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College Students' Alcohol Consumption Habits, Perceptions, Readiness to Change and Exposure to a Brief Information Based Intervention

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to a Brief Information Based Intervention

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Abstract

The current study sought to compare the effectiveness of two brief information based interventions. The first exposed to participants information regarding accurate social norms college student alcohol consumption and a second which focused on information regarding the effects of alcohol on the brain and body. The effectiveness of the interventions was investigated by comparing initial scores on the Readiness to Change scale (RTC; Rollnick et al. 1992) to scores on the same scale after a two week follow up. It was hypothesized that the groups who received the intervention would both show significant increases in scores on the contemplative and action subscales of the RTC scale and decreases in pre-contemplative score in comparison to the control group. The results found that there was a significant reduction in scores on the pre-contemplative subscale of the RTC scale in the social norms group, but no other significant differences between baseline and follow up were found. Perceptions of student drinking habits were also compared to the drinking habits of the owners of those perceptions. Results found that the amount of drinks participants perceived the typical student to consume per week was significantly correlated with reports of the number of drinks which an individual reported themselves to be consuming and the number which they reported their best friend to be imbibing per week. Perceptions and habits were recorded using the Drinking Norms Rating form (DRNF; Baer at al. 1991) and the Daily Drinking Questionnaire (DDQ: Collins, Parks & Marlatt, 1985). Additionally significant differences in perceptions of the physiological effects of consuming alcohol were found according to self reported weekly drinking totals. Individuals who reported moderate-heavy levels (defined as 13-19 drinks in a typical week) of drinking were significantly less accurate in their perceptions of the physiological effects of alcohol than moderate drinkers (6-12 drinks in a typical week), according to a scale created by the researchers (BCBDS; Boudreau & Grahn, 2013).

Introduction

Alcohol use on college and university campuses in the United States is not only identified as a major public health concern by the U.S. Surgeon General and the U.S. Department of Health and Human Services (USDHHS) but has also been the object of much scientific research such as the work done by the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Even with all the attention turned towards alcohol use the culture of consumption in institutions of higher learning is something which has proved difficult to alter. These universities and colleges exist within the culture of the United States which has been familiar with the use of alcohol since its beginnings and prior to them.

The ensuing pages will contain a brief history of alcohol use in antiquity and in the United States. The development of the modern American disease model of alcoholism and its relation to clinical diagnoses will be examined. Additionally there will be an investigation alcohol's effects on the brain and body as the perceptions of these effects in college students is a focus of the current study. This introduction will also review some of the literature on the influence of perceptions of social norms in alcohol consumption. Lastly different methods of intervening with risky college student alcohol consumption will be reviewed including exposure of information regarding accurate social norms of drinking behavior.

There is some evidence which suggests that the intoxicating beverage known as alcohol has been in use in human culture and society for thousands of years. In the ancient Mesopotamian civilization the code of Hammurabi, put in place around 1700 B.C., laid down specific laws on the prices, quantity and distribution of alcohol by tavern keepers. (Mandelbaum, 1965) In record history it seems that the cultivation of alcoholic beverages coincided with the burgeoning of advanced civilization: "The appearance of beer has been regarded by some as an

indicator of social complexity—the rather prosaic knowledge of brewing being regarded as a sign of civilized behavior" (Joffe, 1998, p. 297). So it seems that in many human societies which have become "civilized", alcohol has played a role, and its use needed to be regulated. There are passages from the Old and New Testaments of the Bible which warn against the immoderate use of wine.

In the United State in the 19th century there were many movements aimed at combating the problematic use of alcohol. Alcoholic beverages had become common place in the early 19th century for reasons having simply to do with health and the availability of clean and safe beverages:

> Americans drank because they believed that, when taken in moderate doses alcohol was not only safe but actually beneficial to their health. Water was held in low regard as a beverage, even when it was clean it was thought to no nutritional or digestive value. The supply of milk was inconsistent and extremely perishable. Beer did not keep well and wine was uncommon. Coffee and tea were expensive, whereas whiskey was pure, pleasurable and in the 1820s cost twenty five cents per gallon. (Pegram, 1998, p.9)

The use of whiskey began with those individuals who worked outside and found that it warded off the cold, but soon its use moved into the taverns and saloons where working class men found masculine companionship and relief from dangerous jobs and crowded tenements (Pegram, 1998, p. 104). By the dawn of the 20th century saloons had become associated with crime and social disorder. Many temperance movements including the one promoted by the Women's Christian's Temperence Union (WTCU) fought against the saloon culture in which many men were drinking heavily and causing marital and familial problems. These efforts culminated in the passing of the eighteenth amendment prohibiting of all alcoholic beverages, deemed as America's noble experiment. Thirteen years after its passage, the twenty-first amendment to the

United States constitution repealed the sanctions of the eighteenth. Prohibition did not work, a nation founded in liberty did not respond so kindly to having its rights taken away.

In the years following the repeal of prohibition the moral stance towards abusers of alcohol gave way to a conception of alcoholism as a disease. According to Miller and Sanchez (1994) this disease model was welcomed by the public because it removed stigma from alcoholics. Those who were previously viewed as sinful under a moral model were now seen as sick and treatable. The disease conception may have its value in providing treatment for those individuals who have been diagnosed with alcohol problems, however, the distinct criteria for meeting these diagnoses seemed to create a sort of black and white dichotomy between alcoholic and not. Jellinek (1960), cited in Miller and Sanchez (1994), argues that an overextension of the American disease conception of alcoholism would undermine social sanctions against intoxication. Social sanctions against alcohol consumption have been removed because it is not the public's job to determine who is using in a problematic fashion; it is the task of professionals.

It seems as though the model has persisted into the present day. The APA's (American Psychological Association) fourth edition of the Diagnostic and Statistical Manual published in 1994 has specific criteria for the diagnosis of problematic alcohol use. An individual will only be diagnosed as in need of treatment or support if a licensed clinician deems them to meet the sufficient conditions to be classified as abusing or dependent upon the substance of alcohol. Alcohol abuse and dependence are placed in the same manual which is used to diagnose various mental illnesses such as depression and anxiety, dubbing a person who has a problem with alcohol as mentally ill. These diagnostic classifications, though intended to help identify those individuals who have a serious problem with their alcohol use and are in need of treatment, may

actually be contributing to unsafe use by those individuals who feel they are not in danger of meeting the criteria.

