1358 - Email: irb@emory.edu - Web:

http://www.irb.emory.edu/

APPENDIX E

The purpose of this study is to examine students' relationship between drinking behaviors and the use of the safe ride program, CARPOOL. The study seeks to determine if a change in pattern is achieved by using alternative transportation methods. The information gained could help guide the development and evaluation of programs aimed at reducing drunk driving as well as heavy drinking.

The target population will be students from Texas A&M University, located in College Station, Texas. The student population consists of over 49,000 enrolled undergraduates and graduates. Eligible respondents will meet five inclusion criteria. They must be college students at Texas A&M University in College Station, be 18 years or older, has drank an alcoholic beverage in the last twelve months, has driven a motor vehicle in the last twelve months and has ridden in the safe ride program, CARPOOL, in the last twelve months.

A convenience sample will be used in selecting respondents. Recruitment will be conducted through Texas A&M University staff and student organizations. Staff and student organizations will provide passive recruitment by providing information on the study with a web address to the online survey. Contact will be made through flyers, listserv, e-mails, newsletters, and direct contact. Also, flyers will be displayed on open bulletin boards.

The study will be a cross sectional retrospective study design. The study will use an online survey through Survey Monkey. The self-administered survey will guide the respondent

through the online questionnaire. The estimated time to complete the survey is .25 hours (15 minutes).

Documentation of written/signed informed consent is being requested for waiver from the Emory IRB. Consent will be presented on the first page of the online survey along with a check box for respondents to agree or disagree to the consent. If disagree is chosen, they will be automatically transferred to the thank you page of the survey. If agree is chosen, they will go onto the next page to continue the survey. Respondents are given the opportunity to not answer any question of the survey except for the consent form question. In addition, they can withdraw at any time during the survey.

The study will take place at locations where the respondent has access to a computer, including personal and university computers. Locations would potentially include at respondent's residence, at school, or any other locale providing Internet access.

The survey will consist of 43 questions with topics including eligibility, demographics, alcohol consumption history, and safe ride usage. In addition, the first question section of the survey will consist of five questions to determine respondent eligibility. Those with responses indicating ineligibility will be forwarded automatically to the thank you page and will not complete the rest of the survey.

While taking the online survey, IP addresses will be masked. Names or other personal identifiers will not be obtained from the study survey. Age will be asked, however, date of

birth will not be asked for. After data is collected and exported onto an excel file, a random identifier will be assigned to each respondent's group of answers.

APPENDIX F

1. Background

The purpose of this study is to examine students' relationship between drinking behaviors and the use of the safe ride program, CARPOOL. The study seeks to determine if a change in pattern is achieved by using alternative transportation methods. The information gained could help guide the development and evaluation of programs aimed at reducing drunk driving as well as heavy drinking.

College students are at increased risk of injury and fatalities due to behaviors such as consuming large amounts of alcohol and driving while having drank. Fatalities of college students involving alcohol was over 1,400 deaths annually in 1998 and went up to over 1,800 in 2005 with most of them coming from traffic accidents (Hingson, et al., 2009; Saltz, 2004). Although fatalities from alcohol impaired driving has seen a decline, the percentage of total fatalities of twenty-one to twenty-four year olds remains the same at 16% (National Highway Traffic Safety Administration, 2008).

Besides fatalities, other negative effects associated with drinking have been unintentional injuries, violence and alcohol abuse. In addition, "binge drinking of college students have also been associated with unplanned and unsafe sexual activity, physical and sexual assault, other criminal violations, interpersonal problems, physical or cognitive impairment, and poor academic performance" (Wechsler, et al., 1994; Wechsler, et al., 2002). In 2001, 599,000 full time college students were injured because of drinking, 97,000 were victims of alcohol-

related sexual assault or date rape, and 696,000 were hit or assaulted by another drinking student (Hingson, et al., 2009).

