Levels of alcohol intoxication: An assessment of Perceptions, Knowledge, Attitudes, Practices and Breath Alcohol Levels.

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COMPULSORY DECLARATION

This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.

Signature:_____ Date: 2nd April 2012

Abstract

Throughout the world drunk drivers are responsible for numerous accidents resulting in the injury or death of many drivers, passengers, cyclists, and/or pedestrians. South Africa experiences very high rates of injuries and deaths from road accidents. Young people, especially students and their peers, represent a high risk group because of their inexperience on the roads, and the exacerbation of this risk when alcohol limits are exceeded.

In order to determine students' and their peers' perceptions and cognisance of their degree of intoxication, and to assess their knowledge, attitudes and practices, survey data and measures of breath alcohol concentration (BrAC) were collected from 229 young adults over nine evenings at a single pub frequented by students and their peers in a South African university city.

Data was collected using three instruments: an entry survey administered when respondents entered the pub, an exit survey administered when respondents left the pub, and through breath samples provided by the respondents, measured using a breathalyser.

Only 16 (6.6%) of all 229 respondents knew the legal BrAC limit for driving a motor vehicle in South Africa. Of 62 respondents who indicated that they would be driving home from the pub on the corresponding evening, some 28 (39.4%) tested over the legal limit, of these 28 respondents, some 24 (85.7%) correctly predicted they were over the limit. Despite these alarming statistics 141 (61.6%) of all 229 respondents strongly agreed or agreed that there were times they wished they could test themselves because they were not sure if they were over the limit. More over 177 (77.3%) of the respondents strongly agreed or agreed that they would consider using a breathalyser to test themselves.

The study found that while respondents reported very strong attitudes opposed to drinking and driving, and were moderately accurate at predicting whether or not they were over the legal limit, their behaviour was not always consistent with their attitudes. The study also found evidence that a breathalyser can be an effective tool in community education campaigns run in pubs against drinking and driving.

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Chapter 1

Introduction

In this chapter the background, rationale, and significance of the study is discussed. In addition the chapter outlines the studies research topic, main research questions, main research objectives and clarifies some of the key concepts.

1.1 Background of the Study

This study has been designed to determine students' and their peers' perceptions and cognisance of their degree of intoxication. Students and their peers around the world 'pre-party' or 'pre-game' before driving to a venue from which, after further drinking, they drive home again, in many cases over the legal limit in their respective country (Borsari, Boyle, Hustad, Barnett, Tevyaw and Kahler, 2007). An individual's lack of understanding of his or her degree of intoxication may cause many emotional, academic and social problems which in turn may result in any of a number of negative consequences with one example being drinking and driving.

Drinking and driving is a huge problem for law enforcement organisations trying to keep roads safe. Throughout the world drunk drivers are responsible for numerous accidents resulting in the injury or death of many drivers, passengers, cyclists, and/or pedestrians. Accidents resulting in injuries place a huge burden on the financial resources of the state's health services and make substantial demands of law enforcement and emergency service organisations valuable time (De Beer and Van Niekerk, 2007).

Young people, especially students and their peers, represent a high risk group because of their inexperience on the roads. Young males represent a significantly higher risk group for motor vehicle accidents because they are more likely to engage in risk taking behaviour compared to either young females or older males (WHO, 2007).

1.2 Rationale of the Study

However, do students and their peers have an accurate idea of how intoxicated they are? In the absence of an objective measurement of their Blood Alcohol Concentration (BAC) or Breath Alcohol Concentration (BrAC), do they grossly underestimate their levels? If they were enabled to make an informed decision on whether or not to drive after consuming alcohol, would they seek alternative transport home?

These are important questions that this study seeks to explore. While it is important to clamp down on drinking and driving because of the increased risk of death or injury to the driver and or others, society should note that a drinking and driving conviction can have severe career implications for students studying towards professional occupations. Young people should be provided with the tools that can help them determine their level of intoxication in order to make an informed decision about whether to drive after consuming alcohol.

1.3 Significance of the Study

This study is of critical importance to South Africa where drinking and driving rates are amongst the highest in the world (WHO, 2007). Drinking and driving, and other anti-social behaviour resulting from intoxication and alcohol abuse, are major social issues in South Africa. This research intends to provide substantive insights into the use of breathalysers as an experiential learning tool for community education and social norms campaigns.

The study pioneers a new methodology in South African alcohol-related research. While there has been limited research into the alcohol consumption levels of students at South African universities, it would appear that this study is the first in South Africa to use a breathalyser to measure the alcohol levels of consumers at a pub, and the first to measure perceptions of intoxication amongst any demographic group.

In addition the study also explores students' and their peers' attitudes towards drinking and driving, their experience of law enforcement efforts to reduce drinking and driving, and their knowledge of the legal limit for breath alcohol concentration.

It is hoped that the conclusions drawn from this study will help guide public health practitioners to design various community education campaign or individual-based interventions that allow for the use of a breathalyser to reduce high risk alcohol consumption and discourage drink driving.

1.4 Research Topic

Levels of alcohol intoxication: An assessment of Perceptions, Knowledge, Attitudes, Practices and Breath Alcohol Levels.

1.5 Main Research Questions

The following questions have been identified as the main research questions:

- What is the current knowledge of students on the measurement of BAC and of how BAC relates to their level of intoxication?
- What are the prevailing attitudes of student consumers and their peers towards drinking and driving and would knowledge of BAC positively influence these attitudes?
- What are the intoxication levels of student consumers and their peers when exiting a bar?
- Are student consumers and their peers able to accurately perceive whether or not they are over or under the legal limit applicable to driving a motor vehicle?
- Would knowledge of BAC encourage more responsible behaviour amongst student consumers and their peers?
- Can effective community education campaigns be reinforced through the use of a breathalyser?

1.6 Main Research Objectives

The following objectives have been identified as the main research objectives:

- To investigate the current knowledge that students have on the measurement of BAC and how BAC relates to their level of intoxication.
- To explore the prevailing attitudes of student consumers and their peers towards drinking and driving, and explore whether or not knowledge of BAC may positively influence these attitudes.
- To measure the intoxication levels of student consumers and their peers when exiting a bar.
- To investigate whether student consumers and their peers are able to accurately perceive whether or not they are over or under the legal limit to drive a motor vehicle.
- To explore whether knowledge of BAC would encourage more responsible behaviour amongst student consumers and their peers.
- To investigate whether effective community education campaigns can be reinforced through the use of a breathalyser

1.7 Concept Clarification

Attitudes of consumers refers to respondents attitudes towards responsible alcohol usage and enforcement of legal BrAC or BAC. The main variables for this concept are reported views or measures of responsible alcohol consumption, attitudes for or against enforcement of BAC in South Africa and attitudes for or against the use of a breathalyser as a means of measure one's personal degree of intoxication.

Blood Alcohol Concentration (BAC) is the weight in grams of alcohol per millilitre of blood. The BAC variable will be used in relation to the legal limit for driving a motor vehicle, currently at 0.05g per ml.

Breath Alcohol Concentration (BrAC) is the volume of alcohol in mg per thousand millilitre of breath. The BrAC variable will be used in relation to the legal limit for driving a motor vehicle, currently 0.24mg per 1000ml.

Breathalyser is a device used for measuring the breath alcohol level of air expelled from the lungs. The type of breathalyser used in this study was a DragerAlcotest6810. The device is equipped with a fuel cell, an electrochemical sensor that reacts specifically to alcohol and provides a very short response time.

Knowledge of Blood and Breath Alcohol Concentration is knowledge of the legal breath and blood alcohol limits as legislated in the Road Traffic Act 93 of 1996. The main variables for this concept would be indicators (yes/no) of knowledge of the blood alcohol limit and knowledge of the breath alcohol limit.

Personal Digital Assistant (PDA) is a mobile device that functions as an information manager. The PDA used in this study was an *htc Advantage X7500*. This model has the capability to link to the internet and runs off the Microsoft Windows Mobile operating system.

Present and possible future practices of consumers are respondents' current transportation arrangements, future transportation arrangements, future breathalyser use, and likelihood of drinking and driving.

1.8 Conclusion

In this chapter the background of the study, rationale of the study, and significance of the study was discussed. In addition the chapter outlined the research topic, main research questions, main research objectives and clarified some of the key concepts.

Chapter 2

Literature Review

2.1 Introduction

This review explores the relationship between alcohol consumption and the risk of having an accident; drink driving in South Africa including legislation and enforcement of the legislation; research using breathalysers and research exploring perceptions of intoxication; university drinking influences, patterns and behaviour; and finally alcohol consumption in South Africa and alcohol consumption amongst South African students. Information on the South African context is very limited and no research with young adults using a breathalyser in South Africa was found during the literature review. This absence of research is probably due to the fact that very few international studies have focused on both young adult drinking patterns and their degree of intoxication.

Further, most of the international research into young adults' drinking behaviour seems to focus on students, most probably because student samples are often easy for researchers to access. In many cases researchers used samples from their own universities. As very little has been published on student peer's drinking behaviour, much of this literature review will focus on student related research.

2.2 Relationships between Alcohol and the Risk of Accidents

Consumption of alcohol, even in small amounts, increases the risk of being involved in an accident. Research conducted internationally by the World Health Organisation (2007) has shown that drivers, motorists, cyclists and pedestrians who have elevated alcohol levels have a significantly higher risk of being involved in a road accident than drivers who have not consumed alcohol. As alcohol affects vision, reaction time and judgement, alcohol impairment has been found to strongly influence not only the risk of road traffic crashes but also the severity and outcome of the injuries resulting from these accidents (WHO, 2007).

Male drivers and drivers aged 18-24 years are considered to be the most at risk of drink driving accidents. Inexperienced young adults driving with a BAC of 0.05g/100ml are 2.5 times more likely to have an accident compared to more experienced drivers.

Teenage drivers are 5 times more likely and young adults between the ages of 20-29 years of age are 3 times more likely to be involved in an accident than drivers aged 30 and above, at all BAC levels, respectively (WHO, 2007: 13). Even more concerning is that teenage drivers with a BAC of 0.03g/100ml carrying two or more passengers were found to be 34 times more likely to be involved in an accident than a driver 30 years or older, travelling with one passenger at a BAC of 0.00g/100ml (WHO, 2007:13).

2.3 Impairment at Various BAC Levels

Increased risks of having an accident from drinking and driving result from increased alcohol impairment(Bullers and Ennis, 2006). A chart of impairment at various BAC levels is available from the Arrive Alive website (2011). An adaption of that information to include the respective breath alcohol content is presented in Table 1:

Table 1 Impairment at Respective BAC Levels

Blood Alcohol Content per 100ml	Breath Alcohol Content per 1000ml	Impairment
0.00g - 0.05g	0.00mg - 0.24mg	No signs of abnormality: some individuals may show signs of euphoria. Reaction time at 0.24 is halved.
0.05g-0.10g	0.24mg-0.50mg	Loss of inhibitions Impairment of the ability to be self-critical Over- confidence Impaired muscular coordination Reaction time is four times slower
0.10g-0.15g	0.50mg-0.75mg	Further impairment of ability to be self-critical Emotional instability Memory lapses Reaction times are further delayed Time and place may be impaired
0.15g-0.25g	0.75mg-1.25mg	Markedly decreased muscular coordination Loss of orientation Emotional outbursts Impairment of the normal response to painful stimuli Impairment of memory and possible memory loss
0.25g -0.35g	1.25mg-1.8mg	Above-mentioned abnormalities more pronounced Complete muscular in coordination is evident Loss of memory Complete loss of sense of orientation to time and place. Possible stupor
0.35g and Up	1.8mg and Up	Stupor followed by coma Generalised anaesthesia and paralysis Depressed control of respiration and cardiovascular system Deep coma and possible death

2.4 Drinking and Driving in South Africa

The increased likelihood of having an accident from drinking and driving is a serious concern for South African road traffic authorities because statistics provided by Arrive Alive (2011)suggest at least 2% of all drivers at any given time are intoxicated. Between the hours of 6pm and 9pm however, the percentage of intoxicated drivers was as much as 5%. From 2002 to 2003 in the Western Cape the percentage of all evening drivers on the roads who were intoxicated increased from 2,6% in 2002 to 8,13% in 2003. This increase was possibly attributable to a decline in law enforcement on drink driving, associated with the suspension of using evidence provided by breathalyser equipment by the Director of Public Prosecutions in that Province (Arrive Alive, 2011).

In South Africa 6,859 (27%) of the 25 361 fatal injuries registered at state mortuaries in 2001, resulted from transport related injuries. 2,372 (34.6%) of these 6,859 transport-related deaths were tested for BAC levels. With the increased likelihood of having an accident when drinking and driving, it is not surprising that more than half (or 51.9%) tested positive for elevated BAC levels with 91% of the positive results above the legal limit to drive a motor vehicle(WHO, 2007:5). These transport related deaths included not only drivers but also pedestrians, cyclists and passengers. However over 50% of drivers killed had elevated BAC levels, with the mean for drivers more than three times the legal limit of 0.05g per 100ml of blood (WHO, 2007:5).

In 2003 the Medical Research Council (Arrive Alive, 2011) released similar figures which showed that “the Blood Alcohol Concentration (BAC) of 46,5% of all drivers killed in crashes exceeded the legal limit of 0,05 g/100ml while 9,5% consumed more than 5 times the legal limit.”

Alcohol is also estimated to be a factor in 31% of non-fatal road accidents in South Africa. The financial burden these accident place on the health care services in South Africa was estimated to be around R114 million (WHO, 2007: 6).However the World Health Organisation estimate is considered to be very low. De Beer and van Niekerk (2007: 75) estimated that cost of road traffic accidents attributed to alcohol in 2010 in the Western Cape Province alone would be R3.067 billion.

2.5 Enforcement of Legislation Driving in South Africa

The Road Traffic Act, 93 of 1996, as amended, (Republic of South Arica, 1996)provides the legislative framework for the legal blood alcohol concentration, and breath alcohol concentrations for driving a motor vehicle in the Republic of South Africa. Section 65 (2) stipulates the legal BAC to be less than 0,05 gram per 100 millilitres of blood and section 65 (5) stipulates the legal BrAC to be less than 0,24 milligrams per 1 000 millilitres of breath.

During the period between October 2010 to September 2011, 19,780 drivers were arrested for drinking and driving in South Africa. In the Western Cape Province only 600 drivers were found guilty and sentenced. 47 were sentenced to prison without the option of another type of sentence (SAPA, 2011).

Since October 2009, the South African Breweries and the Provincial Departments of Transport around the country have initiated state-of-the-art Alcohol Evidence Centres, fitted with the latest equipment to accurately detect a driver's breath alcohol level through a single breath sample, as well as closed-circuit television networks to monitor the testing processes, for law enforcement purposes.