The plans for the 5th version of the APA's DSM hold hope for a movement away from the disease model of alcoholism. The new version proposes the replacing the two different diagnoses of dependence and abuse with a single alcohol use disorder continuum. This new diagnostic tool should be able to identify those individuals who may not have met the criteria for abuse or dependence but still has some problematic use of alcohol. A continuum should help to remove the dichotomy between alcoholic and not.

A study by Hagman and Cohn (2011) of which type of criteria would better fit the college student population found that a single factor model as proposed by the DSM-V was a better fit than the two factor model proposed by the DSM-IV. In Hagman and Cohn's study, a sample of 396 college students rated the severity of each individual criterion, e.g. tolerance, withdrawal and legal consequences. These ratings showed that the severity of the criteria was not equal to the abuse-dependence hierarchy and that a continuum which encompassed all the criteria from both DSM-IV factors may be more beneficial in providing diagnosis to more students.

Though the changes in the APA's DSM are a step towards a more encompassing conception of issues with alcohol, a dichotomous viewpoint toward alcoholism is currently persistent in American culture. The college setting seems to be unique in the permission of certain behaviors regarding alcohol use which may be seen as problematic in other settings. Lowinger (2012) found that college students perceive alcohol problems as significantly less serious than problems with other drugs and are significantly less willing to seek psychological treatment for issues relating to alcohol use.

Alcohol Related Problems on Campus

There have been regulations associated with immoderate alcohol use since its initial cultivation in ancient societies. Problems relating to alcohol use persist to this day and the following section will briefly outline some of the harms which are specific to alcohol consumption on college campuses. These issues are valuable to in demonstrating the need for research on intervening with risky drinking college students.

Vandalism. A 1991 study of 4,845 students from 68 colleges and universities found that one in ten students had engaged in vandalism while under the influence of alcohol in the past year and that nearly one quarter of heavy drinking students had engaged in vandalism (Engs and Hanson, 1994). It is not clear whether students damage property because they are drinking heavily or that those students who are more likely to vandalize are also more likely to drink heavily.

Unprotected Sex. Kiene et al. (2009) found that alcohol consumption increased the likelihood of unprotected sex with casual but not steady partners.

Academic Performance. In the college setting it has been found that heavy alcohol use is associated with certain academic problems such as missing an assignment or performing poorly on a test (Perkins 2002), however overall student grade point average (GPA) has not been found to be significantly correlated with drinking patterns (Paschall and Freisthler, 2003).

Social Norms Theory

Though there are many problems associated with alcohol use on college campuses, some students either do not see these problems as significant enough to change their behavior or may not be fully aware of them. The following section will investigate the well supported social norms theory which attempts to explain one of many influences on student alcohol consumption.

Social norms theories suggest that individuals are heavily influenced by what they perceive to be the norms of the groups which they identify with: "Indeed, norms can be powerful agents of control as "choices" of behavior are framed by these norms and as the course of behavior most commonly taken is typically in accordance with normative directives of "reference groups" that are most important to the individual" (Perkins 2002, p. 164). There is evidence for the influence of group norms in studies on conformity such as the experiment done by Solomon Asch in 1951, in which a participant was placed in a room with six confederates who all gave the incorrect answer about the length of a line. Participants were found to also give that incorrect answer even if they knew it was incorrect. Evidences such as these can show us that perceived social norms can be powerful things, even if an individual student may have some reservations about consuming alcohol or consuming in excess, they may quiet these reservations in submission to the perceived norms.

Perkins (2002) found that peer norms were better predictors of undergraduate alcohol consumption than parental influences, perceived faculty norms, residential advisor norms, or lingering religious sentiments. This evidence places peer norms as one of the strongest predictors of consumption among undergraduates. Lewis and Neighbors (2004) studied the perceptions of gender specific drinking norms as compared to reported drinking norms in 115 men and 111 women. Their results demonstrated that as previously found by (Perkins & Berkowitz, 1986 cited in Lewis and Neighbors, 2004), students overestimated the frequency and quantity of drinking by their non-gender specific and gender specific peers. They found that perceived same-sex norms were greater predictors of drinking behavior for women than for men.

Halim, Hasking and Allen (2012) investigated the relationship between perceived social norms and alcohol consumption. They gave electronic surveys to 229 university students and

found that those individuals who drank at higher levels were more likely to perceive others as drinking at higher levels. The researchers also found that high risk drinkers were less likely to perceive the typical student having 4 or fewer drinks at a bar. These perceptions by high risk drinkers did not fit with reports that 46% of the respondents in the Halim, Hasking and Allen (2012) study reported having 3 or fewer drinks on a typical day in which they were drinking.

Perkins and Craig (2012) found that student athletes' perceptions of peer athlete consumption were heavily influential in individual consumption. A study of over four thousand student athletes from 15 different institutions found that student athletes tended to overestimate student drinking norms. The researchers also found that perception of the male student athlete drinking norm was the best predictor of drinks consumed for both genders. The perception of female student athlete drinking was also influential but not as influential that of the male. In the same study the authors also found that a campaign to provide accurate student drinking norms to student athletes was successful in reducing risky alcohol use among this population.

There seems to be a common theme in many of the motivations for college student alcohol consumption and that theme could be described in the following way: perceived norms about alcohol's effects and rates of consumption may be more influential than the actual rates of consumption and effects of alcohol. In terms of social norms, a student's overestimation of the rate and frequency of consumption is more influential than the actual rates and frequencies.

Health Effects of Alcohol

To accurately gage if students are in fact misperceiving the effects of alcohol on the brain and body, in a similar way to that they are misperceiving the norms of peer drinking habits, it may be beneficial to review some of the literature pertaining to the effects of alcohol on physical and mental health.

Alcohol is lipid soluble, and therefore can easily pass across membranes in the human body. "Administered orally, alcohol flows into the stomach where about 20% of the alcohol is absorbed into the bloodstream through its lining; the remaining alcohol is absorbed through the lining of the small intestine" (Kuhn , Swartzwelder, and Wilson, 2008, p. 36). Once in the bloodstream the alcohol has free reign to travel to the brain.

