Personal Awareness of BAC Levels While Drinking Alcoholic Beverages
The Ability to Decipher Personal BAC Levels


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Summary:
Many people are unaware of their BAC level while drinking and decide to drive home after a few drinks. The focus is to understand the correlation, if any, to a person’s perception of their BAC level and their actual BAC level. To help increase the safety of individuals we propose that legislation be put in place that is aesthetically appealing, easy to read charts comparing amount of drinks to body weight be placed in all bars and that it becomes mandatory to bars to have a breathalyzer for customer’s convenience on the premises.

Video Link: http://youtu.be/JBNkYwXRY5Q

Raising Awareness of Individual’s Perception of Their BAC Levels

Introduction to Alcohol (BH)

Alcohol consumption has been part of society socialization for thousands of years. For many, alcohol consumption is link between friends and family. It is a means of communal interaction. For most, a couple drinks with a few friends is all in good fun but for others a couple drinks turn into many drinks and then these individuals become unaware of their impairment. Alcohol consumption is something that can lead to drinking and driving which not only but the individual at risk but also everyone else on the roads.

In the United States, the driving age is 17 years old and the drinking age is 21 years old. The average teenager in the United States has only four years of driving experience before they are legally allowed to drink and possibly drive. These young adults, in four years, have yet to see all of the dangers of the road and now they are about to mix it by being intoxicated and driving.

The legal limit of intoxication is 0.08% but what does this really mean? Blood Alcohol Content (BAC) is used to determine the amount (percentage) of alcohol (ethanol) in the blood. It is the point when an individual is legally intoxicated. An individual’s BAC level can be measured by a blood test or urinalysis. A breathalyzer can be used to get a general clue to how intoxicated an individual is and is more readily available. As the name states, BAC levels are found in the blood.

With increasing levels of alcohol in the blood, impairment is something that changes drastically. People begin to lose motor function, become disoriented, cannot concentrate and slur
Obtaining an Alcohol Permit (MK)

The Division of ABC (Alcoholic Beverage Control) regulates the sales and issuance of licenses of alcoholic beverages in the state of New Jersey. The first step in obtaining an alcohol permit is deciding which type of license you want; are you a small business owner planning on selling alcohol in your restaurant, do you want to open a beer/wine/liquor retail store, or do you plan on opening a bar? The different types of licenses and their permits include:

~ Plenary Retail Consumption License: This license is authorizes the sale of alcoholic beverages for consumption on the licensed premises by the glass or other open receptacle AND allows the sale of alcoholic beverages in original containers for consumption off the licensed premises. Such sales of packaged goods, however, may only take place from the public barroom, and the packaged goods may only be displayed for sale on the perimeter walls, unless the floor plan has been approved by the A.B.C. Director. This license is given to bars and restaurants that serve alcohol on their premises. The population restriction of this license is only 1 of these licenses can be issued to a municipality for every 3,000 residents (except for a grandfather clause that doesn’t apply to licenses that were obtained before 1947).

~Plenary Retail Consumption License with “Broad Package Privilege”: This license is another Plenary Retail Consumption License except the sale of package goods is not restricted to the public barroom.

~Plenary Retail Distribution License: This license permits the sale of alcoholic beverages in original containers for consumption off the licensed premises (package goods). Other mercantile or commercial activity may take place on the licensed premises unless it is prohibited by municipal ordinance. This type of license is given to liquor stores, beer distributors, and grocery/convenience stores. The population restriction for this license is 1 license issued to a municipality for every 7,500 residents (except for a grandfather clause that doesn’t apply to licenses obtained before 1947).

~Hotel/Motel License: This license is a Plenary Retail Consumption License issued to a hotel or motel with 100 or more guest sleeping rooms. It is an exemption to the population restrictions. The license may only be used in connection with a facility that meets the 100 room condition.

~Theater License: This license is a Plenary Retail Consumption License which may be issued to a non-profit corporation which conducts musical or theatrical performances in a theater with seating capacity of 1,000 or more guests. It is an exemption to the population restrictions. This license authorizes the sale of alcoholic beverages for on-premise consumption during performances and for two hours immediately preceding and following performances.

~Club License: A “Club License” is one that is issued by a municipality to a corporation, association or organization that is non-profit and operating for benevolent, charitable, fraternal,
social, religious, recreational, athletic, or similar purposes. The club license authorizes the club
to sell and serve alcoholic beverages but only for immediate consumption on the licensed
premises and only to bona fide club members and their guests. NO ONE ELSE MAY BE
SERVED. This type of license is given to non-profit club operating for benevolent, fraternal,
social, or recreational purposes. There is no population restrictions for this type of license.