In the Western Cape the first provincial centre opened in mid-December 2009. On the 26th of January the following year the *Cape Argus* newspaper (Williams, 2010) reported that 432 drivers had been shuttled to the centre for testing in the previous month. Some 378 had blown over the legal BrAC level and only 18 had blown under, the remaining 3% refused to blow and were taken for blood tests.

The Cape *Argus* report also discussed how 6 members of media and the Western Cape Department of Transport were invited to test the machines by having drinks at the centre for a period of 2 hours. The newspaper article reported on the results of four ‘guinea pigs’. The first was just below the limit at 0.23mg/1000mg after 4 beers, the second was at half the legal limit after two glasses of wine but at four times the limit after four glasses, whilst the third person was over the limit after just two drinks. The fourth ‘guinea pig’ was the author of the study who blew 0.18mg/1000mg after 4 and 0.28mg/1000mg after 5 drinks, respectively.

This exercise illustrated that individual persons respond to alcohol differently and that BrAC has the potential to escalate rapidly with increasing counts of drinks. However, the experiment also begs the question: how can socially responsible consumers of alcohol make a decision whether or not to drive when faced with the absence of an objective measure of alcohol level?

While the importance of breathalysers was highlighted in the article, the use of breathalysers as a tool for obtaining evidence for criminal prosecution was called into question in the landmark case of State vs. Clifford Joseph Hendricks heard in the Western Cape High Court recently (SAFLII, 2011). While Hendricks was acquitted of the charge of drinking and driving, in his judgment delivered on the 9th of September 2011, Judge Erasmus nonetheless stated:

> I can only conclude that a Drager Alcotest 7110 MK III basic specification model, loaded with whatever system it so comes, is in principle capable of producing the desired result. Since I cannot find that the Drager Alcotest 7110 MKIII RSA model number 8314647 with software version 1.1 as used in this case was ever tested, the State's argument cannot prevail.

The judgement has allowed for the continued use of breathalysers in obtaining evidence for criminal prosecution. However it also resulted in the suspension of the breathalyser as evidence while the state addresses some of the concerns highlighted by Judge J Erasmus in his judgement.

By the 28th of February 2012, 13,149 suspected drunk drivers had been tested at the centre since its opening. 9,419 blood samples had been drawn at the centre, 825 were taken to a hospital to have blood samples drawn when a nurse was not available at the centre, and 2,905 were tested using a breathalyser. The highest recorded breathalyser reading taken at the centre was 2.17mg per 1000ml (Republic of South Africa, 2012).

2.6 International Research with Breathalysers

It is widely accepted that breathalysers are capable of providing reliable blood alcohol levels (Kraus, Salazar, Mitchell, Florin, Guenther, Brady, Swartzwelder and White, 2005). Thus it is surprising that there have been relatively few studies that have used a breathalyser to obtain an objective measure of alcohol consumption. Studies have often rather relied on self-report measures (Clapp, Min, Shillington, Reed, Lange, Holmes, 2006). Even fewer studies utilising a breathalyser have been conducted within a student sample. In 1997, Lange Lauer and Voas (cited in Johnson, Jange, Voas, Clapp, Lauer and Snowden, 2006) began by testing young USA residents who crossed the United States - Mexico border to take advantage of a lower drinking age (18 years old) and less expensive alcohol.

The first recorded research on an American university campus was at the University of North Carolina, where researchers evaluated a social norms programme designed to reduce drinking and driving and heavy drinking among university students. The study respondents were asked questions relating to their activities during the evening, and the amounts of alcohol consumed and their methods of transportation. In addition to these responses, researchers obtained a breath sample. The results indicated a decrease in student drinking when compared to another university that did not institute a social norms campaign (Foss, Marchetti and Holladay 2000 and Foss, Diekman, Goodwin and Bartley 2003 as cited in Johnson et al 2006).

Johnson et al (2006) studied students on the San Diego State University campus by obtaining data from areas with high probability of foot traffic on weekend nights. Data was collected through a breath test and an interview on drinking activity during the evening. Breathalyser participation rate among the recruited group was a high 85% and a total of 4,816 students participated in the study over a four year period. The authors felt that field studies involving a breath test can "…paint a more accurate picture of alcohol consumption on campuses, detect trends and changes in drinking, and allow comparisons between different measures of consumption" (Johnson et al, 2006: 38).

Clapp, Johnson, Shillington, Lange and Voas (2008) used the data from their study to explore seasonal and temporal aspects of drinking, by testing the Breath Alcohol Concentration (BAC) results for differences between seasons and times of night.

They observed that breath samples collected during the spring and winter had significantly higher BrAC than those in autumn, and found that trends in a student population mirrored trends in the general population. It is important to note that here seasons indicate academic quarters rather than the year cycle.

Thombs, O'Mara, Tobler, Wagenaar and Clapp (2009) explored the relationship between drinking onset, monthly bar-going frequency and intoxication levels after leaving a bar in a bar district near an American university. They used a structured interview, the Alcohol Use Disorders Identification Test (AUDIT) and a breath test. They found that drinking onset, or the age at which an individual starts drinking, plays a critical role in the development of alcohol abuse.

In a study on drink "specials" (i.e. cheaper drinks) and intoxication levels of patrons exiting university bars, Thombs, Dodd, Pokorny, Omli, O'Mara, Webb, Lacaci and Werch (2008: 416) found that drink discounting by venue owners or managers can be linked to higher intoxication levels among exiting patrons. Those who had taken advantage of the drink specials were 4.38 times more likely than those who did not take advantage of a drink special, to have a BAC over 80mg/dl.

Breathalysers have also been used as a community education pilot project by nursing students from Illinois State University, United States of America (Kerber and Schlenker, 2006). Breathalyser readings were taken from 150 bar patrons and correlated with the number of drinks consumed and the number of hours spent drinking. Patrons were educated about contrasts between how they felt and their actual blood alcohol levels, and information about substance abuse assistance and safe transportation home was provided. The study recommended an expansion of the project to bars off campus where driving home might be a more important issue. Unfortunately the results of the breathalyser readings were not presented in the article.

2.7 Use of Breathalysers in Testing Own Level of Intoxication

Opinions on whether or not breathalysers should be used to promote responsible drinking appear to be divided. Bullers and Ennis (2006)voiced their concern that drink driving laws continue to focus on standard BrAC limits, despite individuals rarely having access to the means to determine their own BrAC levels.

However Voas, Kelley-Baker, Johnson and Furr-Holden (2008) were concerned that making breath alcohol tests available may encourage people to drive at BrAC's that are lower than the legal limit but still perhaps unsafe. This inference assumes that people inclined to use these personal alcohol tests are those who are likely to drive after drinking but may wish to avoid driving illegally. It is possible that those without breathalysers may err on the side of caution whereas those with breathalysers may try to maximise alcohol consumption.

2.8 Research into Perceptions of Levels of Intoxication

While some studies have made use of breathalysers to explore levels of intoxication others have explored individuals' perceptions of intoxication through the use of the Widmark Formula (Clapp, Min, Shillington, Reed, Lange, Holmes, 2006; Gustin and Simons, 2008; Clapp et al, 2009).

The Widmark Formula was first published in 1932 and is used for calculating estimated blood alcohol concentration (eBAC). The formula has subsequently been revised by several authors to allow for gender differences (Clapp et al, 2006) and has been adjusted to include breath alcohol concentration (eBrAC). Four variables required to determine eBAC have been identified. These variables include duration in hours of the drinking episode, gender, bodyweight and volume of alcohol consumed in grams of pure alcohol (Kypri, Langley, Stephenson, 2005).

"C_o" is a theoretical measure which represents the eBAC over a specified period of time and assumes 100% absorption and instantaneous distribution. In reality, the peak is often less than 66.6% of this theoretical since absorption of alcohol is incomplete when food has been consumed.

The "C_o" formula is taken from lecture notes from the Department of Forensic Medicine at the University of Dundee (2011):

$$C_o \text{ (mg/100ml)} = \frac{\text{Alcohol consumed (g) x 100}}{\text{WF x Bodyweight (kg)}}$$

In the "C_o" formula WF represents the Widmark Factor – an estimate of body water content. The mean experimental values are 0.68 for men and 0.55 for women. The difference in the experimental values is that women on average have a smaller body mass and a higher proportion of body fat than men. As a result of these two factors women have a lesser volume of water over which the alcohol may distribute. Hence women attain a higher BAC than men do after the same amount of alcohol.

However there is a suggestion that the Widmark Formula might overestimate an individual's BAC except under controlled conditions where the formula has been found to be quite accurate (Kraus et al, 2005). Donovan (2009) also identifies 3 limitations of the Widmark Formula: Firstly, the formula assumes that alcohol is ingested at once rather than over a period of time; secondly, the formula assumes that an individual has not eaten any food to absorb the alcohol; and thirdly, it does not acknowledge the variability in alcohol absorption and elimination rates between individuals.

Clapp et al (2006: 625) found that 52.2% of their sample of 618 respondents underestimated their eBAC and 23.7% of their sample overestimated their eBAC. Clapp et al (2009) however found very low correlation between eBAC from the formula, and BrAC measured with a breathalyser. Bullers and Ennis (2006) found that people were moderately accurate at estimating whether they were over/under limits but not accurate at estimating BrAC levels. However at higher levels of alcohol consumption the accuracy of their gross self-estimates was not good. They also found evidence that feedback from personal breathalyser use only resulted in increased accuracy when estimating BrAC at lower levels. There are also apparent gender differences, because women appear to be more likely to overestimate permissible alcohol consumption levels (Kypri and Stephenson, 2005).

Individuals who overestimate their intoxication may do so because they are conservative (Mallett, Turrisi, Larimer, and Mastoleo, 2009). One explanation for individuals who underestimate BAC could be that they use two types of cues to estimate personal intoxication, internal cues and external cues. Internal cues include physiological and psychomotor sensations experienced by the individual. External cues include number of drinks consumed in any given time. Internal cues are often found to be less reliable, research also shows that college students have difficulty identifying drink sizes and as a result often drink more alcohol than they realize. This pattern could reinforce false beliefs about acceptable and safe consumption practices (Mallet et al, 2009). As a result of these false beliefs, Gustin and Simons (2008) suggested that because individuals were not good at accurately estimating their intoxication levels they may drive, unaware that they are intoxicated.

If researchers can determine the level at which men and women have the potential to make the most errors, we may have a way to improve and tailor individual-based interventions (Mallett et al, 2009). In a study by Neighbors, Lee, Lewis, Fossos and Walter (2009) an invention designed to reduce the alcohol consumption of young people celebrating a 21st birthday by providing them with personalised BAC feedback was found to reduce the maximum BAC level reached by individuals who had the intention to reach higher BAC's.

2.9 Perceived Risks Influence on Drinking and Driving

Individual-based interventions may not work on all consumers. Gustin and Simons (2008) found that alcohol users who believe they have a behavioural tolerance towards the effects of alcohol may feel more confident in their ability to drive despite recognizing they are intoxicated. These authors also found that while perceived intoxication may be a significant predictor of drink driving avoidance, perceived risk may be a more proximal predictor. Even if drivers are aware of their intoxication levels, they may drink and drive anyway if they do not perceive themselves to be at risk.

Carrizales and Dixon's (2008: 88) review of literature reported that many studies found that men displayed riskier behaviour than did women. While their research did produce conflicting results, they acknowledged that their findings could have been skewed by the use of convenience sampling, which resulted in 67% of the sample of 235 respondents being female. Rhodes and Pivik (2011) found that male and teen drivers consistently displayed risk driving behaviour, enjoying this behaviour and perceiving their activities to be less risky than their female and older counterparts did. They also found that younger male drivers were more at risk of having a motor vehicle accident.

The tendency to drink and drive therefore decreases when either the perceived probability of being arrested or being in any accident increases. Consumers are more likely to drive if they have a short distance to drive, perceive they are less intoxicated or affected than they may be, or perceive they are less likely to be arrested. Therefore perceptions of risk play an important role in influencing drink-driving behaviour.

A search of the literature has revealed no publication from South Africa using a breathalyser or comparing self-assessments of intoxication to an objective measurement.

In order to develop a better understanding into why students have difficulty perceiving their levels of intoxication and engage in drink driving behaviour it may be worthwhile to explore what influences students' consumption, their patterns of consumption and their drinking behaviour.

2.10 University Drinking Influences

Social pressure, stress-related coping responses and sensation seeking behaviour have all been found to influence university student drinking behaviour and can be considered negative influences which encourage students to engage in irresponsible drinking behaviour (Fisher et al. 2007). Students drink for social reasons and peers greatly influence student behaviour. Peer influence within a social context both promotes and reinforces student drinking behaviour (Pedersen and La Brie, 2007).

Beck et al. (2008: 422) distinguish six distinct social contexts of drinking:

- Social facilitation, such as a party or intention to have a good time, where drinking is adopted for social enhancement.
- Peer acceptance, where drinking is used to fit into a group or gain approval.
- Emotional pain, such as drinking because of depression or to forget about academic or personal problems, where the intention is to self-medicate against negative thoughts or stress.
- Family drinking, where drinking is part of family religious or celebratory occasions.
- Sex seeking, where drinking is chosen to establish a sexual relationship, talk to somebody in whom they have an interest, or make it easier to go to bed with somebody
- Motor vehicle scenarios, where drinking occurs in a parked car or while driving around with friends.

Residence life can also profoundly influence student drinking because it in itself brings a wide range of new adjustments and responsibilities to new first year students. Students have to adjust to new academic pressures, pressure to make new friends and adjust to new living situations (Fisher et al. 2007: 218). One study in the United States found that of those living in residence, 87% of males and 85% of females had consumed alcohol. Some 20% of males and 17% of females had engaged in binge drinking at least once in the previous week.

The study compared these percentages to fraternities and sororities which engaged in significantly higher drinking habits (Page & Hegarty, 2006). These fraternity and sorority organisations are not socially relevant to the South African context. Nonetheless the findings do lend weight to the argument that students in these residence contexts often feel compelled to subscribe and comply with the traditions and values within these institutions. The study suggests how students in group accommodation may feel social pressures to conform to the drinking culture within the respective contexts. Students often drink for social reasons that are greatly influenced by their peers; thus peer influence in a university context can be seen as one factor that promotes irresponsible drinking (Pedersen and LaBrie, 2008).

Stress reduction expectations can also promote student drinking, especially since the transition from high school to university can introduce new sources or exacerbate previous sources of academic, social or emotional distress. Students, in many cases, self-medicate in order to relieve tension (Fisher et al., 2007).

2.11 Links between High School and University Drinking Patterns

It is also possible that students' current alcohol usage would have been influenced by their alcohol consumption patterns during high school. Many grade 12 students in South Africa turn 18 during their final year of high school and along with those who have not yet reached legal age, may have consumed alcohol. Some may have even consumed alcohol before their final year of schooling.