Alcohol's effect on the central nervous system can be characterized as biphasic, with an initial stimulant phase followed by a longer sedative phase (Breedlove, Watson and Rosenweig, 2010). The drug accomplishes these two effects through its influence on a number of different neurotransmitter systems, including the GABA, short for gamma-aminobutyric acid, glutamate and dopamine systems. Neurotransmitters are the chemical messengers which brain cells (neurons) use to communicate with one another.

GABA is an important inhibitor; its effects are widespread throughout the central nervous system. When alcohol reaches its target site, the brain, it enhances the effects of GABA on the GABA receptors. These receptors are located on the synapses (connections) between neurons. Alcohol enhances the inhibitory actions of the GABA receptors in the prefrontal cortex an area of the brain known to be responsible for planning, decision making, and social moderation. By in effect turning off the mechanism which normally moderate individuals in their executive functioning alcohol is argued to reduce social inhibition (Vengeliene et al., 2008). Additionally, enhanced inhibition of GABA in the cerebellum can lead to an impairment of motor coordination associated with the overuse of alcohol.

Along with its effects on the GABA neurotransmitter system, alcohol also has an effect on the dopamine system. The dopamine system includes the brain areas of the nucleus accumbens and the ventral tegmental area. Along with a sedated and disinhibited state, low doses

of alcohol can stimulate the dopamine pathway produce a mild euphoria (Breedlove, Watson and Rosenweig, 2010). This euphoria has been hypothesized to be a factor in the addictive nature of alcohol in humans. Animal models have shown that alcohol acutely affects neurons in the nucleus accumbens by increasing their firing rate (Brodie, 2002). This result has also been replicated in observations of the PET (positron emission tomography) studies in humans who were consuming alcohol (Boileau, 2003). In the long term, rodent studies have shown that chronic exposure to alcohol leads to an increase in dopamine uptake in neurons in the Nucleus Accumbens. This increase in dopamine uptake is hypothesized to be due to an increase in extracellular dopamine from chronic exposure to alcohol (Budygin et al., 2006).

　　　　After having reviewed how alcohol produces certain effects in the brain it may be valuable to investigate the effects of alcohol misuse on the developing brain of young adults, as this is the population of interest in the present study. The human brain continues its development into early adulthood. One specific area that is particularly late in development is the prefrontal cortex, an area of the brain which is responsible for judgment and inhibitory control. In the human cerebral cortex there seems to be a net loss of synapses from late childhood until mid-adolescence. This synaptic remodeling is evident in thinning of grey matter in the cortex as pruning of dendrites and axon terminals progresses (dendrites and axon terminals are the components which form connections between cells in the brain). The thinning process continues in a caudal-rostral (back to front) direction during maturation so the prefrontal cortex is affected last. Since the prefrontal cortex is important for inhibiting behavior, this delayed brain maturation may contribute to teenager's impulsivity and lack of control. (Breedlove, Watson and Rosenweig, 2010) These impulsive traits in adolescents and young adults may make it more likely for them to abuse alcohol if it is available. Excessive alcohol use by adolescents can have a

negative impact on brain structures causing important short and long term cognitive and behavioral consequences.

The incomplete development of the pre-frontal cortex could contribute to some young adults' impulsivity, lack of concern for negative consequences, sensation seeking and risk taking. These behaviors and tendencies related to development are possible contributors to the initiation and continued risky use of alcohol: "the relatively late development of the PFC circuits involved in judgment and inhibitory control may underlie the propensity of adolescents to impulsivity and to the ignore the negative consequences of their behavior, both of which could increase the risk of substance abuse" (Alfonso-Loeches & Guerri 2011). The adolescent and young adult brains are also particularly susceptible to alcohol's toxicity at a neural level. Studies show reduced volumes in the hippocampus, a brain area related to learning and memory, in adolescents who began drinking at an early age.

The effects of alcohol on learning and memory have been documented by a number of scientific studies. The following are specific to college-aged individuals. Sanhueza, Garcia-Moreno and Exposito (2011) found that Spanish moderate and heavy drinkers aged about 19 years performed similarly to a group of elderly non drinkers (average age of 69) on a series of neuropsychological tests (including tasks that measure memory and executive functioning). These same Spanish moderate and heavy drinkers performed worse on the neuropsychological tests than their non-drinking age matched peers. Another study by Hartley, Elsabagh and File (2004) found that binge drinking British University students aged 18-23 performed worse than non-drinking controls in tests of sustained attention, episodic memory and planning ability.

Mental Health. Hartley, Elsabagh and File (2004) also found that the British binge drinkers also had higher levels of self rated anxiety and depression as compared the non-drinking controls.

The relationship between alcohol use and anxiety and depression is important to investigate as these are two relatively common mental illnesses for college students.

Depression. Depression is an important issue for college students, because it is a mental illness which affects so many students. Studies have shown that about 30% of college students report that in at least one time in the last 12 months they felt so depressed that it was difficult to function while only 11% of students reported that they had been diagnosed with depression by a professional (NCHA 2011). These evidences point to a lack of support for students suffering from depression in the college setting and the prevalence of alcohol misuse may exacerbate depressive symptoms among students who drink.

A study of 424 Boston area young adults found that 6.8 percent of respondents met diagnostic criteria for Major Depression (MD) and 8.2 percent met criteria for alcohol abuse. The researchers found that subjects who reported a history of alcohol abuse were four times more likely to have been diagnosed with depression than those individuals who did not report abusing alcohol (Deykin, Levy, & Wells 1987). The same study also found that the initiation of alcohol abuse tends to follow rather than precede the onset of depression. This evidence suggests a complicated relationship between alcohol and depression; and that individuals may be self-medicating with alcohol. A study by Gorka, Ali and Daughters (2012) found that in a sample of 150 adults depressive symptoms were found to be associated with problematic alcohol use in individuals with low but not with high distress tolerances. Implications of this study for college aged students may be that individuals in a college setting who have a low tolerance for distress and are experiencing depressive symptoms, may be more likely to take part in problematic alcohol use.