~Plenary Retail Transit License: Permits the sale of opened alcoholic beverages to be consumed
on trains, airplanes, limousines, and boats while the vehicles are in transit. This license is
required for vehicles that travel through or stop in New Jersey. This is the only license that is
issued by the director of ABC instead of a municipality issuing it.

~Wholesale License: This license permits the sale of large quantities of alcoholic beverages to
bars/restaurants/retail distribution establishments. This license is issued by the Director of ABC
instead of a municipality.

~Manufacturing License: This licensed is given to breweries, distilleries, wineries, and bottling
facilities in New Jersey. This license depends on what kind of alcohol is being manufactured or
bottled (beer, wine, or liquor). This license is issued by the Director of ABC instead of a
municipality.

Information derived from:

**Regulations in Alcohol Permits (MK)**

If a person plans on opening a liquor store they must obtain a Plenary Retail Distribution
License which is subject to a few restrictions (but other types of licenses for theaters, clubs, and
hotels aren’t) that include:

~population restrictions (only 1 license can be issued for a set number of residents in that
city/town)

~hours of sale: For Plenary Retail Distribution Licenses the hours are 9:00am-10:00pm Monday-
Saturday, 12:00pm-6:00pm Sunday (Unless Christmas Eve and New Years Eve falls on a
Sunday then sales are permitted from 12:00pm-10:00pm). For Plenary Retail Consumption
Licenses and Club Licenses the hours are 7:00am-1:00am Monday-Thursday, 7:00am-2:am
Friday, 12:00pm-1:00am Sunday (If its Christmas Eve or New Years Eve then sales are
permitted from 7:00am-3:00am whether its a weekday or Sunday).

~closing provisions: During the hours that the sales of alcoholic beverages are prohibited, the
entire store must be closed and no person can be permitted or admitted into the store except
hotels, restaurants, and clubs. Also, during the hours that the sales of alcoholic beverages are
prohibited no one can be admitted or remain on the premises of said store except for the owner,
his employees, and his contractors. The owner and his employees must announce a last call 15
minutes before the store closes and help remove customers at the closing hour.
~sales to certain persons: No employee can sell, serve, or distribute alcoholic beverages to intoxicated people and people under the age of 21 or allow the consumption of alcohol by intoxicated people and people under the age of 21 on the premises.

~distance from certain buildings: No license can be granted to any business if it’s too close to the premises of another business with an existing license.

~public to be freely admitted; minimum room size: Alcoholic beverages can’t be sold to be consumed if the public is not freely admitted. Alcoholic beverages also can’t be sold in a room with a floor space of less than 300 sq ft.

~clear view of premises required: All business that sell, distribute, or dispense alcoholic beverages have to be sufficiently lighted at all times to give a full view of the inside. There can’t be any obstructions of view higher than 4 1/2 ft above sidewalk level.

~Toilet Facilities required: All business that sell alcoholic beverages with the Plenary Retail Consumption License have to be furnished, equipped, or supplied with separate toilets for men and women and have to meet the approval of a Health Officer.

After deciding which type of license you will pursue you then contact the ABC Board for the city or town you plan on opening your business in and find out if a new license is an option or an existing one is available to purchase since there’s population restrictions. If you can’t get a new license and must purchase an existing one, you then contact the owner of the existing license for sale and negotiate a deal. Once you reach a deal for transfer of ownership, you file a person-to-person transfer application with the board of ABC (this application is available to download on the ABC website). You must then publish a notice of impending sale in the local newspaper of the municipality you’re in. Wait for the municipality to conduct a background investigation on both yourself and the purchase you’re proposing. Pay the purchase price and fees once approved by the board of ABC.


Understanding What Is Considered a “Drink” and Impairment (BH)

The issue that brought this idea into light is the fact that many young adults are getting behind the wheel after a night of drinking not understanding their impairment. A study has shown that 2.8 million college students between the ages of 18 and 24 have reported driving under the influence of alcohol (The National Institute on Alcohol Abuse and Alcoholism). These individuals are not able to evaluate their own personal perception of impairment because they have nothing to compare it to. People need to be able to correlate how they are feeling to a quantitative value.

Many people do not even understand the basics. What is a drink? A drink is not a plastic cup of vodka and cranberry juice or a pitcher of beer. There are exact values that measure what a
drink actually is. According to The National Institute on Alcohol Abuse and Alcoholism, a standard drink is 12 ounces of beer is equal to a 5 ounce glass of wine which is equal to 1.5 ounces of 80 proof (40% alcohol) liquor. To visualize this, 12 ounces of beer is a standard bottle of beer and about 1.3 ounces in a pint. A 5 ounce glass of wine looks like a little less than half of a glass. Finally 1.5 ounces of liquor is a shot. Generally mixed drinks with only one type of liquor has 1.5 ounces in it.