In an international study Yu and Shacket (2001) found that students' current consumption was significantly influenced by their alcohol consumption in high school. When alcohol consumption was high in high school, students were more likely to consume large quantities in college.

The first year at university is a developmental transition which brings new responsibilities and freedoms, often away from social support systems to which students have been used to for most of their lives. Students are often pressured to conform to perceived peer norms which can increase alcohol-related risk behaviour (Fisher, Fried and Anushko, 2007) and can be related to an increased likelihood of alcohol-related problems (Beck, Arria, Caldeira, Vincent, O'Grady and Wish, 2008).

2.12 University Drinking Patterns

While alcohol-related problems may affect some students, Bewick et al. (2008: 6) found that even though 90% of students had consumed alcohol in the previous week, there was a significant reduction in the number of units of alcohol consumed over the undergraduate time span. The exception was a still cohort of third or final year students, who still reported drinking within a high risk category. Another important finding was that students who were within the high risk category in their first year were likely to remain there throughout their university career. Therefore it is probably these high risk student consumers that have an increased likelihood of alcohol-related problems

University student drinking patterns in the United States of America have been found to vary over the academic year, and tend to be heaviest at the beginning and end of the year. Students seem to drink less during examination periods and more during holidays and special events. The heaviest drinking seems to take place on weekends where students drink up to four times as much as they do during the week (Neighbours, Walters, Lee, Vader, Vehige, Szigethy and De Jong, 2007: 2008).In many cases these heavy weekend drinking sessions could include binge drinking.

2.13 Binge Drinking

Binge drinking is generally considered to describe occasions when five or more drinks are consumed 'in a row' for men, and four or more for women. This pattern has been associated with a range of negative consequences including damaged property, poor class attendance, hangovers, trouble with authorities, injuries and in some cases death (Pedersen and La Brie, 2007: 1). However Kuo (2000, cited in Pedersen and La Brie, 2007: 2) found that college students disagree with the definition above and believe rather that seven or more drinks for men and six of more drinks for women should be considered as defining binge levels. One explanation for this contrast of views could be that university students across the world generally have higher alcohol consumption patterns then their non-university peers (Bewick, Mulhern, Barkham, Trusler, Hill and Stiles, 2008: 2).

However these definitions of binge drinking are contentious. Firstly, the counts do not give an accurate indication of intoxication levels which can be affected by size and other physical or psychological variables which influence intoxication. Secondly, the definitions do not give a time frame in which the drinking occurs (O'Grady, Arria, Fitzelle and Wish, 2008). Thirdly, the phrase *'in a row'* has been found to be ambiguous and this inadequacy has led the National Institute on Alcohol Abuse and Alcoholism in the United States to redefine the term by adding the specific time constraint of "within a two hour period" (NIAAA, 2004 cited in O'Grady et al 2008: 446).

This change in definition has also had a profound effect on statistical data. The study conducted by Yu and Shacket (2001: 783) of 813 students found that 86% of the students had been engaged in binge drinking in the last year, 72% had engaged in binge drinking in the last month and 54% had engaged in binge drinking at least once in the past week.

O'Grady et al. (2008: 446) found that when the new definition with time frame constraint was applied, the percentage of college students who engaged in binge drinking jumped from 53.1% to 63.6%.In Australia where men are advised to have no more than 60g of ethanol on any occasion and women no more than 40g, 93% of men aged between 18-24 years breached these limits (Kypri et al, 2005: 447).

2.14 Drinking Behaviour

In many cases binge drinking would also result from another phenomenon common among college students, 'pre-partying' or 'pre-matching'. 'Pre-partying' or 'pre-matching' occurs when students drink before a social function or a special event. This practice is chosen so as to become slightly intoxicated before going to a social function or pub/club, either due to social anxiety, or the limited availability of alcohol at a university event or because drinks at a local club or bar will be expensive (Borsari et al, 2007). Pedersen and La Brie (2007: 7) found that 75% of drinkers in their study had pre-partied at least once in the past month. The quick drinking nature of pre-partying and associated drinking games seems to increase the risk for consequences. Students drink multiple shots, beer and other alcoholic drinks in a brief period to become intoxicated, often putting themselves at risk of blackouts and alcohol poisoning due to the rapid rate at which they consume these amounts.

These pre-matches are often combined with drinking games, although drinking games can take place at any point during a drinking session. Their history dates back to ancient Greece and today about 500 or more different drinking games are 'played' by university students (Bosari et al., 2007). The quick drinking nature of both pre-matching and drinking games combine to constitute a greater risk of problems associated with drinking and the related consequences (Pedersen and LaBrie, 2008).

The less obvious nature of pre-partying/pre-matching and drinking games also have implications for prevention and detection, as these activities often occur in smaller groups and quieter contexts which are difficult to detect (Bosari et al., 2008).

Studies have found pre-partying/pre-matching and drinking games to be a common behaviour amongst university students. Bosari et al (2008: 2698) investigated a single event and found that one third of the students had engaged in pre-matching while close to half had played drinking games at or before that event. The body alcohol content among those who had engaged in the pre-match behaviour was generally three times the legal limit for operating a vehicle. Pedersen and LaBrie (2008: 7) found that 75% of respondents had engaged in pre-matching in the past month. Women were found to be drinking heavily to fit in and be attractive to their male peers. As a result women tend to achieve higher BAC levels than their male counterparts and experience more consequences (Mallett, 2009).

2.15 Alcohol Consumption in South African

Alcohol consumption in South Africa has a long history. In pre-colonial times South African's consumption was mainly limited to the elders and senior members or society and was not common amongst youth. Alcohol was consumed during a variety of ceremonies, rituals and festivities (Peltzer and Phaswana, 1999). More recently the use of alcohol has become more common in all segments of society, but especially amongst the youth and students.

When one examines the broader picture in South Africa as recorded by the Department of Health's 2003 South African Demographic and Health Survey (SADHS) (2008: 267), 39% of men and 16% of women 15 years or older surveyed in the study reported that they had consumed alcohol in the past 12 months. White males reported the highest percentage amongst the groups surveyed for current drinking 53% (within the last 7 days), while African females reported the lowest percentage of current drinking at only 7% (within the last 7 days). Coloured and Indian males tied for the second highest both at36% of those surveyed, closely followed by White Females with 31%. Higher rates for both men and women were recorded in urban areas and it was interesting to note that the highest rates were recorded by those who had received education after high school compared to those who did not receive higher education.

The annual alcohol consumption per capita for South African adults 15 years or older is 9.5 litres of pure alcohol. However 72.9% of the population are either lifetime abstainers (never drink alcohol in their lives) or current abstainers (no longer drink alcohol). Therefore the annual alcohol consumption per capita for South African adult drinkers is 34.91 litres of pure alcohol, with 48.1% of males and 41.2% of these adult drinkers engaging heavy episodic drinkers. The South Africa risk of alcohol-attributable country burden of disease is rated as four out of five, where one is least risky and five is most risky (WHO, 2011).

2.16 Alcohol and Students in South Africa

Unfortunately very little South African research has been conducted on students and their attitudes and practices relating to drinking and driving. There appears to be a substantial gap in this field.

Peltzer and Phaswana (1999: 1) found that 57% of the male student and 26% of the female student sample used for their South African study, reported alcohol use in the past month. However, their research used a mixed methodological approach and as a result comprised only a very small sample (number) which cannot be considered to be representative of the national student population. The study showed that 46% of the study respondents were introduced to drinking by friends or acquaintances and only 6% by family members, indicating how strong the influence of peers can be in encouraging student drinking.

Young and De Klerk (2008) completed a study on 2,049 students at Rhodes University in Grahamstown in which students were asked to complete the Alcohol Use Disorders Identification Test (AUDIT) developed by the World Health Organisation. The AUDIT test is considered a suitable measure to study levels of alcohol consumption. They found that half of their respondents reported hazardous, harmful or alcohol dependant drinking patterns. They also found that female students did not appear to be experiencing the same degree of alcohol related harm as did male students.

Also interesting to note is that they found that white student's drinking patterns were more likely to represent the "hazardous to alcohol dependent" categories than did patterns for black students. They proposed that this observation may be due to economic disparities between more wealthy white students and less wealthy black students. One could assume that if white students have more spending power they are more likely to own cars. It is of concern that the student group reporting the more problematic drinking culture is also the group most likely to drive.

2.17 Conclusion

This chapter has provided a concise review of the literature on drinking and driving, BrAC measurement, perceptions of intoxication and alcohol consumption amongst students and their peers. The review of the literature imbued the research with substantial insight into the key themes and underpinned the major segments of the methodology that will now be discussed in the following chapter.

Chapter 3

Methodology

3.1 Introduction

In this chapter the methodology used in the study is discussed. The chapter outlines the reasons why a quantitative research design was selected for the study; outlines the pilot study that was conducted to test the methodology and the changes made to the methodology that resulted from the pilot; outlines the process used for sampling, data collection and data analysis; discusses the ethical issues that were taken into consideration; and explores some of the limitations of the research design.

3.2 Research Design

For this study a quantitative research design was used. Quantitative research borrows from a positivist approach to research and uses an assumption that social sciences research can be usefully modelled around the natural sciences. In this study, research into drinking and driving behaviour explores observable patterns and associations in attitudes of students and their peers towards drinking and driving, breath alcohol levels and perception of intoxication. Quantitative research is objective in the sense that the researcher is able to maintain a distance with the research subjects. Such research designs measure human behaviour through quantification of responses to the variables it seeks to measure or relate (Babbie and Mouton, 1998).

This study describes and analyses human behaviour related to drinking and driving and perception of intoxication after consuming alcohol by means of tables of counts and corresponding percentages.

This research design was selected for this study because the researcher wanted to conduct an exploratory descriptive study using a large sample. A quantitative research design offered an appropriate way to address the ethical issues involved in this research. It was the best way to address the ethical issues because allowed the respondents to respond to the survey's free from researcher effects on responses.
A quantitative design focuses on observable patterns of behaviour rather than on in-depth explorations of individual perceptions, motivations and choices

3.3 Pilot Study

Before embarking on the data collection for the study, the researcher spent two months testing out and exploring the methodology for the study in the pub location. Different elements of the methodology were tested out on various evenings. For the first few evenings the researcher tested pub patrons' attitudes towards the experience of using a breathalyser.

In general pub patrons responded very well to using a breathalyser. Most had never had an objective way of measuring their level of intoxication and most seemed intrigued by the feedback. They were also asked how they would feel about blowing into a breathalyser as part of a research study and indicated they would have no problem with a breathalyser being part of a study in which they participated.

The breathalyser used in the pilot study was an ALERT J5 breathalyser unit loaned to the study by Sperosens. The only problem experienced through the piloting of the breathalyser was that the particular unit that had been loaned for the study could store only the last 20 breathalyser readings recorded on the unit. It was decided after piloting the breathalyser that the unit would not be adequate for data collection in the study because it was expected that more than 20 respondents would be recorded on any given night. The researcher then approached a different company to loan a breathalyser that could record more than 20 readings.

After piloting the breathalyser, the researcher spent two weeks piloting the survey instrument. During this pilot phase pub patrons were asked to respond to sample questions from the survey both on paper and on the PDA, on which the questions loaded for presentation one at a time. Patrons were asked to express whether they found it easier to respond on the paper survey or on the PDA. The feedback from this exercise was that almost all preferred the PDA. However having questions load one at a time was very time consuming and on the last evening of survey piloting the researcher experimented with the PDA loading 3 to 5 questions at a time. This change was very well received and significantly reduced the length of time required by respondents to complete the survey.

The last phase of the pilot project was observing the behaviour of the pub patrons and working out the best location within the pub at which to conduct the data collection.

3.4 Population and Sampling

Survey and BrAC Data was collected from patrons entering a drinking establishment in a club/pub district within a 5km radius of the University of Cape Town. The bar is frequented by students every Thursday evening when the pub offers drinks at fairly affordable prices for students.

The majority of respondents were university students. However because university students often have non-student friends, the population was not be limited to students *per se* but rather youth under the age of 32. This approach allowed for a comparison between students and non-students. The population for the study therefore consisted of all students and their peers who frequented the pub on the evenings surveyed.

Probability sampling was used to select respondents for this study. Normally in probability sampling the researcher selects the sample by inviting every Nth person to participate (Frankfort-Nachmias and Nachimas, 1992). However after consulting with a statistician, a different method of probability sampling was used for this study. Instead of using every Nth person, the first person or group to enter the pub after the researcher had set up was selected to participate. Once a student or group was selected they were asked if they would be willing to participate in a survey on their attitudes towards drinking and driving. If they refused to be a respondent the researcher recorded their refusal. If they agreed to be a respondent they were told that they would be requested later to provide a breath sample for a BrAC test, when they were about to leave the pub and that if they returned for the breath test, they would be given a "goodie bag".
After a respondent completed the entry survey and the next person or group to enter after their survey completion would be invited to participate. In cases of refusal, the following person or group to enter the pub was invited. This process continued from start of data collection until a cut off time of midnight for the entry survey. The entry survey was cut off at midnight to enable the researcher to focus his attention on the exit survey and breathalyser testing. The times of data collection varied depending on the time the researcher could arrive at the pub, and the number of people at the pub on any given night.

The presumption of the method is that all patrons are in principle equally likely to be invited to participate, even though the timing of the first participation may possibly make a particular subset of patrons for an evening more likely.

3.5 Data Collection

The research station was sited about 2 metres from the entrance to the pub at the research station indicated on the Map included as *Appendix A*. All data was collected at this point because it is the only entrance and exit point to the venue (other than emergency exits). Data collection for the study was conducted using three instruments.

3.5.1 Entry Survey

The first instrument was a survey designed for the purpose of the study to explore respondents' knowledge, attitudes and practices relating to drinking and driving, and BrAC. The survey comprised a mixture of closed-ended, contingency questions and matrix questions. The survey was administered using a stand-alone survey form linked to a website called Survey Gizmo (www.surveygizmo.com), but displayed on a PDA located at the entrance to the pub. A photo of the PDA has been included as *Appendix B*.

Before completion of the survey, respondents were assigned an anonymous identifier. The identifiers were three digit numbers with 123 chosen arbitrarily as the random start number allocated to the first respondent. Every new respondent after the first respondent was allocated the next available number. Therefore the second respondent was allocated 124, the third 125 and this process was applied consistently throughout the data collection. The reason for the random start was to ensure that respondents felt that their responses would be confidential. Low identifier numbers might have made respondents feel that they could easily be remembered by their identifier number and that their response to the survey could easily be attributed to them.

Respondents' identifiers were written on a card with the contact details of the researcher and the name of the researcher's supervisor. Respondents were asked to

keep the card and to present the card when they returned to the researcher at the end of the night.