Anxiety. Anxiety is another mental illness that is prevalent among college students. 6.6% of men and 14.5% of women report being diagnosed with anxiety by a professional (NCHA fall 2011). A study by Faulk et al. (2008) found that of the nine different major anxiety disorders, the phobias are likely to have an onset prior to an alcohol use disorder (AUD) in individuals who have been diagnosed with both of these disorders. This evidence suggests that in the case of social or specific phobias individuals may be using alcohol to self medicate or as a way of coping with the tension which arises for them in social situations. Battista, Macdonald and Stewart (2012) conducted a controlled experiment with socially anxious participants to investigate the extent to which alcohol played a role in their behavior in a social situation (answering the questions of a confederate). The researchers found that those individuals who were given alcohol were observed to spend more time talking than the participants in the no-alcohol group. The confederates were also found to behave more warmly to those participants who drank alcohol, even though the confederates were also blind to the participant condition. Though time talking was just one of the four safety behaviors of typically anxious people which were coded for in observation of the participants, these results help to explain why socially anxious people may find alcohol useful in socially stressful situations.

Generalized anxiety disorder, on the other hand, was found by Faulk et al. (2008), to be 4.6 times more likely to occur after, rather than before an AUD. In individuals with GAD the alcohol abuse may in fact play a causal or exacerbatory role in the development of GAD. There is some evidence that chronic alcohol abuse can play a role in affecting certain brain areas, such as the amygdala, which have been found to be associated with a person's fear response (McCool, Christian, Diaz and Lack, 2010). Also individuals, who may have a genetic disposition for the

development of GAD, may increase their risk for its development by following along with what
is perceived as a normal pattern of binge drinking, prevalent among college students

Physical Health. Though alcohol is known as a mind altering substance, its effects are
not limited to the central nervous system.

The Liver. The liver breaks down most of the alcohol a person consumes. But the process
of breaking alcohol down generates toxins even more harmful than alcohol itself. These
byproducts damage liver cells, promote inflammation, and weaken the body's natural defenses
(NIAAA, 2010). Heavy drinking can cause fat to build up in the liver, and if the heavy drinking
is continued over time it could lead to an inflammation of the liver which could inhibit its
function. A study of patients in the United Kingdom, hospitalized with alcoholic liver disease,
found that these individual's drinking habits consisted of heavy drinking daily, or at least four
times a week for a number of years (Hatton et al. 2009). The authors of this study found that
these daily or almost daily drinking patterns were more frequent than the binge drinking habits of
university students. From the point of view of a disease conception of alcoholism (explained
further below) this connection between heavy daily drinking and liver disease minimizes the
perceived risk of liver disease for the average binge drinking college student. However, it may be
argued that this perceived lower risk may contribute to higher rates of binge drinking and
problem drinking later in life.

The immune system. Chronic heavy alcohol use has been found to impair white blood
cell function, namely their ability to fight off harmful bacteria (NIAAA 2010). The chemical
messengers used by white blood cells are also found to have their function affected by chronic
alcohol use. Chronic alcohol abuse has also been linked to an increased susceptibility for
infection of HIV/AIDS (Stinson 1992). It is unclear whether this increased susceptibility is

linked to an increase in probability for sexual interactions with casual partners or because of a

weakened immune system but it is possible that it is a combination of the two. Some studies have

shown that chronic alcohol abuse speeds the course of the HIV infection once an individual is

infected (NIAAA, 2010).

Cancer. According to the National Cancer Institute the consumption of alcohol is

identified as a risk factor for mouth, esophagus, pharynx, larynx, liver and breast cancer. The

cancer risk associated with alcohol misuse is often clouded because there are limited samples of

individuals who use alcohol alone and who do not also smoke. However, one possible

explanation for how alcohol may contribute to the development of certain cancers is given by the

NIAAA (2010):

> Alcohol itself is not the primary trigger for cancer. We know that metabolizing, or
> breaking down, alcohol results in the release harmful toxins in the body. One of
> these toxins is called acetylaldehyde. Acetylaldehyde damages the genetic
> material in cells—and renders the cells incapable of repairing the damage. It also
> causes cells to grow too quickly, which makes conditions ripe for genetic changes
> and mistakes. Cancer can develop more easily in cells with damaged genetic
> material.

It is important to remember that alcohol's indirect release of toxins into the body is just one

possible explanation for the correlation between chronic heavy alcohol use and the onset of

certain types of cancer.

Interventions for College Student Drinking

The above mentioned evidences of the health effects of heavy alcohol consumption help to

demonstrate the need for interventions to reduce risky drinking in a population which may be at

risk.

Expectancy challenge interventions. One method of intervening that has been found to

be effective is expectancy challenge interventions, which attempted to challenge the efficacy of

alcohol in actually producing expected effects. In such interventions participants are not told the content of their drinks. Some are given alcohol while others are given a placebo. After the experiment is over they are asked to identify whether they had alcohol or not and incorrect identifications show individuals that their expectations for alcohol, such as that it increases sociability or reduces tension may not be attributable to the alcohol itself. A review of expectancy challenge interventions by Sheldon et al. (2012) found that compared with controls participants in expectancy challenge interventions consumed less alcohol, had fewer positive alcohol expectancies, and reduced their frequency of heavy drinking.

An example of a successful expectancy challenge intervention was conducted by Lau-Barraco and Dunn (2008) who found that when undergraduates were asked to identify which students were consuming alcohol and which were not they often were mistaken in their identifications. Also the participants gave conflicting reasons for why they thought individuals had been drinking such as "he seemed mellow" and "he was talking a lot".

Social norms interventions. Many interventions done in the college setting have focused on providing students with accurate social norms relating to alcohol consumption. These interventions either inform participants about the number of drinks a typical student consumes in a typical night or the typical negative consequences which a student experiences. The aim of these interventions is to ground those students who consume in an unsafe manner with the information that they are in the minority rather than the majority.

Hagman, Clifford, and Noel (2007) found that a didactic approach in relaying accurate alcohol consumption norms was effective in changing student perceptions of consumption 1 week after the intervention. The intervention consisted of an hour long computer based program called alcohol 101 which compared participants self reported consumption habits and

perceptions of peer habits with gender specific campus and national norms. The researchers did

not examine whether the change in student perceptions led to change in behavior.

A social norming intervention, which was found to reduce risky drinking habits in

conjunction with changing misperceptions of peer consumption habits was conducted by Perkins

and Craig (2006) which specifically targeted student athletes. The intervention consisted in

social norms information being relayed to student athletes through a various number of mediums.