So now it is understood what is considered a “drink” what do we do with this information. Many websites and even cell phone applications have charts where your body weight is on one axis and the amount of “drinks” you consumed is on the other. From this chart you are able to get an understanding of where your BAC level may fall. Here is an example of what a chart may look like for men and women:

![Chart for Men](healthyhorns.utexas.edu)

![Chart for Women](healthyhorns.utexas.edu)

It is very user friendly and easy to understand. This chart can become problematic and must be taken with a grain of salt. Factors that alter your BAC level are the actual number of drinks (bartenders all vary on the amount they put in liquor drinks), the speed at which alcohol is consumed, weight/body fat (women typically have more fat cells which do not suck up the
alcohol causing it to remain in the blood longer) and food in the stomach (McNally). Although
the charts are not precisely accurate, they should still be hung up in bathrooms of bars and clubs.
People may see the chart and think twice before getting behind the wheel.

The chart, on the right hand side, gives some possible impairment the individuals may be
experiencing based on their possible BAC levels. The type of impairment you are experiencing
can be effective in deciding whether or not to drive. Impairment at very low levels can cause
major issues driving. Rossello et al. in their paper Effects of Alcohol on Divided Attention And
on Accuracy of Attentional Shift point out that alcohol widely affects the central nervous system,
(CNS) and can lead to things like a false state of euphoria, increase in security and confidence,
reduced visual capacity and motor performance and impaired judgment, reasoning and attention
among many other things. Moskowitz et al. concluded in their studies that impairment driving
begins as low as 0.02gm/100 ml. If you were to refer back to the chart, there is no male that even
after one drink would be at the 0.02gm/100ml level. It is scary to think that impairment could
occur that quickly.

The Centers for Disease Control and Prevention (CDC) put together some physical cues
to help understand where you fall based on your physical abilities on the BAC level scale. For a
BAC level of 0.02% the body begins to warm up and individuals have problems multitasking
along with a decline in visual concentration. At a BAC level of 0.05% individuals have reduced
motor function and have difficulty steering and slowed reaction times. A 0.08% individuals have
short term memory loss, cannot keep control of a constant speed while driving and impaired
perception. An over the legal limit individual has difficulty staying in the correct lane, slurred
speech, and loss of balance or equilibrium.

Liquor Responsibility: The Consumer or The Seller? (MK)

On August 21, 2008 a man named Michael Eaton arrives at the Dogfish Head Alehouse in
Gaithersburg, Maryland and opens up a tab. He orders 14 bottles of Corona beer along with 2
lemon drop shots and then opens up a second tab and orders 3 more Corona beers and a shot of
tequila. He closes his tabs at 10:55 p.m. and leaves the bar, goes south on Interstate 270 at a
speed between 88 mph and 98 mph, plows into the back of a jeep, keeps going, abandons his car
and flees on foot, rents out a hotel for the night but then turns himself in the following morning.
In the meantime, a 10 year old girl named Jazimen Warr who was sleeping in the back of the
jeep is dead as a result. If a bar’s customer leaves drunk, drives and kills someone, is the
customer or bar responsible for the death? There is a specific law in New Jersey called the New
Jersey Dram Shop Act which recognizes the right to make a claim against a bar or restaurant that
served alcohol to the person responsible for the accident. The Dram Shop Act law governs
commercial establishments that serve alcohol to visibly intoxicated customers that subsequently
cause injury or death to people that have no connection with that business. Bar liability is
important when the injured person has very little or no insurance to cover their injury or fatality.
Bar liability laws vary from state to state where in some states the blame for injury or death falls
only on the intoxicated customer and the amount of compensation to be collected by the injured
person from the vendor is set at a specific amount. In 2011 in New Jersey the Supreme Court
upheld the Voss vs Tranquilino case that allowed the person convicted of a DUI to sue the
establishment that served them alcohol. This means that in the state of New Jersey,
bars/restaurants/clubs are liable for serving alcohol to their customers since it’s considered negligence. In Voss vs Tranquilino, Frederick Voss was injured when he collided his motorcycle with Kristoffe Tranquilino’s car after he had been served alcohol at a restaurant called Tiffany’s. Voss was charged with a DWI and then sued Tiffany’s stating that he was negligently served alcoholic beverages that contributed to his accident and injuries. Tiffany’s subsequently lost at trial. Back in Maryland, Michael Eaton was found guilty for vehicular manslaughter in the death of Jazimen Warr and for leaving the scene of an accident and is currently serving an 8 year prison sentence.