The survey was accessed on the PDA through the following web address http://edu.surveygizmo.com/s3/508484/Entry-Survey. The questions in the entry survey were spread over 4 electronic pages. The age, gender and identifier was on the first page, questions 4 through 9 were on the second page, questions 10 through 14 were on the third page and questions 15 through 22 of the fourth page. A screen shot exhibiting the look and feel of the questions on the PDA has been included as *Appendix C*.

The researcher captured the first page of survey on the PDA. This page required that each particular respondents' age gender and identifier label was entered into the PDA. Following the completion of the first page, the researcher handed the PDA to the respondent to complete the remaining 3 pages of the survey.

Once the survey was completed in full a message from the researcher appeared on the screen. The message expressed thanks for taking part in the research, informed respondents that their results were anonymous and that their responses were only identifiable by their identifiers. The message also informed respondents that they could withdraw from the study at any point and provided the email address of the researcher.

The survey responses were sent electronically directly from the PDA over a live mobile internet connection to Survey Gizmo, which saved and stored the data. The data could be downloaded onto a spreadsheet at any point in time. A copy of the Entry Survey has been attached as *Appendix D.*

3.5.2 Exit Survey

Respondents who returned to the research station at the end of their pub night were asked three questions by the researcher:

Do you believe you are sober enough to drive a motor vehicle?;

Do you think you are above or below the legal limit to drive a motor vehicle?;

Where are you going now as you leave the pub?

The answers to these questions were captured manually on a table along with the corresponding identifier labels respondents had been assigned on entry to the pub and the exit times. These exit responses and data were entered into an online exit survey accessed at http://edu.surveygizmo.com/s3/523930/EXIT-SURVEYat a later point in time. This process was intended to facilitate patrons' quick exit from the pub. A copy of the Exit Survey has been included as *Appendix E*.

3.5.3 Breath Alcohol Testing

Respondents were then asked to give breath samples upon exiting the pub. Breath samples were collected using a DragerAlcotest6810 handheld breathalyser. The unit used in this study was loaned to the researcher by Drager South Africa. Before taking the breath sample the researcher asked each respondent to rinse their mouth out with water to clear the mouth of any residual mouth alcohol.

The DragerAlcotest6810 uses a platinum electrochemical sensor (fuel cell) to measure breath alcohol level. The breathalyser stores the last hundred tests result on its internal memory. The breathalyser reading was blocked out for ethical reasons (see ethics section later in the thesis) but the unit's test number was visible and this test number was captured alongside the respondents' identifier on the same data form as the exit questions. A photo of the Drager Alcotest 6810 had been included as *Appendix F*.

Entry survey, exit survey and breathalyser test number were coded with the identifier in order to match the three sets of data responses to their individual respondent after data collection.

Every respondent who had participated in the all three parts of the study was given a "Goodie bag"."Goodie bags" were given to respondents after completing the breathalyser test at the end of the night, to encourage completion of the entire study process and to further educate the respondents. The "goodie bag" consisted of either a digital breathalyser, a t-shirt or a wrist band that said "friends don't let friends drink and drive". The goodie bag also included a pamphlet on responsible use of alcohol, information on BAC and BrAC and their measurement, a disposable breathalyser and two small packets of Potato Chips. The disposable breathalyser also enabled respondents to perform a self-test of their intoxication levels as they left.

The pamphlet provided information on drink units in relation to the legal limit, alcohol's effects on driving ability at different breath alcohol levels, and the difference between alcohol use, alcohol misuse and alcohol dependence. The pamphlets were designed by South Africans Against Drunk Driving. An example of the pamphlet has been included as *Appendix G*.

Data was collected on 9 Thursday evenings during May and June 2011. On one scheduled Thursday (23rd of June) data collection was cancelled due to the researcher's work commitments. Data was also collected on Tuesday the 17th of May because the following day was a public holiday and it was thought students and their peers might be likely to frequent the pub on that night. Data collection produced 232 entry surveys.

3.6 Data Analysis

Data from the online survey was downloaded and transferred directly into an Excel file. The data set has been included at the end of this report as Appendix I. Once the online data had been captured, the breathalyser results were married to the survey data. Descriptive statistics were used to describe both single variables and associations that connect one variable with another. In addition more conditional statistics were explored through the use of pivot tables. Data analysis also took into account the time spent by respondents in the bar. The results of this analysis can be found in the discussion of findings chapter that follows.

3.7 Ethics

Permission for this study was sought from the University of Cape Town, Department of Social Development Ethics Committee. No record of research with a breathalyser in South Africa had been found when researching the background literature for this proposal. As no study of this nature had taken place in South Africa the proposal had to be sent to the Faculty of Humanities Ethics Committee. New research requires special ethical consideration, especially when research involves human subjects and a number of safety and anonymity concerns needed to be taken into account.

The ethical considerations for this study were confounded by questions such as how do researchers survey potentially intoxicated subjects whilst ensuring they are able to give informed consent? The researcher also had to consider what the legal and moral implications might be of allowing an intoxicated respondent to leave a bar to possibly utilise unsafe means to get home. This matter may require special concern when considering the lack of public transport available to consumers in the study areas.

Advice on the ethical considerations for this proposal was sought from a number of sources. The researcher thanks members of the Department of Social Development at the University of Cape Town, and the Medical Research Council of South African Alcohol and Drug Abuse Research Unit. Particular thanks are warranted for John Clapp from the Centre for Alcohol and Other Drug Studies at San Diego State University for his input regarding research using breathalysers.

In addition to addressing ethical concerns, the researcher approached an attorney for legal opinion on the use of breathalyser results in research as well as legal ramifications of testing in a bar or nightclub. The purpose of this consultation was to explore whether a bar or nightclub employee should require somebody to submit to a breathalyser if there exists grounds to believe a patron ordering a drink maybe intoxicated or about to drive home.

Privacy

Breathalyser results have the potential to be sensitive information that many people would rather keep private. The nature of the setting for this study required respondents to blow into a breathalyser in an open setting; however the results of the study were only made available, privately, to the respondents the following day via email when requested. Only two respondents chose to take up this option.

Confidentiality

All information will remain confidential and anonymous. All respondents who filled in the survey on entry into the bar were given an identifier and a marker to identify them as a respondent in the study. At no point in the process were respondents' names recorded. This approach sought to ensure that any sensitive information cannot be associated to an individual by name.

Simple demographic data including gender, age and university affiliation was recorded but actual names, student numbers or ID numbers were not recorded to ensure respondents' anonymity. Respondents could also immediately refuse participation. Everybody who participated in the study was given a card with details both of the researcher and of his university supervisor, which allowed them to retroactively withdraw from the study.

Harm to Clients

BrAC readings were only taken at the end of the evening and BrAC reading was blind to both the researcher and the respondents for the duration of the data collection. There were many reasons for this approach. Firstly research using a breathalyser where feedback is provided to the respondents has the potential to produce iatrogenic results. These effects can include increased drinking or the survey participation itself becoming a drinking game of sorts.

Secondly, if the researcher was aware of the BAC feedback during the testing some important questions arise. If the researcher could say with almost certainty, when faced with scientific evidence, that somebody was over the legal limit for drinking and driving, of concern would be the extent to which researchers are responsible for stopping that individual from driving.

In addition, since BrAC levels could continue to rise long after consumption, there is the complication that a person blowing under the legal limit when exiting the pub could experience a subsequent rise in breath alcohol level above the legal limit, even if no further alcohol consumption occurred.

There was a possibility that some respondents would still want to know if they were intoxicated and able to drive, or not. For this reason crystal breathalysers were provided along with the information brochures in the thank-you "goodie bag" offered to respondents after completion of the breathalyser on exiting the bar. Additionally this tool empowered respondents to be socially responsible and enabled them to make an informed and independent decision on whether or not to seek alternative transport home. The researcher was also willing to suggest to any driver who expressed that an inability to drive home, the option of taking a taxi.

Information from South Africans Against Drunk Driving, disposable breathalysers and other material as part of the community education element of the study were also provided. These elements were intended to offset any potential harm resulting from lack of information.

Informed consent

In order to deal with the issue of obtaining informed consent from intoxicated people the following approach was advised. The survey was conducted on entry to the venue when respondents were most likely to be sober. The researcher, on the night, did not approach or test anybody who was visibly drunk, for example, staggering or slurring when entering the venue. Nobody who was visibly drunk or slurring was permitted to participate in the study. If there was any suspicion that incoming patrons had been pre-drinking to an extent that it might have an impact on the results of the study, they were excluded from participating in the study.

Respondents were also able to retrospectively withdraw from the study. A message to this extent was also included at the end of the online survey.

3.8 Limitations

The design of the present study has some limitations which illustrate the challenges associated with such research. Firstly the research relies on self-report data. Where respondents have pre-drunk before entry to the bar, the reliability of their responses must be checked through comparisons with responses from those who did not report pre-drinking behaviour.

It needs to be recognized that the pub/club focused sampling strategy that was used in this investigation gives findings that cannot necessarily be generalised to a complete student population, a population of young adults or society in general.

It is also possible that highly intoxicated patrons might be more likely to avoid participation due to embarrassment, thereby producing a biased sample.

The research is also limited in that it only provides a snapshot of the sample, it will not provide seasonal or temporal aspects for drinking as the study of Clapp, Johnson, Shillington, Lange and Voas (2008) explored. The data collection process requires respondents to provide data at the beginning and end of the night. As a researcher one has to consider the possibility that respondents might forget to return to the research station at the end of the night. In this study an inducement was used to try and encourage this completion of the necessary data profile.

3.9 Conclusion

This chapter has discussed the methodological process outlined at its introduction namely, research design; pilot study; population and sampling; data collection; data analysis; ethics; and finally the limitations of this methodological process.

Chapter 4

Discussion of Findings

4.1 Introduction

This chapter comprises a discussion of the findings of the study. The chapter begins by examining the rates of study participation and some of the individual characteristics of the participants. The demographic data on participants and data from surveys and breath tests are explored under several themes. These themes were informed by the types of associations emerging from the data analysis and from the literature review. The findings of the study are integrated with the existing literature. The chapter ends with a discussion of the researcher experience in conducting the study.

4.2 Rates of Participation

Table 2 reflects the numbers of individuals invited to participate, the numbers who participated in the entry survey and the numbers who participated in the exit survey and breathalyser test. The table also shows the time of the first survey and the time of the last breath test on each night respectively:

Table 2: Rates of Participation and Completion of Breathalyser Test

Date	Invited to Participate			Entry Survey			Exit Survey and Breath test			Time of First Entry Survey	Time of Last Breath Test
	Male	Female	Total	Male	Female	Total	Male	Female	Total		
5th May	22	11	33	21	8	29	16	4	20	8.15pm	2.16am
12th May	26	13	39	20	8	28	15	8	23	8.07pm	2.25am
17th May	14	7	21	12	6	18	12	5	17	6.07pm	12.43am
19th May	13	10	23	13	7	20	9	4	13	9.20pm	1.43am
26th May	29	14	43	24	14	38	21	12	33	8.01pm	2.49am
2nd June	22	14	36	19	14	33	17	8	25	7.55pm	2.40am
9th June	9	21	30	8	20	28	6	16	22	7.38pm	1.40am
16th June	13	11	24	11	6	17	10	6	16	8.21pm	1.10am
30th June	12	10	22	12	9	21	7	8	15	8.25pm	12.18am
Totals	160	111	271	140	92	232	113	71	184		
	100%	**100%**	**100%**	**88%**	**83%**	**86%**	**81%**	**77%**	**79%**		

Of the 271 (160 males and 111 females) invited to participate, 232 (140 males and 92 females) (86%) agreed and participated, and of these 232respondents, in all184 (79%) returned to provide a breath sample.3 respondents were later found to be outside of the age range of 18-32 years of age and their results were excluded from the data at analysis. The final number of respondents included in the data analysis for the study was therefore 229.

4.3 Individual Characteristics

As shown in Table 3, 138 (60.3%) of the 229 respondents were male. Some 135 (58.9%) of the total sample of 229 were university students. The oldest student was 29 years of age.

Table 3: Final Sample by Age, Gender and Student Status

	Female		Male		
	Student		Student		
Age	No	Yes	No	Yes	Total
18	11	16	16	15	58
19	9	22	13	18	62
20	2	10	4	12	28
21	2	9	6	8	25
22	0	2	2	8	12
23	1	0	5	3	9
24	1	1	2	3	7
25	0	0	5	5	10
26	3	1	4	1	9
27	0	0	2	0	2
28	1	0	3	0	4
29	0	0	0	1	1
30	0	0	1	0	1
31	0	0	1	0	1
Total	30	61	64	74	229
Totals	91		138		229

As shown in Table 4, 131 (57.6 %) of the respondents in this study frequented the pub or a similar pub or club either once or twice a week, but 55 (24.0%) frequented a pub three or more times a week, while 42 (18.4%) indicated less frequently than once a week.

Table 4: Frequency of Pub visits of Respondents

Frequency of Pub Visits	Less than once a week	Once a week	Twice a week	Three times a week	More than three times
Respondents (N=229)	42	55	77	39	16
%	18.4	24.0	33.6	17.0	7.0

It is not surprising that a higher percentage of the sample was male compared to female as the pub attracts its patrons through drinks specials that are more likely to attract male students. The researcher also observed that during the period of the study, the size of male only groups entering the pub tended to be larger than female only groups. Mixed groups were also observed to comprise more males than females.

The researcher was however surprised to find that 135 (58.9%) respondents were university students. While it was expected that older patrons would not be students, it was found that some 63 (36.3%) of the 173 respondents who were 21 years or younger were not students. One explanation for these apparently lower student percentages maybe the time of year the study was conducted (May, June and July 2011).

As Neighbours et al. (2007) noted, university student drinking patterns have been found to vary over the academic year and students tend to drink more over weekends. It is therefore possible that the timing of the study had an impact on the percentage of patrons who were students. It is feasible that if the study had been conducted at the beginning of the academic year, when the pub attracts more students, the percentages would be higher. In those months the venue often requests student cards to limit entry to students of any institution, as an indirect means of eliminating what is presumed to be possible undesirable elements.

4.4 Transportation to and from the Venue

Table 5 shows that while 143 respondents (78.6% or over three-quarters of the 229) had a valid drivers license, only 71 (31.0%) of the 229 respondents drove to the pub. The most common mode of transport to the pub was a lift with a friend, with 100 (43.7%) indicating this mode of transport.