These mediums included posters, weekly emails, newspaper advertisements and student athlete

peer educators. The results of the study found that among student athletes who were exposed to

the program misperceptions of the quantity of alcohol consumed by peers in social situations

were reduced. Also, frequent consumption, high quantity consumption and negative alcohol

related consequences were reduced among those student athletes exposed to the program. This

program was successful in part because it targeted a specific group of students, student athletes.

Social norming campaigns are often successful because they challenge an individual's

conception of their habits as normal. A productive way to do that is to target the individual with

personalized feedback comparing their habits to the actual norms, as was done by Nieghbors,

Lewis, Bergstrom and Larimer (2006). In this intervention students were able to compare their

habits with perceived peer habits and actual peer habits. The intervention was targeted towards

students who were heavy drinkers and was successful in reducing both the number of drinks a

student had per week and negative consequences related to consumption.

Lee, Geisner, Patrick and Neighbors (2010) investigated the extent to which

misperceptions about the negative consequences could be corrected and what effect that

correction could have on unsafe student consumption habits. They found that most students

overestimated the number of negative consequences related to alcohol that a typical student

experiences and also that most students underestimated how negatively those students evaluated those negative consequences.

Individual counseling and motivational interviewing. In typical counseling with adults who are experiencing problems with alcohol individuals are experiencing ambivalence between their desire to drink and their desire to avoid the negative consequences associated with drinking. However in the special population of college students, individuals often do not find their drinking problematic. Miller (1983) cited in Baer et al. (1994) argues that a confrontational intervention rarely produces a reduction in risk. "Persons who are told that they 'have a problem' are likely to become defensive and argue that it is not true" (Baer et al. 1994, p. 102). The answer is a client centered therapy developed by Miller (1983) called Motivational Interviewing.

Motivational interviewing focuses on the notion that change should be elicited from within the client as opposed to forced upon them from the outside by the counselor (Rollnick & Allison 2004). A counselor who practices motivational interviewing will first attempt to use empathic listening to understand the client's point of view. Then after a relationship is built between counselor and client the counselor attempts to explore the client's values and goals and how they are related to his or her addictive problem. There are three concepts which Rollnick and Allison (2004) argue are vital to recognize in a client: readiness, ambivalence and resistance. Readiness is important for a counselor to notice because if the counselor is too eager to encourage change, it may further deter a client's willingness to progress forward.

Ambivalence, as discussed above, is a concept that is traditionally targeted in therapy, and is not experienced in the same way by college students as by individuals in typical substance abuse therapy. As most undergraduates enjoy drinking socially, they tend to have positive associations with the drug:

> On a personal level, most college students do not see their drinking as a problem. To admit a problem with alcohol necessitates acknowledgment of lack of control (failure), and perhaps the acceptance of lifelong abstinence. College drinking occurs in social 'party' situations over short periods of time. Many students believe their college years are a time to be irresponsible and reckless, and that safer drinking will develop naturally. (Baer et al. 2004, p.84)

Ambivalence in college students is complicated and may not be initially discernible for either the counselor or the client. It may be necessary for the counselor to guide the client in the development of discrepancies between personal values and their behavior.

A third concept which is important to recognize in motivational interviewing is resistance. Rollnick and Allison (2004) define resistance as "a general reluctance to make progress or as opposition to the counselor or what the counselor thinks is best or as the clients expectations as to the posture of the agency the counselor represents" (Rollnick and Allison, 2004, p. 109).

Motivational interviewing as a concept has been slightly modified for interventions with college students. The most popular application of the motivational interviewing technique for undergraduate institutions is the BASICS program (Brief Alcohol Screening Intervention for College Students) developed by Dimeff et al. (1999). The following is a concise description of the program by Fachini et al. (2012) who conducted a review of the efficacy of BASICS programs across different undergraduate settings:

> BASICS is a specific protocol of BI (brief intervention) for college students delivered face-to-face and usually conducted over the course of two structured sessions, including motivational interview and personalized feedback based on student drinking behavior. It is especially relevant to encourage students to change their behavior by using empathy and warmth approach rather than confrontation. Moreover, clinicians can assist patients by helping them establish specific goals and build skills for modifying their drinking behavior.

Fachini et al. (2012) found that in a review of 18 studies on the BASICS program, after a 12 month follow up period, those students who were exposed to the program showed, on average, a

significant reduction in both alcohol consumption and alcohol related problems. All of the

studies were conducted at public universities and all of the 6233 students who participated in the

studies were classified as at risk drinkers. Murphy et al. (2010) compared the efficacy of the

BASICS program to two different didactically based computer programs in a single study of 74

heavy drinking undergraduates and found that the BASICS program was more efficacious in

promoting motivation to change, self ideal and normative discrepancy. However there were no

significant differences between the BASICS programs and the computer programs in drinking

behavior at the one month follow up, both interventions showed equal reductions in drinking.

Readiness to Change. Interventions which are informed by motivational interviewing

such as the BASICS programs are successful because they take into account the wishes and

sentiments of the individual. The stages of change model, promoted by Prochaska & DiClemente

(1986) suggested that there were four stages which an individual moved through as he or she

changed their behavior. The stages are as follows: pre-contemplation, contemplation, action and

maintenance.

This stage model was proposed to be valuable in assessing clients readiness to change

their addictive behaviors such as alcohol use in brief interventions. The first scale which was

created to measure the construct of Readiness to Change conceptualized by placement into one

of the four stages was the URICA, the University of Rhode Island Change Assessment,

originally developed for psychotherapy by Prochaska et al., (1988) and applied to the treatment

of alcoholism first by Diclemente and Hughes (1990). In the current study readiness to change

will be measured with a scale called the Readiness to Change Questionnaire developed by

Rollnick et al. (1992) which is a 12 question assessment catered specifically to alcohol use,

modeled after the original 32 question URICA.

The present study aims to see if information, specifically information regarding the accurate social norms and the health effects of alcohol consumption can have an impact on an individual's readiness to change their drinking behavior.

Conclusions and Hypothesis

The current study hopes to encompass what is learned from theories of motivation, brain chemistry and interventions to create an intervention designed to reduce risky alcohol consumption with a balanced approach. It will be important to remember that students are unlikely to recognize their consumption as problematic, as they are influenced by a disease model of alcoholism, perceptions of the health effects of alcohol and the perceived social norms of its use. As learned from the success of motivational interviewing, motivation for change should be elicited from the individual and intervention information should be presented in a non-judgmental and non-confrontational manner.