**BAC Levels and Personal Perception of BAC (BH)**

Many studies have been done to look at BAC level and motor functioning. There is little research, however, on an individual’s perception of their BAC level based on how they physically feel. As mentioned previously, this study is interested in evaluating an individual’s drinking habits and whether or not they get behind the wheel, their BAC level while they drink, and their perception to tell when they believe that they have reached the legal limit. A similar study was conducted by Airhihenbuwa et al. where they looked at the relationship between the subject’s perception of their own intoxication, impairment and how it is related to BAC levels. The study used fifteen subjects ranging from 21-40 in age and recorded BAC level, reaction and anticipation times. They concluded that their perceived intoxication was somewhat related to impairment but not to BAC level.

Drinking and driving is a very serious issue and people should not only be aware of their BAC levels but also at what rate the alcohol eliminates from the body. Research done by Friel et al. showed that the peak of alcohol absorption occurs 10-91 minutes after drinking. This knowledge could be very effective when examining individuals BAC levels as they continue to drink.

A study (Tassel et al 2000) has been conducted to examine the difference between accuracy of a male and female drinker’s future BAC level. Twenty men and twenty women were recruited and given 190 proof alcohol with fruit juice mixer and then given a questionnaire asking their drinking habits, estimates of what their peak BAC level would be given the amount of alcohol they’d receive, and how many drinks they believe it would take them to reach a .08% and .10% BAC level. Over a 15 minute time period, males were given 3 standard drinks (190 proof with mixer) and females were given 2 standard drinks (190 proof with mixer). After the 15 minutes of drinking, breath tests were administered every 5 minutes until their BAC levels went down to .025%. Overall, 33 of the 40 participants overestimated what their peak BAC levels would be. As a group, the volunteers estimated their peak BAC levels would be 72% higher than what it actually measured out to be. 89% of the men overestimated their BAC levels and the men overestimated that their BAC levels would be 80% higher than it actually was. 84% of the women overestimated their BAC levels and predicted it would be 58% higher. Basically participants were not accurate in estimating their BAC levels and males were less accurate than females.
From this study, we hope to increase awareness to young adults. Drinking and driving is a very serious issue and how to handle your alcohol and be responsible is something that is overlooked in school. Students are taught the dangers that can result in drinking and driving. They are not taught what certain BAC levels feel like.

Another Option To Know You BAC: Breathalyzers (BH)

Breathalyzers are instruments that are used indirectly to measure an individual’s BAC level. It works by measuring the amount of alcohol in one’s breath. A breathalyzer is not to be confused with actual BAC level because like the name suggests it is the blood alcohol content. A breathalyzer uses an individual’s air not their blood to get a reading.

The way a breathalyzer works most basically is the ethanol from the alcohol is absorbed into the bloodstream. As the blood circulates it reaches all areas of the body including the lungs. A breathalyzer works by taking a reading of the air, blown out by the lungs, and calculating how much ethanol is in that breath. That breath is therefore proportional to the amount of BAC level in the blood. The ratio to correlating the breathalyzer reading to the BAC level is 2,100:1. This means, in basic terms, that 2,100 milliliters (ml) of air from the lungs will equal one milliliter of blood (Freudenrich 2000).

The Breathalyzer Devise and How It Works (BH)

The mechanism in which a breathalyzer registers the ethanol content is a complex system. A breathalyzer must contain: a individual’s breath, two glass vials which contain the chemical reaction mixture, and photocells which are connected to a meter that when a chemical reaction occurs the meter changes.

When an individual breathes into the breathalyzer, the breath is sent to one vials which contains a mixture of sulfuric acid, potassium dichromate, silver nitrate and water. The way this chemical reaction works is that the sulfuric acid removes any alcohol from the air and converts it into a liquid solution. Once in a liquid form, the alcohol reacts with the potassium dichromate which in turn produces “chromium sulfate potassium sulfate acetic acid water” (Freudenrich 2000). In the reaction, the silver nitrate is consider the catalyst. The catalyst is the one that is responsible for speeding up the chemical reaction. During this second reaction, the dichromate ion which is reddish-orange at this point, changes color to become green chromium ion when it reacts with the alcohol. The amount of color change is related to the level of alcohol which is in the individual’s breath.

When determining the actual amount of alcohol in the individual’s breath, it is compared to an unreacted mixture in the photocell system. The system produces an electric current. The current causes the needle in the breathalyzer to move away from its resting place.

Breathalyzers: Cost (MK)
Breathalyzers are used both by law enforcement and for personal use. They are easily obtainable over the internet. Websites like Amazon sell them with prices ranging from five dollars to well over one hundred dollars. Just like with anything else, before purchasing such an item, background research must be done on the product.