Table 5: Respondent Transport Arrangements to and from the Venue

	How are you planning to get home tonight?					
How did you get to this venue tonight?	A family member or friend will fetch me	A lift with a friend	I am driving	Taxi	Walking	Totals
A friend or family member dropped me off	7	1	0	12	0	20
A lift with a friend	5	79	3	11	2	100
I drove	1	2	67	1	0	71
I walked	0	0	0	6	1	7
Taxi	0	3	0	28	0	31
Totals	13	85	70	58	3	229

The most common way of leaving the pub was a lift with a friend, as reflected by 85 (37.1%) respondents, followed by driving a vehicle as reported by 70 (30.6%) respondents. More respondents used a taxi to get home from the pub, 58 (25.3%) in all, than the count of respondents who used a taxi or train to get to the pub, 31 (13.5%). Of the 58 leaving by taxi, 12 had been dropped off by a friend or family member, some 11 had arrived with a friend, and 6 had walked.

4.5 Knowledge of Legal Limit for BrAC

Only 15 (6.6%) of the 229 respondents who completed the entry survey knew that the legal limit for BrAC requires readings less than 0.24mg per 1000ml, as indicated in Table 6. Over a third of respondents, 79 (34.5%), believed the legal limit for BrAC was 0.05mg per 1000ml, while 71 (31.0%) admitted that they did not know the limit. These results may mean that promotion campaigns aimed at reducing drinking and driving have not sufficiently targeted this age group.

Table 6: Respondents beliefs about Legal Limit for BrAC

What is the legal limit for breath alcohol concentration when driving a motor vehicle in South Africa?	Count	%
I don't know	71	31.0%
Less than 0.02mg Alcohol per 1000ml breath	54	23.6%
Less than 0.05mg Alcohol per 1000ml breath	79	34.5%
Less than 0.10mg Alcohol per 1000ml breath	10	4.4%
Less than 0.24mg Alcohol per 1000ml breath	15	6.6%
Total	229	100.0%

Since most promotion campaigns have been through *Lead SA* campaigns in newspapers, one could infer that this age group is less likely to read newspapers. If so, students and their peers have very limited access to the newspaper based promotional material. Other campaign types should therefore be explored to target this age group.

As79 (34.5%) of the 229 respondents incorrectly chose 0.05mg, they could have mistaken the BAC limit numbers to be the BrAC limit. This error would have been possible if they recognized the number 0.05 for the BAC levels and presumed it to apply to BrAC levels as well. These results may indicate that too little attention is paid to the legal limit for BrAC. In that case it may be important to provide both levels and explain their contrasts and differences in promotional material.

4.6 Driver Experience of Law Enforcement

Some 76 (42.2 %) of the 180 driver license holders shown in Table 7 had previously been through a roadblock after drinking, while 61 (33.9%) indicated they had been stopped by a law enforcement officer after drinking. Despite these encounters, only 12 (6.7%) of the 180 license holders reported they had been arrested for drinking and driving.

Table 7: Law Enforcement Experience of Driver License Holders

Law Enforcement Experiences of Driver License Holders (n=180)	Have you ever driven through a roadblock after drinking?	Have you ever been stopped by a law enforcement officer after you have been drinking?	Have you ever been arrested for drinking and driving?
Yes	76	61	12
%	42.2%	33.9%	6.7%
No	104	119	168
%	57.8%	66.1%	93.3%

These results suggest that to increase the perceived risk of arrest for drinking and driving, it may be necessary for transport authorities to increase the number of roadblocks and arrests. The study did not explore whether those stopped at a roadblock or by a law enforcement officer had been screened for alcohol. Any future studies may usefully seek such information. However it is important here to consider that it is possible some intoxicated drivers are slipping through the web of roadblocks set up by transport departments.

4.7 Drinking and Driving Attitudes

From the responses on the Likert scale question presented in Table 8, some 207 (90.4%) of the 229 respondents indicated that they either strongly agreed or agreed that drinking and driving should be avoided at all costs. It would appear that respondents' attitudes are opposed to drinking and driving.

Table 8: **Likert Scale Responses to Attitudes to Drinking and Driving**

Drinking and driving should be avoided at all costs! (N=229)	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Respondents (N=229)	141	66	19	3	0
%	61.6%	28.8%	8.3%	1.3%	0.0%

In Table 9some 163 (71.2 %) of the 229, either agreed or strongly agreed that the possibility of their name appearing in the newspaper made them think twice about drinking and driving. One could infer from this result that naming and shaming campaigns run in newspapers are likely to discourage drinking and driving.

Table 9: Likert Scale Responses to Possibility of Name Appearing in Newspaper

The possibility of having my name appearing in the newspaper makes me think twice about drinking and driving!	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Respondents (N=229)	116	47	44	11	11
%	50.7%	20.5%	19.2%	4.8%	4.8%

However from the results presented in Table 10 it is interesting to note that only 91 (39.8%) of the 229 respondents strongly agreed or agreed that if they drink and drive, they are likely to get caught. The results appear to indicate that while most people would prefer not to suffer the consequences of a drinking and driving conviction, the perceived risk of arrest for drinking and driving is low.

Table10: Likert Scale Responses to Likelihood of Getting Caught

If I drink and drive I am likely to get caught	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Respondents (N=229)	29	62	79	46	13
%	12.7%	27.1%	34.5%	20.1%	5.7%

Also interesting to note from Table 11 is that while 141 (61.6%) of the 229 respondents strongly agreed or agreed that there were times they wished they could test themselves because they were unsure if they were under or over the limit.

Table 11: Likert Scale Responses to Desire to Test Oneself Before Driving

There are times I wish I could test myself before I drive because at the time I am not sure whether I am under or over the limit!	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Respondents (N=229)	73	68	53	22	13
%	31.9%	29.7%	23.1%	9.6%	5.7%

While some 177 (77.3%) of the 229 respondents in Table 12 strongly agreed or agreed that they would consider using a breathalyser, like the one available in the pub, to make an informed decision about drinking and driving.

Table 12: Likert Scale Responses to Use of a Breathalyser Available in the Pub

I would consider using a breathalyser like the one in this venue to enable me to make informed decisions about drinking and driving! (n=229)	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	I Don't Know
Respondents (N=229)	85	92	35	8	5	4
%	37.1%	40.2%	15.3%	3.5%	2.2%	1.7%

The breathalyser available in the pub is coin operated and was installed by "brandhouse" as part of their "drive dry" campaign. The breathalyser is coin operated and costs users R5 per reading. Patrons choosing to use this machine pay and blow into a straw inserted into the machine. Results are displayed digitally on a screen in the front of the machine. The difference of 15.7% in the responses to the statements of Table 11 and Table 12is surprising because the statements are actually very similar.

One may infer from the difference in the responses that while a higher proportion of respondents would like to make an informed decision about drinking and driving, a smaller proportion are concerned about whether they are over or under the legal limit.

A likely explanation for this contrast is that while some drivers are concerned about the legal limit because they do not want to drive when they are over the limit, others may only be interested in knowing their intoxication level so that they can take steps to reduce the risk of getting caught.

Despite the differences, the findings appear to support the findings of Kerber and Schlenker (2006) who proposed that breathalysers could be a very effective tool in community education campaigns.

This inference is supported by the results presented in Table 13 that show that only 18 (7.9%) of the 229 respondents would drive anyway if a breathalyser indicated they were over the limit.

Table 13: Likert Scale Responses to Behaviour if Aware they are Over Limit

If you blew into a breathalyser and it indicated you were over the limit what do you think you would do?	Ask a friend to drive	Call somebody to collect your car	Drive anyway	Leave your car and call a taxi	Wait a little while and not have any more drinks
Respondents (N=229)	63	35	18	30	83
%	27.5%	15.3%	7.9%	13.1%	36.2%

As presented in Table 14, only 13 (5.7%) of the 229 respondents said they were always happy to get a ride home with somebody who had been drinking compared to 68 (29.7%) who said never. Also important to note is that only 18 (7.9%) indicated they would still drive even if a breathalyser indicated they were over the limit.

This result suggests that breathalysers have the potential to dramatically change the behaviour of drivers. The results also suggest that making breathalysers available to drivers and providing them with an objective means to test their levels of intoxication could result in a decrease in the high rates of drinking and driving in South Africa (Arrive Alive, 2011; SAPA; 2011).

Table 14: Likert Scale Responses to Getting a Ride Home With Somebody Who Has Been Drinking

I am happy to get a ride home with somebody who has been drinking.	Always	Depends on how drunk they look	Never	Only if I had no other option	Only if I know how much they have been drinking
Respondents (N=229)	13	29	68	40	79
%	5.7%	12.7%	29.7%	17.5%	34.5%

4.8 BrAC of Respondents

Some 182 (112 Males and 70 females) of the 229 respondents provided a breath sample. Of these, 28 respondents recorded breath samples of 0.00mg per 1000ml, while the highest recorded breath sample was 0.93mg per 1000ml, as shown in Table 15.

Of the 182 respondents included in the sample who completed an exit survey and who were also breath-tested, 103 (56.6%) were found to be over the legal limit to drive.

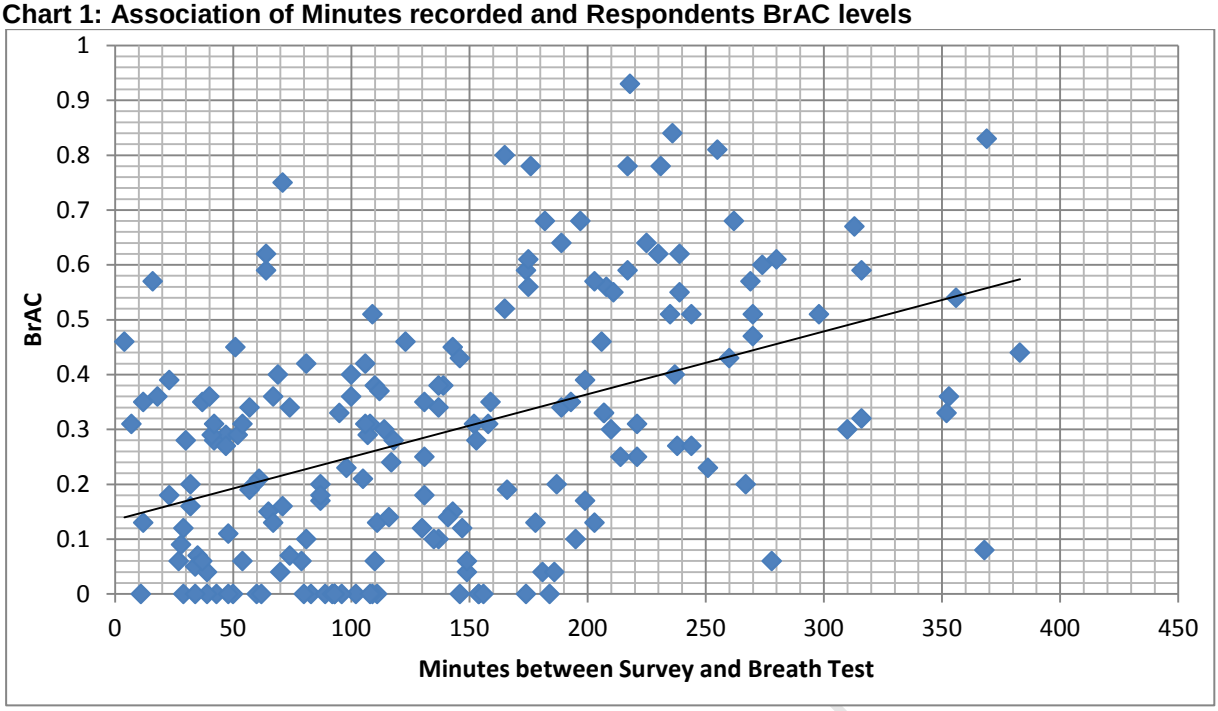
Table 15: BrAC levels of Respondents Providing a Breath Sample

BrAC Level	0.00mg	Below 0.24mg	Above 0.24mg
Respondents (n=182)	28	51	103
%	15.4	28.0	56.6

4.8.1 BrAC and Time in Pub

Chart 1 provides a visual depiction of the BrAC of each respondent who provided a breath sample as related to the length of time, in minutes, between the respondent's initial completion of the survey on pub entry and the corresponding breath test. The trend line in the chart indicates that, on average, the longer a respondent took to provide a breath sample, the higher their recorded BrAC would be.

Chart 1: Association of Minutes recorded and Respondents BrAC levels



However there were notable exceptions. One exception was the group of respondents who took less than an hour to provide a breath sample but had an elevated BrAC above the legal limit. There are a number of possible explanations for this phenomenon.

Firstly, it is possible that the respondents drank a number of drinks in a very short space of time while at the pub. Secondly, it is possible that these respondents migrated between clubs during the evening and as a result had been drinking at another venue before arriving at the pub. Thirdly, it is possible that those respondents, as discussed by Bosari et al. (2007) and Pedersen LaBrie (2008), may have engaged in pre-matching that could result in higher BrAC's.

In the circumstance of this study with only exit breath samples, it was not possible to assess the change in BrAC while at the pub, by using both entry and exit breath samples.

There was a considerable variability in the distribution of the data dots in relation to the trend line. This variability is easily explained because there was no uniformity in the number of alcoholic drinks, the types of alcoholic drinks, and the percentage alcohol content in the drinks consumed by the respondents in the study. The rates of alcohol metabolism varies between respondents and depends on their weight, percentage body fat and gender (University of Dundee, 2011).

The chart also illustrates that almost all respondents who from entry time took longer than 200 minutes to provide a breath sample, with a few exceptions, were over the legal limit to drive. These results may suggest that respondents who took more than 200 minutes to provide a breath sample are likely to drink at much higher levels than their counterparts.

Table 16 shows that 66 (48.5%) out the 136 respondents who took less than 200 minutes to provide a breath sample, left to frequent other pubs or clubs in the area. Thus these respondents' BrAC levels could have easily risen to higher levels after providing a breath sample, especially if they continued drinking at another venue.