Though correcting misperceptions about social norms has been found to be efficacious in reducing risky drinking in college students, little research has been done in investigating correcting misperceptions on the health consequences binge drinking. The current study sought to investigate the extent to which education of the harms of binge drinking will have an effect on college student's drinking behavior. It will compare the impact of social norms information to that of information on alcohol's negative effects on physical and mental health.

Hypotheses

1) Both intervention groups (social norms and health effects) will show a decrease in scores on the pre-contemplative subscale of the and an increase in scores on the contemplative and action subscales Readiness to Change Questionnaire (Rollnick et al. 1992).

2) Data from the baseline assessment will show that students who more accurately perceive social drinking norms and health consequences will have more moderate drinking behavior.

Methods

Participants

56 Connecticut College Students participated in at least the first part of the study. Thirty six of

those 56 completed the follow up assessment, and had usable data. These 36 included 13 from

the social norms condition, 13 from the physiological effects condition and 10 from the control

condition, see procedure. Participants included 27 men, 28 women, and one individual who

identified as transgender all over the age of 18. See table 1 for more information on ethnicity,

class year and age of the participants. A table was set up by the researchers in the college library

to recruit participants. Participants were given a baked good in return for their participation. It

was advertised that credit would be available to students who were in enrolled in the Psychology

100 course and those students were given laboratory credit for the amount of time they

participated instead of baked goods.

Procedure

      Baseline assessment. Participants were informed that the study had two parts, the first

would be the completion of a 20-30 minute paper and pencil questionnaire and carried out that

day in the library and the second was a follow up assessment that could be filled out

electronically and would be sent to their email in two weeks. Individuals who agreed to this

format were asked to read and sign an informed consent form (see appendix A) and to write

down their email address on a list of participant email addresses which was kept separate from

any of their responses in the study. Participants were also asked to write their ID number on the

packet of questionnaires which they received, so that their baseline assessment could be matched

Table 1

Demographics

		Percent
Athletic Involvement:	Athlete	57.1%
	Non-Athlete	42.9%
Gender:	Male	48.2%
	Female	50%
	Transgender	1.8%
Ethnicity:	Caucasian	71.4%
	Hispanic/Latino	10.7%
	Asian	8.9%
	African American	4.6%
	Other	3.1%
Class year:	Senior	33.9%
	Junior	16.9%
	Sophomore	16.9%
	Freshmen	26.8%
Age:	21 and over	46.4%
	Under 21	53.6%

with their follow-up assessment and their confidentiality be protected. Participants were informed of the reasons why they were asked to write down their student ID numbers. Along with a space provided to for a student ID number the packet also included the Daily Drinking Questionnaire (DDQ; Collins et. al., 1985), (see appendix F), the Drinking Norms Rating Form (DNRF; Baer et al., 1991), (see appendix E), the Biological Consequences of Binge Drinking Scale (see appendix C), the Readiness to Change Questionnaire (Rollnick et al. 1992) (see appendix E) and a demographic questionnaire (see appendix F). These measures were the same for all participants but the next 3 to 5 pages of the packet varied depending on the group to which the participant was assigned.

*Grouping of Participants***.** Participants were assigned into three groups A, B or C. Packets were handed out in order by group.

Group A (Social norms). Participants in this group were exposed to 3 pages and 241 words of information regarding the norms of college student alcohol consumption habits. Data from the American College Health Association's National Collegiate Health Assessment (Spring 2012) and the Core Drug and Alcohol Survey (2012) were used. The data from the ACHA NCHA 2012 highlighted the differences between perceptions of alcohol use and actual reported use. An example of a point from the intervention is "The percentage of students who never drink alcohol: perceived: 3.1% actual: 21%". These data points were also represented graphically. Data from the Core Alcohol and Drug survey had more of a focus on the norms of subjects associated with alcohol use. An example of a data point form the Core Alcohol and Drug survey which was exposed to participants is "34.8% of students reported some form of public misconduct (such as trouble with the police, fighting/argument, DWI/ DUI, vandalism) at least once in the past year

due to alcohol use". The complete 3 pages of information exposed to participants in this group

can be found in appendix H.

       Group B (Physiological effects). Participants in this group were exposed to three pages

and 935 words of information regarding the effects of alcohol consumption on the brain and

body. Sources that were used include information regarding alcohol's effects on various

neurotransmitter systems from the HAMS Harm Reduction network (2012), facts in reference to

the development of the central nervous system in young adults from Breedlove, Watson and

Rosenweig, (2010), three scientific studies which investigated the effects of binge drinking on

young adult's memory and executive functioning, and a final section from the USDA Dietary

Guidelines 2005, Chapter 9 "Alcoholic beverages" which explained some of the risks and

benefits associated with the consumption of alcohol for different age groups and frequencies of

consumption. The full 3 pages of information can be seen in appendix I.

       Group C (Control group). Participants in this group were not exposed to any information

regarding alcohol's physiological effects or the norms of its use; they were exposed to a short

story titled Two Times One, by Joan Walsh, which was three and a quarter pages and 1,558

words.

       Letter Writing Task. For all three groups, at the begging of the information packet there

were instructions for the participant to "read the following information carefully because there

will be instructions to perform a task once you are done reading". The instructions which were

given at the end of the social norms information packet to this group were: "INSTRUCTIONS:

Please use the space below to write a paragraph to a friend who may be feeling pressure to binge

drink and does not wish to. Cite some of the information above in attempt to support this

individual who may be feeling that all college students binge drink". In the physiological effects

group the instructions at the end of the packet read similarly to the instructions given in the

social norms group with the omission of the mention of a student who is feeling that all college

students binge drink. In the control group the instructions simply asked the participants to write a

brief summary of the story.

      Follow Up Assessment. The follow up assessment was sent to all the participants by

email two weeks following the baseline assessment. Participants were reminded of the initial

session that they had participated in and asked to click on a link which would bring them to the

online survey. The medium which was used to collect the data online was SurveyMonkey.com.

The follow up assessment included the same Readiness to Change scale (RTC; Rollnick et. al.

1992) which was given in the baseline assessment. The assessment also included a version of the

Daily Drinking Questionnaire (DDQ; Collins, Parks & Marlatt, 1985) which asked how many

drinks they had consumed in each day of the last week. Other questions on the follow up

included a multiple choice question on the percentage of college students who binge drink, and a

question on the physiological effects of alcohol use. See appendix J for the full details on these

questions.