The sensors in breathalyzers is a major focus when evaluating which one to purchase. There are two types of sensors in breathalyzers: fuel cell sensors and semi-conductor sensors. A sensor is the part inside of a breathalyzer that reads and interprets your %BAC. At higher levels of BAC (over the legal limit of .08%) fuel cell sensors give more accurate results but they’re also more expensive. The cost of a good quality fuel cell sensor breathalyzer varies between $250 to $1500. As with all products, the higher the cost the better the quality for both types (fuel cell and semi-conductor sensors). The types of breathalyzers used by law enforcement are the more expensive fuel cell breathalyzers. Semi-conductor sensor breathalyzers are cheaper in price and the cost ranges between $55 and $250. Some advantages of fuel cell sensors over semi-conductor sensors include: fuel cell sensors don’t show a false positive for diabetic people or for people on a low calorie diet (Semi-conductor sensors sometimes show a false positive in these 2 scenarios), fuel cell sensors are more accurate and consistent than semi-conductor sensors (fuel cells give the same BAC test result when you test someone repeatedly in a short amount of time and are more accurate at higher %BAC levels), fuel cell sensors remain accurate for up to thousands of tests while semi-conductors are not, and finally fuel cells are more precise because the %BAC levels are displayed to the thousandth decimal while semi-conductors are displayed to the hundredth decimal. Fuel cell sensor breathalyzers are used by law enforcement, substance abuse clinics, and businesses while semi-conductor sensor breathalyzers are generally used by individuals for self testing.

**Breathalyzers: Calibration** (MK)

Since the breathalyzer contains a chemical reaction it is important to make sure it is calibrated correctly at all times. The sensor in a brand new breathalyzer (for both semi-conductor and fuel cell) is automatically calibrated (setup/programmed/planned to determine the correct range) at the factory it was produced in to give accurate readings. The more a breathalyzer is used over time the less accurate it becomes because residue builds up on the sensor and this causes it to give inaccurate readings. All breathalyzers have to be recalibrated every 6 to 12 months. To recalibrate you pack up your breathalyzer and ship it back to the manufacturer at a cost between $20 to $50 plus shipping and handling.

**Breathalyzers: Sanitation** (MK)

Law enforcement uses professional level breathalyzers with fuel-cell sensors that give the highest level of accuracy. Since law enforcement uses only the most accurate and expensive types of breathalyzers, they must use a brand new, unopened, sterile mouthpiece each time in between uses for safety and performance reasons. To keep up with the use, law enforcement replace the mouthpiece after each testing and screening. Another popular choice instead of replacing the mouthpiece with each use is to instead use disposable breath alcohol testers. One brand of disposable breath alcohol testers are called BACtrack Singleshot. They come in three different %BAC thresholds, .02%, .05%, and .08%. The user of the BACtrack Singleshot
activates the tube tester, blows into it, and the crystals inside the tester change color to indicate a positive or negative result based on the %BAC. For example, a BACtrack Singleshot .05% indicates a positive by changing colors when the %BAC in the breath is at .05% or higher.

Our Study (BH)

Our proposal will focus on young adult, college students who tend to go out and have a couple drinks and then get behind the wheel. These individuals may feel like they are fine but in all actuality their BAC level may be greater than expected. Each individual will complete a survey based on their drinking habits. The survey will ask questions regarding how many drinks they usually consume, how many drinks they consume if they are driving, the time interval that they are out, if they wait before driving home (if so how long) and additional related questions. We will compile the surveys and make general assumptions based on statistical tests. From there, we will monitor subjects as they drink in a bar setting. We will keep track of how many drinks they consume. It will also be important to note how much alcohol the bartender puts in a mixed drink. We will be able to get a general understanding of how much alcohol is in the drink by doing a pour count. A pour count is done by counting each second the alcohol is being poured into a drink. Each “drink” should have a pour count of two. As it does not seem very accurate, it actually is by a trained bartender. After each drink we will ask subjects to blow into the breathalyzer. We will record each value. We will ask the individual’s to tell us when, if they were driving, they would be driving home. We will take a final BAC level reading.

Community Action Plan: Part I (BH)

Each participant will have the benefit of knowing where their BAC levels stand after the completion of the study. The subjects will more accurately know how to assess their body’s tolerance. We will try to take note of physical cues that the individual is doing at certain BAC levels to try and help them understand where their perception actually lies. It will give them a framework on how their body responds to alcohol.

Community Action Plan: Part II (BH)

On the larger scale, we hope that bars will take additional steps to make their guests understand how important it is not to drive home. To help increase awareness to a large number of people, we will propose a legislative bill that requires signs to be posted on what is considered a “drink.” We also think that the charts, like the one mentioned previously, which have weight and drinks consumed on it should be posted in bars. A good place to put them could be in the men and women’s bathroom and at all exits. It is a place that everyone uses and people would have it at their disposal.