It has been stated that "College students often drink more than any other group" (Sarkar, et al., 2005). One study showed that 42.7% of students become intoxicated and 20.7% do it frequently (Timmerman, et al., 2003). College students have a high rate of drinking including drinking excessively. According to the CDC, from 1998 to 2007, the percentage of college students that had binged drank in the past two weeks was between 39% and 41% (Center for Disease Control and Prevention, 2010). The NIH also shows data from 2001-2002 that 17.7% of eighteen to twenty-four year olds binge drank one to eleven times in the past year and 39.7% binge drank twelve or more times (National Institutes of Health, 2006).

Drinking and driving is also prevalent. Alcohol consumption is one of the main causes of car accidents among young adults (Lavoie, et al., 1999). In a report on Preventing Alcohol-Related Problems on College Campuses, two million out of eight million students stated they occasionally drive while intoxicated and more than three million rode with someone who drank (Saltz, 2004).

A program to reduce the risk of drinking and driving is the safe ride concept. It has been touted as the "theoretically perfect solution to drinking and driving problem" (Caudill, et al., 2001). In looking at safe rides, currently there are only a few studies that specifically investigate whether there is increased alcohol consumption with safe ride programs. Only one study specifically looked at the population of college students and their use of safe rides.

Gieck et al. reviewed if there was an increase in alcohol consumption of college students and briefly looked at motivations of using safe rides. However, the primary question sought to be answered was if the program was cost effective (Gieck & Slagle, 2010). The other studies by Harding et al. and Sarkar et al. looked at alcohol history and whether there was an increase in alcohol consumption, but did not emphasize motivation. In the Harding et al. study, it was stated that there were differing potential interpretations as to if high BAC was caused by the offer of a safe ride or if a safe ride provided a way to avoid risk with a high BAC (Harding, et al., 2001).

One of the issues in promoting alternative transportation means is that they might be interpreted as sending a message that increase in drinking is okay as long as one does not drive. The harm reduction dilemma in communicating not to drink and drive could pose harm in the outcome. An increase in drinking is seen as distinct from drinking and driving (Glascoff, et al., 1994). Also the original message of "If you choose to drink, drink only in moderation and choose a designated driver who doesn't drink at all" seems to have been distorted (Reiling & Nusbaumer, 2007). If that truly is the case, then users of the programs could be at greater risk of negative consequences from potential increase in alcohol consumption.

The goal of the current study is to determine if there is an increase in alcohol consumption of college students from using the safe ride programs.

The questions being addressed are:

4. Is there a correlation in the amount of alcohol consumption and use of safe ride programs for college students?
5. What is the motive for college students to use safe rides?
6. Do students drink more because of availability of safe rides?
7. Do students use safe rides because they already planned on drinking more?

The significance of the study is to seek if using safe ride programs by college students reduces as well as does not promote harm from not only drinking and driving, but also alcohol consumption.

2. Design

a. Sample

The target population will be students from Texas A&M University, located in College Station, Texas. The student population consists of over 49,000 enrolled undergraduates and graduates and ranks as the nation's sixth largest university in enrollment (Texas A&M University, 2010). The city of College Station itself is a smaller town with a population of over 93,000 individuals in 2009 (City of College Station, 2010). The students make up over half the total population of the city.

Eligible respondents will meet five inclusion criteria. 1) Must be college students at Texas A&M University in College Station, 2) Must be 18 years or older, 3) Have consumed alcohol within the last twelve months, 4) Have driven a motor vehicle in the last twelve months, and (5) Have ridden in the safe ride program, CARPOOL, in the last twelve months.

b. Setting

The study will take place at locations where the respondent has access to a computer, including personal and university computers. Locations would potentially include at respondent's residence, at school, or any other locale providing Internet access.

c. Recruitment

A convenience sample will be used in selecting respondents. Recruitment will be conducted through Texas A&M University staff and student organizations. Staff and student organizations will provide passive recruitment by providing information on the study with a web address to the online survey. Contact will be made through flyers, listserv, e-mails, newsletters, and direct contact.

Direct contact will be made in the classrooms at the university and at the student health center by university staff. Teachers will provide flyers through handouts and PowerPoint presentation display with information including study description, contact

information and the web address needed to access the survey. Also, Texas A&M University student health center staff will provide flyers to students who enter the center.