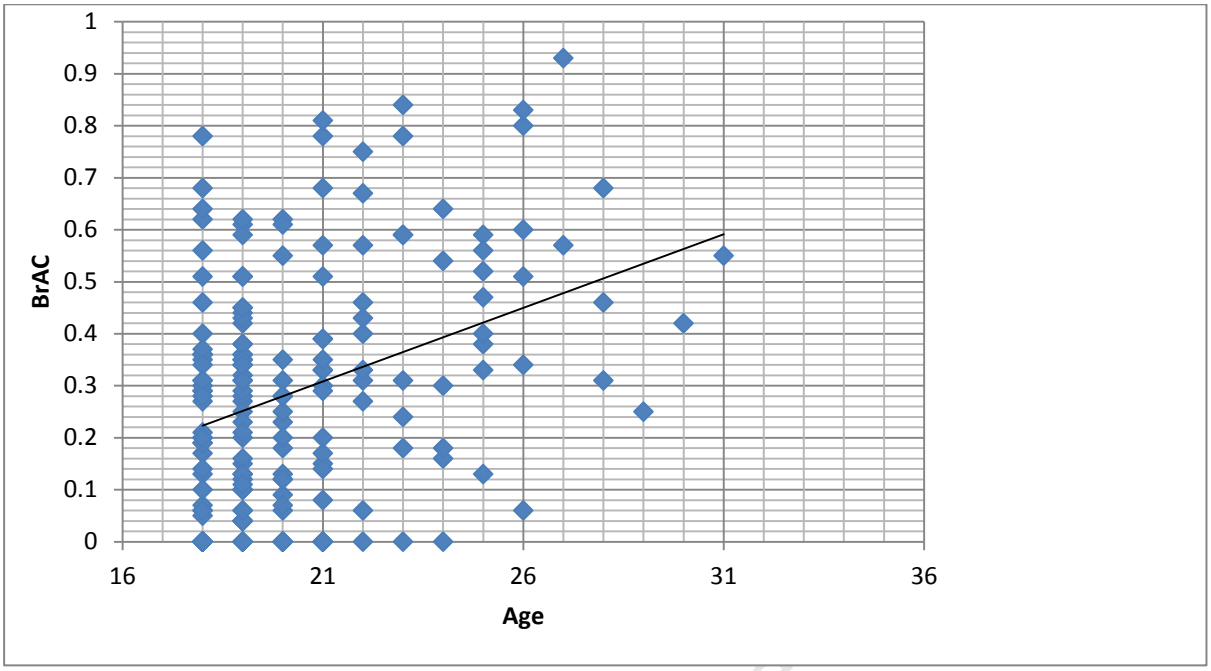
Table 16: Respondents Movements after Providing Breath Sample by Time Category

Time Categories	Another Pub	Home	Other	Total
Under 200min	66	62	8	136
Over 200min	36	12	0	48
Total	102	74	8	184

4.8.2 BrAC and Age

The trend line in Chart 2 illustrates that, on average, the older people who frequented the pub were reaching higher BrAC levels. This pattern can be explained by an observation made by the researcher during the data collection that older patrons tended to be regulars and therefore stayed longer at the venue and hence drank more.

Chart 2: Association of BrAC levels and Age

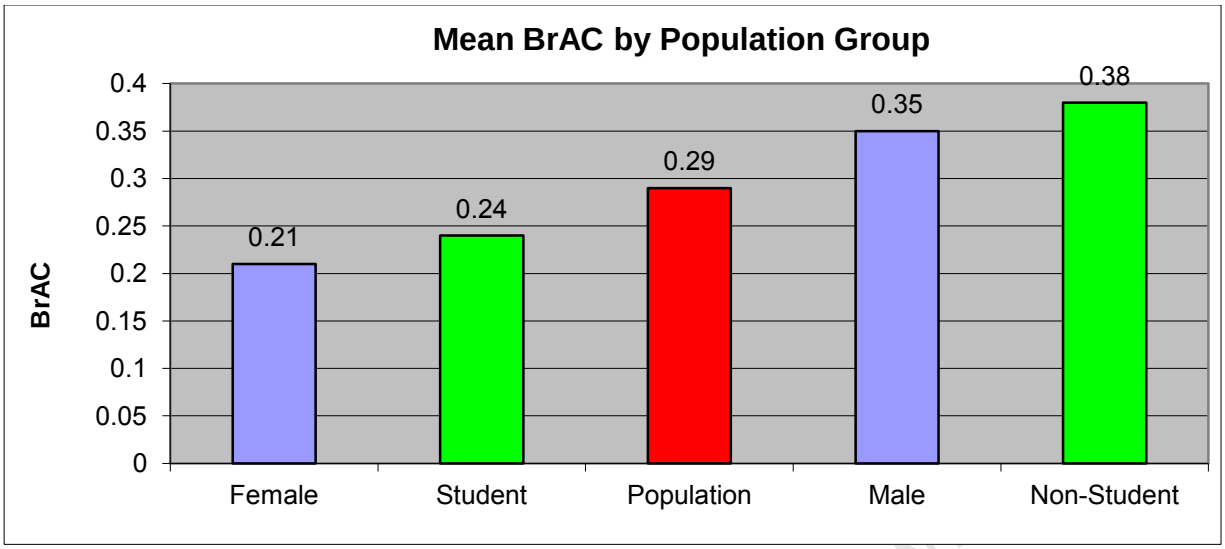


It is important to note from the chart that only two respondents over the age of 25 had BrAC levels under the legal limit of 0.24mg per 1000ml. Younger respondents had a much higher variability in their readings and there was a fairly significant number of respondents between the ages of 18 and 24 who blew under the legal limit.

4.8.3 BrAC by Population Group

As depicted in Chart 3, the average BrAC for all respondents who provided a breath sample was 0.29mg per 1000ml breath. Non-students had a higher average BrAC than their 135 student peers, with averages of 0.38mg per 1000ml and 0.24mg per 1000ml respectively.

Chart 3: Mean BrAC by Population Group



Male respondents had, on average, a higher BrAC than female respondents, with a mean of 0.35mg per 1000ml compared to the females mean of 0.21mg per 1000ml.

This difference in gender means is associated with the fact that 74 (66.1%) out of the 112 males were over the limit, compared to only 29 (41.4%) out of the 70 females, were legally drunk, as highlighted in Table 17. It is therefore clear that males tended to drink much more than females because female BrAC levels increase faster than do males, in short their BrAC levels are much more sensitive to consumption (University of Dundee, 2011). Hence, if women display lower BrAC, this outcome means that they are highly likely to be drinking less than males.

Table 17: Number of Legally Drunk BrAC Respondents by Gender

Legally Drunk	No	Yes	Total
Female	41	29	70
Male	38	74	112
Total	79	103	182

It could be considered surprising that the student average of 0.24mg BrAC was lower than their peer average of 0.38mg. These results differ from Bewick et al's (2008) finding that university students across the world have higher alcohol consumption patterns than their non-university peers. One could perhaps argue that academic schedule is also an important variable in influencing consumption levels amongst students and that there are probably times when students' peers are likely to show higher consumption patterns than recorded in this study.

4.9 Drinking and Driving Behaviour

The average BrAC of those 62 persons who indicated they were driving home and provided a breath sample, was 0.22mg per 1000ml. However 28 of the 62 (39.4%) were over the legal limit. In Table 18, we observe females who indicated they were driving were less likely to be legally drunk compared to males. Only 5 (26.3%) of the 16 females, compared to 23 (50.0%) of the 46 male drivers, blew above the limit.

Table 18: Number of Drivers Over and Under the Legal Limit by Gender

Driving on the night in question	Legal to Drive	Legally Drunk	Totals
Female	11	5	16
Male	23	23	46
Totals	34	28	62

As shown in Table 19, students who indicated that they were driving were less likely to be over the limit than non-students. Only 12 (29.3%) out of the 41 student drivers, compared to 16 (76.2%) out of 21 non-student drivers, tested over the limit to drive. These results are not surprising given the large difference in average BrAC levels for student and non-student drinkers. We have previously noted findings by Neighbour's et al (2007) that student drinking patterns vary throughout the academic year.

Table 19: Number of Legally Drunk Drivers by Student Status

Driving on the night in question and Legally Drunk	No	Yes	Totals
Non Student	5	16	21
Student	29	12	41
Totals	34	28	62

As Gustin and Simmons (2008) proposed, it is possible that these 28 legally drunk drivers were underestimating their level of intoxication and as a result driving unaware that they were over the limit. Bullers and Ennis (2006) noted that while drink driving laws focus on a legal BrAC level, in many cases individuals do not have a way to measure their BrAC levels.

The difference in intention to drive while legally drunk between genders is harder to explain. This researcher believes that it is possible that if perceived risk plays has a proximal role in decisions to drink and drive, as proposed by Gustin and Simmons (2008), then legally drunk females are less likely to be risk takers than their male counterparts. These findings are supported by the findings of Rhodes and Pivik (2011) who found that younger males are more likely to display risky driving behaviour.

It should be of particular concern in Table 20 that all 4 respondents who had previously been arrested for drinking and driving and who indicated they were driving when leaving the pub, tested over the legal limit. While three were only marginally higher, at readings of 0.25mg, 0.29mg and 0.31 mg per 1000ml, the fourth BrAC was 3.5 times the legal limit (0.83mg per 1000ml).

Table 20: Relationship between Legal Limit, Previous Arrest and Driving

	Legally Drunk	Grand Total
Driving Home and Previously Arrested	4	4
Total	4	4

The research study did not explore whether those arrested for drinking and driving had been prosecuted and what the outcome of any court case had been. It is entirely possible that these 4 respondents either were never prosecuted, or not found guilty of drinking and driving, and therefore felt that the risk of drinking and driving and getting caught does not lead to severe consequences.

It is also interesting to note that from Table 21, that only 4 (33.3%) of the 12 respondents who had been previously arrested for drinking and driving, agreed or strongly agreed that if they drink and drive they are likely to get caught.

Table 21: Previously Arrested Respondents Perception of the Likelihood of Getting Caught Driving Drunk.

If I drink and drive I am likely to get caught	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Respondents (n=12)	1	3	4	3	1

Table 22 shows that some 19 (38.8%) of the 49 respondents who had indicated that they were driving after leaving the pub, had provided a breath sample, and had strongly agreed or agreed that drinking and driving should be avoided at all costs, nonetheless tested over the legal limit to drive. In all 30 (61.2%) of these 49 drivers who provided a breath sample and were not drunk, were consistent with their statement that they strongly agreed or agreed that drinking and driving should be avoided at all costs.

Table 22: Drinking and Driving Attitudes of Drivers by Legally Drunk Status

	Legally Drunk		
Drinking and driving should be avoided at all costs!	No	Yes	Total
Strongly agree	21	8	29
Agree	9	11	20
Neutral	4	7	11
Disagree	0	2	2
Total	34	28	62

As highlighted in Table 23, some 18 (64.2%) of the 26 legally drunk drivers who had indicated they had been through a roadblock after drinking, nonetheless strongly agreed or agreed that drinking and driving should be avoided at all costs.

Table 23: Drinking and Driving Attitudes of Drivers' Who Had Been Through a Road Block by Legally Drunk Status

	Legally Drunk		
Drinking and driving should be avoided at all costs!	No	Yes	Total
Strongly agree	6	8	14
Agree	4	10	14
Neutral	3	7	10
Disagree	0	1	1
Total	13	26	39

Table 24 shows that some 13 (65.0%) of the 17 legally drunk drivers who had been stopped by a law enforcement officer when they had been drinking, nonetheless claimed they strongly agreed or agreed that drinking and driving should be avoided at all costs, yet tested over the limit.

Table 24: Drinking and Driving Attitudes of Drivers Stopped by a Law Enforcement Officer by Legally Drunk Status

	Legally Drunk		
Drinking and driving should be avoided at all costs!	No	Yes	Total
Strongly agree	6	8	14
Agree	4	10	14
Neutral	3	7	10
Disagree	0	1	1
Total	7	17	24

4.10 Perceptions of Intoxication

Table 25 shows that respondents seemed to predict their status more correctly when they were over the limit, than when they were under the limit. In all 94 (91.3%) out of the 103 respondents who recorded breath samples above the legal limit correctly predicted they were legally drunk. However only 48 (59.7%) of the 79 respondents under the legal limit correctly predicted they were legal to drive, with 31 (40.3%) of the 79 incorrectly assuming they were legally drunk.

Table 25: Perception of Intoxication by Breathalyser Reading

	Legal to Drive	Legally Drunk	Total
ABOVE	31	94	125
UNDER	48	9	57
Total	79	103	182

These findings support Bullers and Ennis (2006) findings that people are moderately accurate when predicting whether they are over or under the legal limit. It is however surprising that a higher percentage correctly diagnosed when they were legally drunk as opposed to those who correctly diagnosed they were legal to drive. These results suggest that young adults are far more cautious about predicting they are legal to drive, than predicting they are legally drunk.

If young adults are more cautious in predicting that they are legal to drive then Table 27 provides some interesting insight into how frequently driver licence holders drive when they believe they maybe over the limit. In Table 26, some 39 (23.8%) of the 164 driver licence holders stated that they always or frequently drive when they think they maybe over the limit. It is therefore a concern that almost one in four young adults are undeterred from driving when they know ought not to drive.

Table 26: Drivers Licence Holders Perception of Own Drinking and Driving Frequency

I drive when I think I maybe over the limit	Always	Frequently	Seldom	Very Seldom	Never
Respondents (n=164)	16	23	43	32	50
%	9.8%	14.0%	26.2%	19.5%	30.5%

It is however more concerning that 110 (48.0%) of the when the 229 respondents perceived that their close friends either always or frequently drive respondent believes they may be over the limit, as represented in Table 28. Although it is concerning that so many respondents hold this perception of their friends' behaviour, one may question how accurate these perceptions might be. The types of indicators used to make this assumption were not explored in this study.

Table 27:Perception of Friends Frequency of Drinking and Driving

My close friends drive when I think they may be over the limit*	Always	Frequently	Seldom	Very Seldom	Never
Respondents (N=229)	36	74	59	34	26
%	15.7%	32.3%	25.8%	14.8%	11.4%

4.11 Drivers vs. Non-Drivers Perceptions of Intoxication

Non-drivers more accurately predicted when they were over the legal limit when compared to drivers, as indicated in Table 27. Some 70 (93.3%) of the 75 non-drivers correctly predicted they legally drunk, compared to 24 (85.7%) of the 28 legally drunk drivers. However non-drivers were less accurate in predicting when they were legal to drive compared to drivers. Some 24 (52.1%) of the 45 non-drivers compared to 24 (70.6%) of the 34 drivers correctly predicted they were legal to drive.

Table 28: Drivers vs. Non Drivers Perceptions of Intoxication by Breathalyser Reading

	Legal to Drive		Legally Drunk		
Perceptions of limit	UNDER	ABOVE	UNDER	ABOVE	Total
Drivers on night	24	10	4	24	62
Non Drivers on night	24	21	5	70	120
Total	48	31	9	94	182

It would appear that, although Gustin and Simmons (2008) believed that individuals may drive assuming they are under the limit when they are in fact over, only a small percentage of young adults drive under these conditions. Once again, it would appear that both non-drivers and drivers err on the side of caution when predicting whether they are over or under the legal limit.

4.12 Perception of ability to drive based and feelings of sobriety

From the comparison in Table 29 it is clear that non-drivers were more likely to think they were legally drunk when over the limit, compared to drivers. Some 61(81.3%) out of 85 non-drivers and 10 (35.7%) out of 28 of drivers over the limit correctly assumed they were not legally drunk. However drivers were more likely to think they were legal to drive when under the limit, than non-drivers. Some 31 (91.2%) out of 34 drivers and 34 (71.9%) out of 45 non-drivers under the limit thought they were legal to drive.