Community Action Plan: Part III (BH)

We also plan to propose a second legislative bill that would require all establishments that sell alcohol to have a breathalyzer on premise and be used if a guest requests it. We also hope to advocate to bar owners, based on statistical evidence, that each bar would benefit greatly from owning a breathalyzer. It would be a small investment but could ultimately save lives. It
should definitely be something that bars have at their disposal if requested by one of their guests. It is like a boat having those blow up safety vests. Many times you may not use them but when you actually do they are, by law, at your disposal for your safety.

Drinking and driving is an issue that must be taken seriously. The amount of accidents due to drinking and driving can easily be avoided as long as individuals take the initiative and become responsible. They need to learn the correct perception of their body’s tolerance and be able to make the responsible decision not to get behind the wheel.

References (BH)


Patrick N. Friel, John S. Baer, Barry K. Logan, Variability of Ethanol Absorption and Breath Concentrations During a Large-Scale Alcohol Administration Study, Alcoholism: Clinical and Experimental Research, 1995, 19, 4


Appendices (BH)

Cover Letter to Congress (BH)

Dear New Jersey Senators,

An Act to decrease the amount of drunk driving accidents and to help monitor individuals blood alcohol concentration (BAC) by making it mandatory that all establishments in which alcohol is consumed have a breathalyzer at the disposal of customers upon request as well as a BAC Monitor Chart.

Operating a motor vehicle under the influence of alcohol can lead to obvious serious consequences from anything up to death. Due to the serious implications that arise with alcohol consumption, there is a federal law which makes it illegal to operate a motor vehicle with a certain blood alcohol concentration (BAC). In the United States, the legal limit of BAC is 0.08% along with a zero tolerance policy for those individuals caught under the age of 21. Although many are made aware that there is a legal limit of 0.08%, it is necessary that additional measures are taken to provide people with some understanding on where their BAC is before they get behind the wheel. This could be accomplished by making it mandatory that all establishments where alcohol could be bought and consumed have two precautionary measures to help ensure guest’s safety. First all establishments should have breathalyzers on premise and at the disposal of customers if requested and secondly they should have BAC Monitor Charts to help individuals indicate their BAC based on weight and drinks consumed.
Breathalyzers are a device that is commonly used by law enforcement officials to test an individual’s level of intoxication. A breathalyzer is beneficial because it gives a quantitative assessment. When people prepare to get behind the wheel all they have is their personal assessment of how they perceive they feel.

The “Breathalyzers for Safety Act” should be enacted to make it mandatory for all establishments where alcohol is consumed to have breathalyzers made available to patrons who wish to learn their BAC before getting behind the wheel. The breathalyzers could help in any liability issues that could arise from a customer leaving the premise intoxicated as well as safety precautions for all guests. Establishments would have the right to offer a breathalyzer test to those they deem are intoxicated above the legal limit. If refused, guests would have the option to sign a waiver indicating refusal which would further make the serves not liable.

The “BAC Chart on Premise” Act would provide an aesthetically appealing chart which would allow individuals to compare the number of drinks consumed to their personal body weight to get an understanding where their BAC level falls. It is a way for individuals to have a general understanding of their BAC after every single drink consumed. This is a proactive way to inform individuals and let them make better judgment calls before getting behind the wheel.

The “Breathalyzers for Safety Act” and “BAC Chart on Premise” are potential new additions that would improve the safety of the United States citizens by providing individuals with the information they need before making a decision to get behind the wheel.

Sincerely,
Brittany Heil
Dr. Julie Fagan

Below is a project proposal that could be submitted to the Human Subjects Institutional Review Board at Rutgers University for review. It was decided by the authors not to proceed with this study, but to write to our legislators to consider putting in legislation concerning breathalyzers and knowledge of blood alcohol content (above).

HUMAN SUBJECTS RESEARCH PROTOCOL – E12-342

I. TITLE: Personal Awareness of BAC Levels While Drinking Alcoholic Beverages

II. OBJECTIVES:
The main objective of this study is to examine whether people are able to accurately determine their Blood Alcohol Content (BAC) after a period of drinking.

III. BACKGROUND AND RATIONALE:
Almost every high school student in the United States completes a course in Driver’s Education in high school. In this course the rules of the road are discussed with an emphasis on driving while intoxicated. I feel that while it gives students a general understanding of how much harm could be caused while drinking and driving it is not really practical to many high school
students due to the facts that they legally are not able to drink and if they are underage drinking they, realistically, are not mature enough to know their limits. This transpires to young adults and the point where they decide to get behind the wheel. Are we, as young adults, now mature enough to know our limits? Are we able to accurately drive under the legal limit BAC of 0.08? Is the legal limit a safe value to operate a motor vehicle at?

The point at which an individual is considered to be impaired due to alcohol is when their blood contains 0.08 grams per deciliters of alcohol or more. According to the U.S. Department of Transportation, in 2010 alone there were 10,228 fatalities in car crashes involving a BAC over the legal limit of 0.08. This accounted for 31% of the total traffic fatalities for the entire year. That is an extraordinary number for something that could be easily avoided.