Listserv, e-mails, and newsletters will contain the same information as the direct contact flyer with the description of the study, contact information for more information and a web address/hyperlink directing to the survey on the Internet. Texas A&M University Student Activities and student organizations will provide the information to listserv, e-mail, and newsletters. In addition, flyers will be displayed on open bulletin boards.

Information provided will state that study participation is voluntary and that participating will not have any effect on current or future grades or academic standing.

An incentive will be offered in the form of a random drawing. Respondents will enter to be eligible to receive ITunes gift cards in the amount of $25. Four gift cards will be available for the drawing. Entering the drawing is voluntary.

d. Procedures

The study will be a cross sectional retrospective study design. The study will use an online survey through Survey Monkey. Online survey was the chosen method of data

collection due to the potential access to computers that students have and their educational status including knowledge of using computers. In addition, the method requires minimal time and cost to the study respondents. The self-administered survey will guide the respondent through the online questionnaire. The estimated time to complete the survey is .25 hours (15 minutes).

At the end of the survey, respondents wanting to enter the incentive drawing will have the opportunity to click on a hyperlink that will direct them to a second Survey Monkey survey. The second survey will contain one question asking for the respondent to input their e-mail address. The e-mail addresses will not link to the first survey's data. At the end of the data collection, all e-mail addresses will be grouped and four will be randomly chosen to receive the incentive. Contact will be made to the four respondents for information to send the incentive to them by mail.

e. Measures

Questionnaire items were adapted from previous survey questions from the National Institute on Alcohol Abuse and Alcoholism, Behavioral Risk Factor Surveillance System, Caudill et al. study, Gieck et al. study, and Sarkar et al. study. The survey will consist of 43 questions with topics including eligibility, demographics, alcohol consumption history, and safe ride usage. In addition, the first question section of the survey will consist of five questions to determine respondent eligibility. Those with

responses indicating ineligibility will be forwarded automatically to the thank you page and will not complete the rest of the survey.

The survey tool was pretested using cognitive interviewing and expert review. Pilot testing will be done using a convenience sample of the target population. After the pilot, an evaluation will take place to look at the questions themselves and the method of delivery to determine readability and understanding. The rate of participation and eligibility qualification will also be reviewed. Any needed modifications will be made and resubmitted to the IRB for approval.

f. Risks to participation

Respondents are given the opportunity to not answer any question of the survey except for the consent form question. In addition, they can withdraw at any time during the survey.

g. Benefits to subject or future benefits

Respondents will not benefit directly from the study.

h. Data analysis

The proposed sample size is N=1,045, which was rounded up from the result of the equation used. This was derived from using the equation below that provides a +/- 3% margin of error for a 50/50 split at a 95% confidence level.

$N = ((50{,}000)(.5)(.5)) / ((50{,}000-1)(.03/1.96)^2 + (.5)(.5)) = 1{,}044.83$

Analysis of data will include calculation of Blood Alcohol Concentrations using the revised Widmark equation that is utilized by the National Highway Traffic Safety Administration. The revision includes the total body water and metabolism rate of respondents. Paired t test will be used to compare BAC levels while using safe rides and when not using the program.

Univariate analyses using quantitative data will also be conducted including frequency distribution, central tendency and dispersion. The questions will use scales of measure and open-ended questions with some additional areas asking for brief explanations to provide data.

Statistical analysis will be conducted using Survey Monkey, Excel spreadsheets, and EpiInfo. Results will be displayed in text, charts, and graph formats.

3. Training

Passive recruitment will be conducted through Texas A&M University staff and student organizations. Instructions will be given to them in the recruiter letter on their role and what information to be provided to the target population. Also included will be instructions to reinforce that the study is voluntary and has no bearing to their academic standing with the university. Contact information to the principal investigator will be included if need for further clarification.

4. Data Management and Monitoring

All data will be stored on the Survey Monkey server and on a password-protected computer. Only the principal investigator will have access to the data. In addition, SSL encryption will be used while respondents are responding to the questions. The level of SSL encryption is VeriSign certificate Version 3,128 bit encryption.