Measures

      Drinking Norms Rating Form: (DNRF; Baer et al., 1991) Individuals estimate the

typical drinking patterns of various reference groups. Responses to items regarding participant's

estimates of the typical number of drinks consumed each day of the week by a typical same sex

student and a closest friend (see appendix B).

      Daily Drinking Questionnaire: (DDQ; Collins, Parks & Marlatt, 1985) Individuals fill

in seven boxes with the number of drinks they consume on each day of the week and seven

boxes with the corresponding hours spent drinking (see appendix C).

Demographic Questionnaire: Participants will be asked questions regarding their age, gender, class year, history of alcoholism in their family, club/ varsity sport affiliation on campus and estimated GPA, and estimated parental income (see appendix G).

Biological Consequences of Binge Drinking Scale: A 6 item self-report scale developed in the current study for the purpose of measuring individual's perceptions of the consequences of binge drinking on the brain and body (See Appendix C). Definitions are given for binge drinking, moderate drinking and adolescents. Subjects respond by using a 5-point likert type scale ranging from disagree to agree. The reliability of the new scale was found to be acceptable with a Crobach's alpha of .703.

Readiness to Change Questionnaire (RTC; Rollnick et al., 1992). A 12 item self report scale that assessed cognitions about changing drinking behavior drinking on three subscales: Pre-Contemplative, Contemplative and Action (see appendix E). Subjects respond by using a 5-point likert type scale ranging from disagree to agree. The scale has been found to have acceptable test-retest reliability on all three of the subscales precontemplation = 0.82; contemplation = 0.86; action = 0.78 (Rollnick et al., 1992).

Results

Intervention

A number of paired samples T-tests were conducted to examine the effects, if any, of the interventions on scores in the Readiness to Change questionnaire (RTC). Differences in scores on the subscales between the baseline and follow-up were examined. In the social norms group the baseline scores were significantly higher than the follow-up scores in the pre-contemplative (PC) subscale of the Readiness to change questionnaire. See table 2 for detail on the comparison of baseline and follow-up scores of each subscale (pre-contemplative, contemplative and action) for each group (social norms, brain and body and control).

Grouping for analysis of baseline data

Participant's responses were categorized into 5 groups according to the number of drinks they reported consuming in a typical week. Participants were classified as nondrinkers if they reported consuming 0 drinks, light drinkers if they reported 1-5 drinks, moderate drinkers 6-12 drinks, moderate-heavy drinkers 13-19 drinks and heavy drinkers 20+ drinks. Participants were also grouped according to their reports of the number drinks they perceived a typical student and their best friends to consume in a typical week. See table 3 for frequencies of drinking by category. These groups were created for the purpose of running one-way ANOVAs. For ease of explanation, the grouping variables have been given labels. Individual reported totals were labeled as self total category, reported best friend totals as best friend total category and perceived typical student totals as typical total category. The raw number values of reported drinks in a typical week, not classified into categories, were labeled as self total, best friend total, and typical total.

Table 2

Scores on the subscales of the Readiness to Change Questionnaire (Rollnick et al., 1992) by intervention group

		Social Norms		Brain+ Body		Control	
		Mean	SD	Mean	SD	Mean	SD
PC score	Baseline	12.93	2.53	11.31	3.2	12.3	2.67
	Follow up	11.64	2.52	11.62	3.04	12.7	3.65
	Mean Difference	1.29*		-.31		-.4	
C score	Baseline	9.85	3.94	10.46	3.6	9.0	2.71
	Follow up	10.23	2.47	11.0	2.77	9.4	3.24
	Mean Difference	-.38		-.54		-.4	
A Score	Baseline	11.0	2.86	11.23	2.97	9.33	2.45
	Follow up	10.62	2.18	10.62	3.71	10.0	3.87
	Mean Difference	.38		.61		-.67	

Note *= $p < .05$

Table 3

Frequencies of drinking by category

		Non-drinker	Light Drinker	Moderate Drinker	Moderate-Heavy Drinker	Heavy Drinker
N	Self - report	10	16	16	12	1
	Best friend	7	10	20	11	7
	Typical Student	0	4	23	20	8
Percent	Self - report	18.2	29.1	29.1	21.8	1.8
	Best friend	12.7	18.2	36.4	20.0	12.7
	Typical Student	0	7.3	41.8	36.4	14.5

Reported weekly totals

Significant correlations were found between self totals, best friend totals and typical totals. A bivariate correlation analysis found self totals were significantly positively correlated with best friend totals Pearson Correlation=.746, p<.001 and with typical totals Pearson Correlation=.362, p=.007. Best friend totals were also significantly correlated with typical totals Pearson Correlation=.554, p<.001.

A one-way ANOVA was performed to investigate the relationship between self total categories and typical totals and it revealed that there were significant differences between the groups F(3,50)=3.72, p=.017. Tukey post hoc tests revealed that those individuals who perceived that the typical student was a light drinker drank significantly less than those individuals who perceived the typical student to be a heavy drinker Mean Difference= 9.25, std. Error= 3.4, p=.043. Tukey post-hoc tests did not reveal any significant differences between the rest of the groups, see tables 4 and 5 for detail.

Another one way ANOVA was conducted and found significant differences between typical total categories in best friend totals F(3,50)=11.49, p<.001. Tukey post hoc tests revealed that individuals who perceived the typical student to be a heavy drinker M=17.37, SD=8.30 reported their best friends to consume significantly more than those individuals who perceived the typical student to be a light drinker M=1.75, SD=2.06, mean difference=15.63, p=.001 and those individuals who perceived the typical student to be a moderate drinker M=5.64, SD=3.76, mean difference=11.74, p<.001. In addition those individuals who perceived the typical student to be a moderate-heavy drinker M=13.38, SD=7.86, reported their best friends to consume significantly more than those individuals who perceived the typical student to be a light drinker

Table 4

Means of self-reported consumption habits organized by perceptions of typical student habits

Perception of typical student as:	Mean of one's own habits (DPW)	SD
Light drinker (1-5)	1.25	1.50
Moderate Drinker (6-12)	5.48	4.67
Moderate-Heavy Drinker (13-19)	8.78	5.40
Heavy Drinker (20+)	10.50	8.60