Table 29: Drivers vs. Non Drivers Perception of Sobriety versus Legally Drunk Status

	Legal to Drive		Legally Drunk		Total
Sober to Drive	No	Yes	No	Yes	
Drivers	3	31	10	18	62
Non Drivers	11	34	61	14	120
Total	14	65	71	32	182

While some 24 (85.7%) out of the 28 drivers over the limit in Table 30 correctly indicated they were over the limit, 15 (62.5%) of those 24 said they thought they were sober enough to drive. One explanation for these responses could be that those who perceive that they have a high behavioural tolerance for alcohol may feel comfortable to drive despite being technically over the limit (Gustin and Simmons, 2008).

Table 30: Drivers over Limit Responses to Under or Above Statement Compared to their Perception of Sobriety to Drive

Sober to Drive	Under Limit	Above Limit	Total
NO	1	9	10
YES	3	15	18
Total	4	24	28

Table 31 shows that some 19 (67.9%) of the 28 drivers over the limit and 14 (77.8%) of the 18 of those who thought they were sober enough despite recognizing they were legally over the limit, nonetheless strongly agreed or agreed that drinking and driving should be avoided at all costs.

Table 31: Drivers Legally Drunk Perception of Sobriety to Drive Compared to Drinking and Driving Attitudes

	Legal to Drive		
Drinking and driving should be avoided at all costs!	No	Yes	Total
Strongly agree	4	4	8
Agree	1	10	11
Neutral	5	2	7
Disagree	0	2	2
Total	10	18	28

These results suggest that while most people display strong attitudes against drinking and driving, their practices are not always consistent with their attitudes. It could be that diminished perceived risk and increased behavioural tolerance towards the effects of alcohol neutralise the strong attitudes against drinking and driving after alcoholic drinks have been consumed.

Whatever the reason, it is important to explore why the attitudes of young adults do not necessarily translate into the appropriate behaviour.

4.13 Response of Respondents to the Research

The students and their peers who participated in the study provided positive verbal feedback on their experience of being a respondent in the study. Verbal feedback was noted on the data collection sheets. One respondent commenting on completing the survey on the PDA said that it was "very cool, very advanced, none of that paper shit (*sic*)". Another respondent commenting on the overall experience of completing the survey said "this is really cool, by the way I like it". Another respondent who felt that the study was very important said "this is really good, it really is helpful".

In addition to the verbal feedback a number of observations were noted by the researcher. The first observation was that friends of respondents in the study who were with the respondent when completing the exit survey and providing a breath sample also wanted to have the experience of blowing in the breathalyser.

The second observation was that on some nights there were many patrons standing around discussing and/or using the coin operated breathalyser at the entrance to the pub. The last observation was that every week more and more patrons at the pub could be seen wearing the wrist bands that were given to them in their 'goodie bags'.

This observation is extremely important because it indicates that respondents valued the items distributed in the "goodie bag" and supported the responsible driving message. Students and their peers are generally considered to demographic group that are brand conscious and unlikely to wear messages they consider to be 'uncool'. Therefore one could infer that they are unlikely to wear a wristband with "friends don't let friends drink and drive" if they did not support the message.

4.14 Conclusion

This chapter has discussed the findings of the study examining rates of participation and some of the individual characteristics of the participants. The chapter gave detailed attention to associations between attitudes to risk behaviours and related factors arising from the data analysis and from the literature review. The findings of the study were integrated with the existing literature. The chapter ended with a discussion of the researcher experience conducting the study. This discussion of the findings was used to outline the research conclusions and recommendations discussed in the following chapter.

Chapter 5

Conclusions and Recommendations

5.1 Introduction

In this final chapter the conclusions of the study are discussed. These conclusions are drawn from the findings arising from the study and discussed in the previous chapter. Discussion of the conclusions leads to some recommendations for anti-drinking-and-driving campaigns offered by the researcher.

5.2. Conclusions

Although a small sample was used for this study, the results may be seen to be reflective of the population of students and their peers that frequent the particular pub venue on a Thursday evening. While the results cannot be generalized to all students and their peers across South Africa, this study has pioneered a methodological approach that is unique in the country. In addition the study has begun to explore attitudes towards drinking and driving in South Africa, how these attitudes influence behaviour and perceptions of intoxication. The findings of the study provide new insights into this phenomenon.

The results of the study indicate that student and peer knowledge of the legal limit for BrAC is very poor. One can infer from the findings that students and their peers do not know that there is a difference between blood alcohol concentration and breath alcohol concentration. If this inference is correct, one may suggest that young people do not yet have an understanding of the difference between blood and breath alcohol measurement. Future community education campaigns should therefore be designed to highlight the distinctions.

Despite this lack of knowledge of the legal limit for BrAC, respondents reported very strong attitudes opposed to drinking and driving, with most respondents indicating that drinking and driving should be avoided at all costs. The fact that many respondents would like to test themselves before driving, and would consider using a breathalyser such as the one available in the pub to test themselves before driving, is a very positive finding. In addition, only a very small percentage of respondents said they would still drive if a breathalyser indicated they were over the limit.

The results suggest that attitudes towards drinking and driving might slowly be shifting amongst the younger members of the population. The results also indicate that the breathalyser may be useful tool for discouraging drinking and driving, informing people about the legal limit and empowering patrons in pubs to make informed decisions about drinking and driving. The use of breathalysers in community education campaigns is therefore recommended.

The mean intoxication level for all consumers participating in the study was under the legal limit to drive, such intoxication levels of respondents might be considered to be fairly low. There was however a high variability in the results and many respondents were significantly above the legal limit. It is important to note that many of the respondents who provided breath samples were leaving for another pub or club so it is highly likely that their intoxication levels would increase. Almost half who left for another pub were not yet legally drunk. If they continued to drink at the next pub this status would very likely change.

The intoxication level of drivers is of greater concern. Almost half of the respondents who indicated they were driving home blew over the legal limit. Also of concern is that although many drivers correctly indicated they thought they were over the limit, many still thought they were sober enough to drive. These results indicate that although a driver's attitudes may be strongly opposed to drinking and driving, their behaviours are not consistent with their attitudes.

One could infer that the fact that behaviours are not consistent with attitudes may reflect the perceived risk of drinking and driving being relatively low. The low perceived risk is plausibly a result of more than half the respondents never having ever been through a road block or never having been stopped by a law enforcement offer after drinking, let alone arrested for drinking and driving. It is also of concern that many of the respondents who had been arrested for drinking and driving still did not strongly agree or agree that drinking and driving should be avoided at all costs.

The results suggest that law enforcement authorities need to increase the levels of enforcement on the roads to raise the perceived risk of being caught.

Also it was clear, from the various high percentages of patrons invited s who agreed to participate, and who returned to complete the exit survey and breathalyser test, and from the comments made by the respondents, that the methodology for this type of research adopted in this study, is well designed and appropriate for research into student and their peers levels and perceptions of intoxication and their attitudes towards drunk driving.

5.3 Recommendations

The researcher recommends further investigation into the phenomenon of the attitudes, practices and perceptions of intoxication related to drinking and driving amongst students and their peers. The study could easily be expanded to include more pubs, students at other universities and their peers, or other demographic groups.

Further studies should make use of breath testing equipment allowed for evidentiary breath testing by the Road Traffic Act 93 of 1996. Although the breathalyser used in the study was sufficient for the purpose required by the study, the use of a more sophisticated model would strengthen the findings of any other study.

Data collection on a PDA or PC Tablet through a survey website by future researchers is recommended. During the data collection many respondents commented how painless the experience of completing the survey was on the PDA. The process also makes it very easy to convince respondents that their responses are anonymous and confidential. Due to the sensitive nature of some of the questions, the assurance of anonymity and confidentiality are seen as very important in ensuring the necessary high participation rates to achieve reliable results. Data analysis is much easier through the ability to download data from survey websites into Excel spreadsheets.

The study found the breathalyser can be an effective tool in community education campaigns run in pubs. Any mechanism that allows pub patrons to test their level of intoxication should be encouraged. It would be preferable to use breathalysers that provide a BrAC reading. Nonetheless, disposable breathalysers that indicate simply whether or not an individual is above or below the legal limit, could also be used.

Community education campaigns need also to focus on the measurement of breath alcohol concentration, blood alcohol concentration the legal limits. If breathalysers' are used in a campaign then it is of critical importance that people are informed about how alcohol is metabolised by the body. It is possible for BrAC levels to increase after a breathalyser test. Campaigns should also focus on the level of impairment at different BrAC levels.

The researcher also recommends that items like wrist bands and t-shirts be included in future education campaigns or replications of the study. Any promotional item that has the potential to reinforce a responsible use of alcohol message is strongly encouraged.

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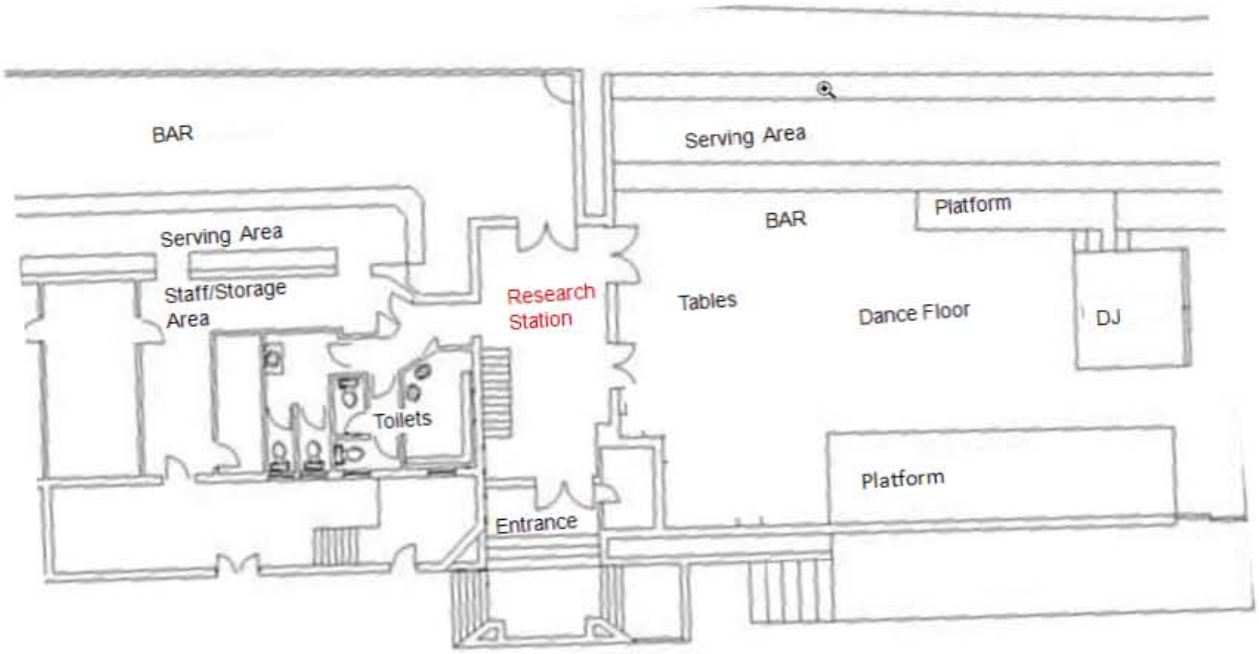
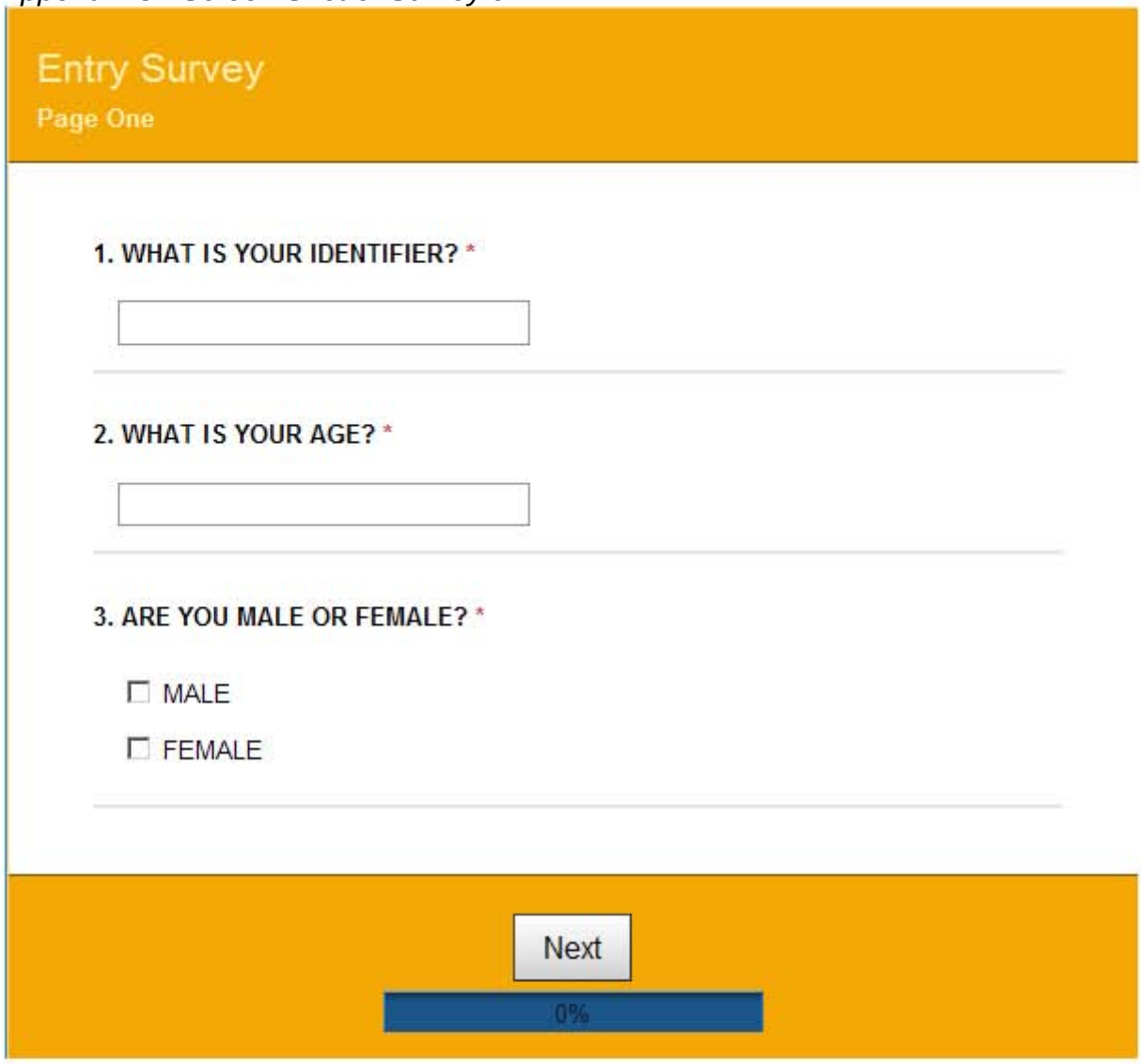
Appendix A Map of the Research Venue