Many people are aware of the Blood Impairment Chart for both men and women. It explains what a “drink” is. Generally “one drink” is equal to 1.5oz of 80 proof liquor, 12oz of regular beer and 5oz of wine. While that is a good general understanding and can be used in a chart which correlates to personal body weight it is not very accurate and leave a lot of room for error. Things not considered when looking at a chart would be fat content, how often the individual drinks or does not for that matter, and the functionality of the liver (metabolizes the alcohol) among many other things.

My purpose in conducting this study is to see if people are able to know where their BAC levels are based on how they feel. I hypothesize that if people are continuously tested then they could learn when they start to feel a certain way they are above the limit. This may give individuals the realization of what they think they can handle and what their body can actually handle.

IV. PROCEDURES
A. Design:
1. Subjects will take a survey for comparative reasons
2. Subjects will be asked to consume alcoholic beverages as if they would normally
   a. BAC levels will be tested with a breathalyzer after the completion of each drink
   b. Subjects will be asked to tell us when they feel they are capable of driving a motor vehicle
      i. BAC will be taken at this point
B. Sample: The study will be performed on human subjects.
C. Measurement/Instrumentation:
  1. Breathalyzer
  2. Data on what each drink is and the number of drinks consumed
D. Location:
   1. Bars in the New Brunswick, NJ area including Knight Club, Olive Branch, and Golden Rail
   2. Bars in Asbury Park, NJ including Johnny Mac’s, Porta, and Brickwall
   3. Bars in Belmar, NJ including Bar A, Connolly Station, and Boathouse
E. Detailed Study Procedures:
   The study will begin with subjects completing a general survey concerning their drinking habits. Subjects will be asked at random. The second part of the study will take place in a bar setting. Subjects will consume alcoholic beverages and we will document every time they get a new drink. After each drink they will be asked to blow into a breathalyzer. The BAC will be
recorded. The subjects will also be asked to tell us when they think they would be able to drive home. A final BAC will be taken. At the completion of the study we hope to educate drinkers on their BAC level and relate it to how they feel. We hope drinkers will be more knowledgeable before getting behind the wheel.

F. Consent: The study will be explained to the subject by the student principal investigator, the consent form will be read to them and any of the subject’s questions will be answered. Participants will be offered the informational sheet below. The student researcher will say: “This research study is being conducted as part of a class project at Rutgers University which has been approved by the Human Subjects Institutional Review Board under protocol # E12-342. The study involves only a survey to be filled out that is both anonymous and confidential. Your participation in this study is strictly voluntary. The student researcher has been approved by the Rutgers Institutional Review Board to conduct the research. The consent will be read, and your questions answered. By giving verbal consent, you will be agreeing to participate in the study that you are over the age of 21.”

G. Internal Validity: There is no true potential to study bias. Results of the surveys will be quantitatively analyzed by the company that produces the survey.

H. Data Analysis:
   Some statistical tests will be done on the survey and on the actual individuals BAC level including averages, standard deviations, probability, histogram analysis.

II. BIBLIOGRAPHY

Patrick N. Friel, John S. Baer, Barry K. Logan, Variability of Ethanol Absorption and Breath Concentrations During a Large-Scale Alcohol Administration Study, Alcoholism: Clinical and Experimental Research, 1995, 19, 4

Informational Sheet

Personal Awareness of BAC Levels While Drinking Alcoholic Beverages
Authors: Julie Fagan, Ph.D with students Brittany Heil and Mel Karabas

INTRODUCTION: You are invited to voluntarily participate in a research study that will measure your alcohol consumption habits.

INFORMATION:
   Many studies have been conducted to measure what a safe blood alcohol level should be. Currently the legal BAC is 0.08 grams per deciliters of alcohol. Many studies have looked at the effects that this level has on an individual’s ability to function. We are interested in the relationship between perceived intoxication and BAC level. A similar study was conducted by
Airhihenbuwa et al. where they looked at the relationship between the subjects perception of their own intoxication, impairment and how it is related to BAC levels. The study used fifteen subjects ranging from 21-40 in age and recorded BAC level, reaction and anticipation times. They concluded that their perceived intoxication was somewhat related to impairment but not to BAC.

Drinking and driving is a very serious issue and people should not only be aware of their BAC levels but also at what rate the alcohol eliminates from the body. Research done by Friel et al. showed that the peak of alcohol absorption occurs 10-91 minutes after drinking. This knowledge could be very effective when examining individuals BAC levels as they continue to drink.

The goal of this study is to examine closely how people perceive they feel and how their body actually feels. We hope to gain credible knowledge through this study and increase awareness that everyone can relate to.