5. Confidentiality

While taking the online survey, IP addresses will be masked. Names or other personal identifiers will not be obtained from the study survey. Age will be asked, however, date of birth will not be asked for. After data is collected and exported onto an excel file, a random identifier will be assigned to each respondent's group of answers.

6. Informed Consent

Documentation of written/signed informed consent is being requested for waiver from Emory IRB. Informed consent will be obtained prior to answering the survey questions. Consent will be presented on the first page of the online survey along with a check box for respondents to agree or disagree to the consent. If disagree is chosen, they will be automatically transferred to the thank you page of the survey. If agree is chosen, they will go onto the next page to continue the survey.

Principal investigator and Emory IRB contact information is available on the consent form for any questions respondents might have. They will also have the ability to print a copy of the form for their viewing and records.

7. New Findings or Research Results

Respondents will not be directly impacted from participating in the survey. They will not be provided findings or research results.

8. References

Aspler, R. (1988). *Transportation Alternatives for Drinkers*. Paper presented at the Surgeon General's Workshop on Drunk Driving: Background Papers.

Barr, A., & MacKinnon, D. P. (1998). Designated driving among college students. *J Stud Alcohol, 59*(5), 549-554.

Bryan-College Station Convention and Visitors Bureau. (2010). Nightlife and Bars. 2010, from http://www.visitaggieland.com/Things-to-Do/Entertainment/Nightlife-and-Bars

CARPOOL. (2008). Statistics. 2010, from http://carpool.tamu.edu/stats/index.asp

Caudill, B. D., Harding, W. M., & Moore, B. A. (2000). At-risk drinkers use safe ride services to avoid drinking and driving. *J Subst Abuse, 11*(2), 149-159.

Caudill, B. D., Harding, W. M., & Moore, B. A. (2001). DWI prevention: profiles of drinkers who use designated drivers. *Addict Behav, 26*(2), 155-166.

Center for Disease Control and Prevention. (2010). DATA 2010. 2010, from http://wonder.cdc.gov/data2010/

City of College Station. (2010). Fast Facts. 2010, from http://www.cstx.gov/index.aspx?page=3429

Decina, L. E., Foss, R., Tucker, M. E., Goodwin, A., & Sohn, J. (2009). *Alternative Transportation Programs: A Countermeasure for Reducing Impaired Driving* (Final Report No. DOT HS 811 188). Chapel Hill: Highway Safety Reseach Center, University of North Carolina.

DeJong, W., & Winsten, J. A. (1999). The use of designated drivers by US college students: a national study. *J Am Coll Health, 47*(4), 151-156.

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2009). *Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method* (3rd ed.). Hoboken: John Wiley & Sons, Inc.

Ditter, S. M., Elder, R. W., Shults, R. A., Sleet, D. A., Compton, R., & Nichols, J. L. (2005). Effectiveness of designated driver programs for reducing alcohol-impaired driving: a systematic review. *Am J Prev Med, 28*(5 Suppl), 280-287.

Elam, C., McKaig, R. N., Jacobs, B., Whitlow, M., & Gros Louis, K. R. R. (2006). Examining a Safe Ride Program: An Assessment of the Midnight Special Late Night Bus Service. *NASPA Journal, 43*(2).

Family Sues Over Safe-Ride Program. (2004). *Perspective, 19*(11).

Family sues school, city over alcohol-related death. (2004). *Alcoholism and Drug Abuse Weekly, 16*(35).

Gieck, D. J., & Slagle, D. M. (2010). Examination of a University-Affiliated Safe Ride Program. *Journal of Alcohol and Drug Education, 54*(1), 37-55.

Glascoff, M. A., Knight, S. M., & Jenkins, L. K. (1994). Designated-driver programs: college students' experiences and opinions. *J Am Coll Health, 43*(2), 65-70.

Harding, W. M., Apsler, R., & Goldfein, J. (1988). *A Users' Guide to Ride Service Programs*. Winchester: Harold Russell Associates, Inc.