Appendix B Photo of the PDA

Image taken from www.hpc.ru/devices/images/729_01.jpg

Appendix C Screen Shot of Survey on PDA



Appendix D Entry Survey

Page One
1) WHAT IS YOUR IDENTIFIER?*

_____

2) WHAT IS YOUR AGE?*

_____

3) ARE YOU MALE OR FEMALE?*
[ ] MALE
[ ] FEMALE

Page 2
4) ARE YOU CURRENTLY A REGISTERED UNIVERSITY STUDENT?*
[ ] YES
[ ] NO

5) DO YOU HAVE A VALID DRIVING LICENSE?*
[ ] YES
[ ] NO

6) HOW MANY TIMES A WEEK (ON AVERAGE) DO YOU GO OUT TO DRINK AT A VENUE LIKE THIS ONE?*
[ ] LESS THAN ONCE A WEEK
[ ] ONCE A WEEK
[ ] TWICE A WEEK
[ ] THREE TIMES A WEEK
[ ] MORE THAN THREE TIMES A WEEK

7) HOW DID YOU GET TO THIS VENUE TONIGHT?*
[ ] I DROVE
[ ] A LIFT WITH A FRIEND
[ ] A FRIEND OR FAMILY MEMBER DROPPED ME OFF
[ ] I WALKED
[ ] TAXI

8) HOW ARE YOU PLANNING TO GET HOME TONIGHT?*
[ ] I AM DRIVING
[ ] A LIFT WITH A FRIEND
[ ] A FAMILY MEMBER OR FRIEND WILL FETCH ME
[ ] WALKING
[ ] TAXI

9) WHAT IS THE LEGAL LIMIT FOR BREATH ALCOHOL CONCENTRATION WHEN DRIVING A MOTOR VEHICLE IN SOUTH AFRICA?*
[ ] LESS THAN 0.02mg Alcohol per 1000ml BREATH
[ ] LESS THAN 0.05mg Alcohol per 1000ml BREATH
[ ] LESS THAN 0.10mg Alcohol per 1000ml BREATH
[ ] LESS THAN 0.24mg Alcohol per 1000ml BREATH
[ ] I DON'T KNOW

---

10) I WOULD CONSIDER USING A BREATHALYSER LIKE THE ONE IN THIS VENUE TO ENABLE ME TO MAKE INFORMED DECISIONS ABOUT DRINKING AND DRIVING!*
[ ] STRONGLY AGREE
[ ] AGREE
[ ] NEUTRAL
[ ] DISAGREE
[ ] STRONGLY DISAGREE

11) DRINKING AND DRIVING SHOULD BE AVOIDED AT ALL COSTS!*
[ ] STRONGLY AGREE
[ ] AGREE
[ ] NEUTRAL
[ ] DISAGREE
[ ] STRONGLY DISAGREE

12) THE POSSIBILITY OF HAVING MY NAME APPEARING IN THE NEWSPAPER MAKES ME THINK TWICE ABOUT DRINKING AND DRIVING!*
[ ] STRONGLY AGREE
[ ] AGREE
[ ] NEUTRAL
[ ] DISAGREE
[ ] STRONGLY DISAGREE

13) THERE ARE TIMES I WISH I COULD TEST MYSELF BEFORE I DRIVE BECAUSE AT THE TIME I AM NOT SURE WHETHER I AM UNDER OR OVER THE LIMIT!*
[ ] STRONGLY AGREE
[ ] AGREE
[ ] NEUTRAL
[ ] DISAGREE
[ ] STRONGLY DISAGREE

14) IF I DRINK AND DRIVE I AM LIKELY TO GET CAUGHT*
[ ] STRONGLY AGREE
[ ] AGREE
[ ] NEUTRAL
[ ] DISAGREE
[ ] STRONGLY DISAGREE

---

15) I AM HAPPY TO GET A RIDE HOME WITH SOMEBODY WHO HAS BEEN DRINKING*
[ ] ALWAYS
[ ] DEPENDS ON HOW DRUNK THEY LOOK
[ ] ONLY IF I KNOW HOW MUCH THEY HAVE BEEN DRINKING
[ ] ONLY IF I HAD NO OTHER OPTION
[ ] NEVER

16) IF YOU BLEW INTO A BREATHALYSER AND IT INDICATED YOU WERE OVER THE LIMIT WHAT DO YOU THINK YOU WOULD DO?*
[ ] DRIVE ANYWAY
[ ] WAIT A LITTLE WHILE AND NOT HAVE ANY MORE DRINKS
[ ] LEAVE YOUR CAR AND CALL A TAXI
[ ] CALL SOMEBODY TO COLLECT YOUR CAR
[ ] ASK A FRIEND TO DRIVE

17) I DRIVE AFTER DRINKING 3 OR MORE ALCOHOLIC DRINKS*
[ ] ALWAYS
[ ] FREQUENTLY
[ ] SELDOM
[ ] VERY SELDOM
[ ] NEVER

18) HAVE YOU EVER BEEN STOPPED BY A LAW ENFORCEMENT OFFICER AFTER YOU HAVE BEEN DRINKING?*
[ ] YES
[ ] NO

19) HAVE YOU EVER DRIVEN THROUGH A ROADBLOCK AFTER DRINKING?*
[ ] YES
[ ] NO

20) HAVE YOU EVER BEEN ARRESTED FOR DRINKING AND DRIVING?*
[ ] YES
[ ] NO

21) MY CLOSE FRIENDS DRIVE WHEN I THINK THEY MAY BE OVER THE LIMIT*
[ ] ALWAYS
[ ] FREQUENTLY
[ ] SELDOM
[ ] VERY SELDOM
[ ] NEVER

22) I DRIVE WHEN I THINK I MAYBE OVER THE LIMIT*
[ ] ALWAYS
[ ] FREQUENTLY
[ ] SELDOM
[ ] VERY SELDOM
[ ] NEVER

Thank You!
Thank you for taking my MASTERS THESIS survey. Your participation is very much appreciated. Your data is anonymous but is identified only by your study identification number. You are able to withdraw from the study at any point. If you wish to withdraw your responses please email your study identification number to Rowan1982@gmail.com.

Appendix E Exit Survey

Page One
1) WHAT IS YOUR IDENTIFIER?*
_____

2) DO YOU BELIEVE YOU ARE SOBER ENOUGH TO DRIVE A MOTOR VEHICLE?*
[ ] YES
[ ] NO

3) DO YOU THINK YOU ARE ABOVE OR UNDER THE LEGAL LIMIT TO DRIVE A MOTOR VEHICLE?*
[ ] ABOVE
[ ] UNDER

4) WHERE ARE YOU GOING NOW AS YOU LEAVE THE PUB?*
[ ] HOME
[ ] ANOTHER PUB/CLUB
[ ] OTHER

Appendix F Photo of the Drager Alcotest 6810

Image taken from www.ace-breathalyzer.com/breathalyzer-draeger-alcotest-6810-6510-extended-with-electrochemical-sensor.59.html

Appendix G Pamphlet

Appendix H Extract from final merged data file

Response ID	7	8	9
Date Submitted	2011/05/05 13:22	2011/05/05 14:15	2011/05/05 13:22
Status	Complete	Complete	Complete
Contact ID			
Comments			
Language	English	English	English
Referer			
IP Address	41.6.156.94	41.6.156.94	41.6.156.94
Longitude	18.4167	18.4167	18.4167
Latitude	-33.916698	-33.916698	-33.916698
Country	South Africa	South Africa	South Africa
City	Cape Town	Cape Town	Cape Town
Region	11	11	11
Postal			
Response ID	8	9	10
WHAT IS YOUR IDENTIFIER?	124	125	126
WHAT IS YOUR AGE?	19	18	30
ARE YOU MALE OR FEMALE?	FEMALE	FEMALE	MALE
ARE YOU CURRENTLY A REGISTERED UNIVERSITY STUDENT?	YES	NO	NO
DO YOU HAVE A VALID DRIVING LICENSE?	YES	YES	YES
LESS THAN ONCE A WEEK:HOW MANY TIMES A WEEK (ON AVERAGE) DO YOU GO OUT TO DRINK AT A VENUE LIKE THIS ONE?	TWICE A WEEK	LESS THAN ONCE A WEEK	TWICE A WEEK
HOW DID YOU GET TO THIS VENUE TONIGHT?	TAXI	TAXI	A LIFT WITH A FRIEND
HOW ARE YOU PLANNING TO GET HOME TONIGHT?	TAXI	TAXI	A LIFT WITH A FRIEND
WHAT IS THE LEGAL LIMIT FOR BREATH ALCOHOL CONCENTRATION WHEN DRIVING A MOTOR VEHICLE IN SOUTH AFRICA?	I DON'T KNOW	I DON'T KNOW	I DON'T KNOW
I WOULD CONSIDER USING A BREATHALYSER LIKE THE ONE IN THIS VENUE TO ENABLE ME TO MAKE INFORMED DECISIONS ABOUT DRINKING AND DRIVING!	AGREE	AGREE	STRONGLY AGREE
DRINKING AND DRIVING SHOULD BE AVOIDED AT ALL COSTS!	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE

THE POSSIBILITY OF HAVING MY NAME APPEARING IN THE NEWSPAPER MAKES ME THINK TWICE ABOUT DRINKING AND DRIVING!	AGREE	AGREE	STRONGLY AGREE
THERE ARE TIMES I WISH I COULD TEST MYSELF BEFORE I DRIVE BECAUSE AT THE TIME I AM NOT SURE WHETHER I AM UNDER OR OVER THE LIMIT!	DISAGREE	NEUTRAL	STRONGLY DISAGREE
IF I DRINK AND DRIVE I AM LIKELY TO GET CAUGHT	STRONGLY AGREE	AGREE	NEUTRAL
I AM HAPPY TO GET A RIDE HOME WITH SOMEBODY WHO HAS BEEN DRINKING	NEVER	NEVER	ONLY IF I KNOW HOW MUCH THEY HAVE BEEN DRINKING
IF YOU BLEW INTO A BREATHALYSER AND IT INDICATED YOU WERE OVER THE LIMIT WHAT DO YOU THINK YOU WOULD DO?	ASK A FRIEND TO DRIVE	LEAVE YOUR CAR AND CALL A TAXI	WAIT A LITTLE WHILE AND NOT HAVE ANY MORE DRINKS
I DRIVE AFTER DRINKING 3 OR MORE ALCOHOLIC DRINKS	NEVER	NEVER	ALWAYS
HAVE YOU EVER BEEN STOPPED BY A LAW ENFORCEMENT OFFICER AFTER YOU HAVE BEEN DRINKING?	NO	NO	YES
HAVE YOU EVER DRIVEN THROUGH A ROADBLOCK AFTER DRINKING?	NO	NO	YES
HAVE YOU EVER BEEN ARRESTED FOR DRINKING AND DRIVING?	NO	NO	NO
MY CLOSE FRIENDS DRIVE WHEN I THINK THEY MAY BE OVER THE LIMIT	FREQUENTLY	VERY SELDOM	FREQUENTLY
I DRIVE WHEN I THINK I MAYBE OVER THE LIMIT	NEVER	NEVER	ALWAYS
Idenifier Exit	124	125	126
Exit test order	14	15	1
Duration	04:40:00	04:38:00	01:46:00
Minutes in Pub	280	278	106
Identifer Three	124	125	126
Date Submitted	2011/05/05 14:15	2011/05/05 14:19	2011/05/05 14:25
Breath Test Number	1197	1198	1179
Drager Reading	0.129%	0.013%	0.089%
Drager Reading 2	0.129	0.013	0.089
BrAC	0.61	0.06	0.42364
BrAC2d	0.61	0.06	0.42
Legally drunk	1	0	1

Sober to Drive	NO	NO	YES
Above of Under	ABOVE	ABOVE	ABOVE
Home another pub or other	HOME	HOME	ANOTHER PUB/CLUB

Appendix I Extract of Correspondence with International Author on Ethics

On Feb 16, 2010, at 2:47 AM, Rowan Dunne - NEW wrote:

Dear Sir

My name is Rowan Dunne. I am a Master of Social Science (Policy and Management) student at the University of Cape Town in South Africa. I am currently completing my Masters Internship at South African Breweries a subsidiary of SABMiller.

In Cape Town currently we are seeing a huge clamp down on drinking and driving with government departments creating new evidence centres to fast track prosecution. The first evidence centre opened in Cape Town in mid December and by the end of January 378 of the 428 people who had been taken to the centre had been found to be over the legal breath limit of 0.24.

Alternative transport options are however limited and for many people taking cabs is not an option. I have therefore decided to do research on how consumers would respond to the opportunity to breathalyse themselves before driving home. If night clubs and bars offered this service would people use it to make informed decisions on whether to drive or not. Or I would like to look at how consumers in a club or bar would respond to knowing their alcohol level at any given point when compared to the number of drinks.

I noticed your article in the American Journal of Health Behaviour. I have run into an ethics roadblock, where I have a department that is concerned about the use of a breathalyser in a bar or club environment. I was hoping that perhaps you might be able to help me by providing some advice on the ethical considerations of breathalysing people for research purposes. Any advice you have would be of great help?!

Best regards
Rowan Dunne

From: John Clapp [mailto:jdclapp@mail.sdsu.edu]
Sent: 16 February 2010 17:00
To: Rowan Dunne - NEW
Subject: Re: Breathalyzer Research -Ethics

Dear Rowan:

Thank you for your inquiry. There are two issues you might consider. We have been able to use breathalyzer tests to measure BrAC in bar, party, club and street settings without issue. The nature of these test is for research, however, and we did not provide BrAC feedback to individuals. The most common ethical issue we face is obtaining informed consent from intoxicated people. We use two methods to handle this problem. First we offer retroactive withdraw from the study. We give respondents cards with an identifying number and our email and telephone number. The can contact us the next day and ask for their data to be removed from the study. We also do not test anyone who is visibly drunk (staggering, slurring, etc).

The second issue you might want to consider is BrAC feedback. It doe not work. In fact, it often produces iatrogenic results (increased drinking). It can become a drinking game of sorts. We never give respondents their BrAC in the field (we are also blind to their BrAC).

For DUI control, two approaches seem to work. One is environmental and includes law enforcement and media and the other includes designated drivers. At the bar level you might try a designated driver program. The key is to have drinking groups negotiate who will be the designated driver before they start drinking. If you combine this with some increased enforcement message you can achieve even better results.

Best of luck; DUI is a difficult problem.

John D. Clapp, Ph.D.