BENEFITS: You will not receive any direct benefit for participating in this research. However, it is expected that the research will provide scientists with a better understanding of individual’s knowledge of when they reach the legal drinking limit of 0.08.

RISKS: This study includes a survey and BAC levels using a breathalyzer. The breathalyzer will use non-reusable sanitized mouth strips.

CONFIDENTIALITY: This research is completely anonymous. No information will be recorded that could identify you.

COMPENSATION: You will receive no monetary compensation for participating in this study.

RESEARCH QUESTIONS: If you have any questions regarding the study, you may contact Dr. Julie Fagan at 848-932-8354 or email her at Fagan@rci.rutgers.edu

SUBJECT RIGHTS: If you have any questions about your rights as a research subject, you may contact the IRB Administrator at Rutgers University at: Rutgers University Institutional Review Board for the Protection of Human Subjects; Office of Research and Sponsored Programs; 3 Rutgers Plaza; New Brunswick, NJ 08901-8559; Tel: 848 932 4058; Email: humansubjects@orsp.rutgers.edu

The Survey

Please Circle the answer you feel best fits your habits:

1. Do you consume alcoholic beverages?
Yes  No

2. What is the total duration you spend out at bars while drinking (hours)?
0  1-2  3-4  5-6  6+

3. If you are NOT driving, how many drinks* will you consume on average?
4. If you ARE driving home, how many drinks* will you consume on average?
0                       1-2                  3-4                  5-6                  6+

5. If you ARE driving home AND driving friends home, how many drinks* will you consume on average?
0                       1-2                  3-4                  5-6                  6+

6. Do you think that you can tell when you should stop drinking if you are driving home?
Yes                      No

7. How much time do you leave from your last drink until the time you get behind the wheel (hours)?
0                       1-2                  3-4                  5-6                  6+

8. What do you think your BAC level is when you drive home (if you have been drinking)?
0                     0.01-0.02        0.03-0.04        0.05-0.06        0.07-0.08        0.09+

**Keep in mind “one drink” is equal to 1.5oz 80 proof liquor to 12oz of general beer to 5oz glass of wine**

Letters To The Editor: (BH)

Dear (editor),

As a graduating student at Rutgers University I have had the opportunity to apply my knowledge that I have learned through the years in hopes to better the community. Being part of a University with such a large student body in the city of New Brunswick, New Jersey with countless bars sparked my interest in alcohol safety of my fellow classmates.

Drinking and driving is a serious issue that occurs all over the world. Anyone could make one bad judgment call and put not only themselves but many others at risk. I believe it is imperative to take the steps to commandeering this poor decision from being made.

I believe with the right precautionary measures the community can become a safer place when it comes to drinking and driving. I propose to legislator that every bar, by law, should have two items in it. First, I propose that every bar, tavern, restaurant ect. which sells alcohol should have a breathalyzer on premise. They should be at the disposal of guests if they request it. Second, I propose that every public place where alcohol can be consumed have a chart like the one listed below. Both of these two items would allow people to practice better judgment on where their blood alcohol concentration stands.
I feel that if individuals need to be given the opportunity to practice caution when they are thinking about getting behind the wheel. By giving individuals the option to know their blood alcohol concentration they are able to make better judgment calls about getting behind the wheel after drinking.

Sincerely,
Brittany Heil

To The Editor,

Subject: Making Breathalyzers Legally Mandated in all Bar and Club Establishments in New Jersey

My Name is Mel Karabas and I am a senior at Rutgers University in New Brunswick. I am an Animal Science Major and currently taking an Ethics course with Dr. Julie Fagan. While meeting other students in the class, I joined the group that was interested in the drunk bus at Rutgers University. The drunk bus is service offered by the University that picks up and drives students that are too intoxicated to go home by other means. When the regular University bus services stop working around 2:00am and students that have been drinking either at bars, clubs, house parties, and fraternity parties leave these establishments and are either too intoxicated to drive home, they use the drunk bus service offered by Rutgers. But for people that are not Rutgers University students and leave establishments and have had a few alcoholic beverages but don't believe they are too intoxicated to drive home anyway, my group wondered how we could prevent this from happening and came up with a relatively simple solution. Let's make the places that serve alcoholic beverages be required to carry and offer breathalyzers on the premises to their customers. If breathalyzers were widely available and free for customers, a person could simply ask to use one from the bartender, see what their %BAC level is, and if it's over the legal
limit then they would know that its illegal for them to drive right that second and they could simply wait it out or use taxi services to get to their destination.

Mel Karabas  
Graduating Class of 2013  
Rutgers University majoring in Animal Science  
School of Environmental and Biological Sciences  
Dr. Julie Fagan, Professor at Rutgers University