Harding, W. M., Caudill, B. D., Moore, B. A., & Frissell, K. C. (2001). Do drivers drink more when they use a safe ride? *J Subst Abuse, 13*(3), 283-290.

Hingson, R. W., Zha, W., & Weitzman, E. R. (2009). Magnitude of and Trends in Alcohol-Related Mortality and Morbidity Among U.S. College Students Ages 18-24, 1998-2005. *Jounal of Studies on Alcohol and Drugs, 16*, 12-20.

Lavoie, M., Godin, G., & Valois, P. (1999). Understanding the use of a community-based drive-home service after alcohol consumption among young adults. *J Community Health, 24*(3), 171-186.

Mundorf, N. (2005). *Creating Safe Transportation Options for College Students - Change Strategies for Safe Transportation Behaviors*. Kingston: University of Rhode Island, Dept. of Communication Studies.

National Highway Traffic Safety Administration. (1994). *Computing a BAC estimate*. Washington D.C.

National Highway Traffic Safety Administration. (2008). *2007 Traffic Safety Annual Assessment - Alcohol-Impaired Driving Fatalities* (No. DOT HS 811 016). Washington, DC: National Highway Traffic Safety Administration.

National Highway Traffic Safety Administration. (NDL). Designated Driver / Safe Ride Program. 2010, from http://nhtsa.gov/people/injury/alcohol/designateddriver/index.html

National Institutes of Health. (2006). *Alcohol Use and Alcohol Use Disorders in the United States: Main Findings from the 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions*. Bethesda.

NIOSH. (1996). Preventing Occupational Hearing Loss - A Practical Guide. In NIOSH (Ed.), *NIOSH* (Vol. 96-110): NIOSH.

Reiling, D. M., & Nusbaumer, M. R. (2007). An exploration of the potential impact of the designated driver campaign on bartenders' willingness to over-serve. *Int J Drug Policy, 18*(6), 458-463.

Rivara, F. P., Relyea-Chew, A., Wang, J., Riley, S., Boisvert, D., & Gomez, T. (2007). Drinking behaviors in young adults: the potential role of designated driver and safe ride home programs. *Inj Prev, 13*(3), 168-172.

Rothschild, M. L. (2003). *Road Crew Research Report*.

Rothschild, M. L., Mastin, B., & Miller, T. W. (2006). Reducing alcohol-impaired driving crashes through the use of social marketing. *Accident Analysis and Prevention*(1335), 1-13.

Royal, D. (2003). *National Survey of Drinking and Driving Attitudes and Behavior: 2001* (Final Report No. DOT HS 809 549-551). Washington, DC: The Gallup Organization.

Safe Ride Programs United. (2010). Programs. 2010, from http://srpu.org/programs

Saltz, R. (2004). Preventing Alcohol-Related Problems on College Campuses—Summary of the Final Report of the NIAAA Task Force on College Drinking. 2010, from http://pubs.niaaa.nih.gov/publications/arh284/249-251.htm

Sarkar, S., Andreas, M., & de Faria, F. (2005). Who uses safe ride programs: an examination of the dynamics of individuals who use a safe ride program instead of driving home while drunk. *Am J Drug Alcohol Abuse, 31*(2), 305-325.

Texas A&M University. (2010). About Texas A&M University. Retrieved 2010, from http://www.tamu.edu/home/aboutam/

Timmerman, M. A., Geller, E. S., Glindemann, K. E., & Fournier, A. K. (2003). Do the designated drivers of college students stay sober? *J Safety Res, 34*(2), 127-133.

Wechsler, H., Davenport, A., Dowdail, G., Moeykens, B., & Castillo, S. (1994). Health and Behavioral Consequences of Binge Drinking in College: A National Survey of Students at 140 Campuses. *JAMA, 272*(21).

Wechsler, H., Lee, J. E., Kuo, M., Seibring, M., Nelson, T. F., & Lee, H. (2002). Trends in College Binge Drinking During a Period of Increased Prevention Efforts: Findings From 4 Harvard School of Public Health College Alcohol Study Surveys: 1993-2001. *Journal of American College Health, 50*(5).