Table 5

Mean differences in self reported consumption habits by perceptions of typical student habits

	Mean1-Mean2	Mean Difference
Heavy drinker-Light drinker	10.5-1.5	9.25*
Heavy drinker-Moderate drinker	10.5-5.48	5.02
Heavy Drinker- Moderate to heavy drinker	10.5-8.78	1.73
Moderate to Heavy drinker-Moderate drinker	8.78-5.48	3.30
Moderate to heavy drinker-Light Drinker	8.78-1.5	7.53
Moderate drinker-Light drinker	5.48-1.5	4.23

*Note: *= p<.05*

M=1.75, SD=2.06, mean difference=11.63, p=.007 and those individual who perceived the

typical student to be moderate drinker M=5.64, SD=3.76, mean difference=7.74, p=.001

Categories of drinking and RTC scores

Best Friend's habits. A one-way ANOVA was run and found that there were significant

differences between best friend total categories in scores on the contemplative subscale of the

readiness to change scale f(4,46)=4.62, p=.003. Scores between groups on the pre-contemplative

subscale f(4,46)=.754, p=.561 and the action subscale f(4,46)=1.59, p=.192 were not found to

differ significantly according to reports of best friends drinking habits. Tukey post hoc tests

revealed that those individuals who perceived their best friend to be a moderate-heavy drinker

M=13.27, SD=3.13 scored significantly higher on the contemplative subscale than those

individuals who perceived their best friend to be moderate drinkers M=9.25, SD=2.95 mean

difference=4.02, p=.009 or light drinkers M=8.3, SD=3.16, mean difference=4.97, p=.005.

Tukey post hoc tests did not reveal significant differences between the other categories of

drinkers in scores on the contemplative subscale.

Percieved typical student habits. A similar result was found when a one-way ANOVA

examined the differences between groups in perceptions of typical student drinking habits and

scores on the three difference subscales of the readiness to change questionnaire. There were

significant differences between groups in the contemplative subscale f(3,47)=3.3, p=.028, but not

in the pre-contemplative f(3,47)=.704, p=.55 or the action subscale f(3,47)=.76, p=.521. Tukey

post hoc tests revealed that there were some close to significant differences like the difference

between moderate drinkers M=8.36, SD=2.45 and light drinkers M=13.33, SD= 3.79, mean

difference=4.97, p=.069. There was also a close to significant difference between moderate

drinkers M=13.33, SD=3.79 and moderate-heavy drinkers M=11.26, SD=3.18, mean difference= 2.43, p=.087.

Self Reported Habits. These differences in contemplative subscale scores did not carry over into self-reported drinking habits. A one way ANOVA was run to investigate these possible differences in self-reported drinking levels and subscale score and found that there were significant differences between groups for the pre-contemplative subscale f(3,47)=2.96, p=.042. There were no significant differences between groups in the contemplative subscale f(3,47)=2.62, p=.062 or between groups in the action subscale f(3,47)=.344, p=.793. Tukey post hic tests did not reveal any significant differences between categories of self-reported drinking habits in a typical week and scores on the pre-contemplative subscale or on the other two subscales, see table for detail.

Gender differences

An independent t-test was conducted and found men differed significantly in perception of typical student drinking habits on a Saturday night M=6.08, SD=2.4 than women M=4.8, SD=1.17 t(52)=2.51, p=.15. Independent t-tests found similar results in gender differences between reports of best friend drinking habits. Men reported that their best friends M=5.69, SD=3.84 consumed significantly more drinks on a Saturday night than women reported their best friends to be drinking M=3.92, SD=2.07, t(51)=2.09, p=.041. Differences between reports of one's own drinking habits on a typical Saturday night did not vary significantly among men M=5.1, SD=3.83 and women M=3.52, SD=2.21, t(51)= 1.86, p= .071.

Significant gender differences were also found in perceptions of typical student weekly alcohol consumption totals. Men perceived that the typical student M=14.93, SD=6.57 consumed more drinks per week than women M=11.61, SD=4.65 t(52)=2.14, p=.037. Men M=7.95,

SD=6.56, did not report significantly different weekly totals than women M=6.46, SD=5.42, t(52)=.91, p=.37. There were also no significant differences in reported best friend weekly totals, men M=11.19, SD=8.62, women M=9.0, SD=7.12, t(52)=1.02, p=.32.

Athletic Involvement

Athletic involvement was significantly correlated with reported levels of best friend drinking habits Pearson Correlation= -.301, p=.025. However, Athletic involvement was not significantly correlated with levels of self-reported consumption habits Pearson Correlation=-.246, p=.07 or with perceptions of typical student consumption Pearson's correlation=-.221, p=.11. An independent t-test was run and found that athletes M=12.08, SD=8.55 reported significantly greater levels of drinking in their best friends than non-athletes M=7.35, SD=6.03, t(53)=2.3, p=.025.

Perceptions of Biological consequences

Reliability. An analysis of reliability was conducted on the newly created Biological Consequences of Binge Drinking scale and found an acceptable Cronbach's alpha of .703.

Best Friend totals. A one way ANOVA was conducted and found significant difference between best friend total categories in scores on the Biological Consequences of Binge Drinking Scale (BCBDS) F(4,49)=2.85, p=.034. Tukey Post hoc tests revealed that those individuals who reported their best friends to be heavy drinkers M=21.67, SD=3.5 scored significantly lower on the BCBDS than those individuals who perceived their best friends to light M=25.5, SD=2.12, mean difference=-3.83, p=.037 or moderate drinkers M=25.35, SD=2.74, mean difference= -3.68, p=.023.

Self totals. Similar results were found in self total categories. A one-way ANOVA found significant differences in BCBDS scores between self total categories F(3,50)=2.99, p=.04.

Tukey post hoc tests revealed that those individuals who reported moderate to heavy levels of

consumption M=22.77, SD=3.03 scored significantly lower on the BCBDS than those individual

who reported moderate levels of consumption M=25.53, SD=2.45, mean difference= -2.76,

p=.036, see tables 6 and 7 for more detail.

Typical Totals. Dissimilarly typical total categories were not significantly different in BCBDS

scores between groups. A one-way ANOVA was performed F(3,50)=1.84, p=.152.

Household Income. Significant differences were also found in BCBDS score in relation to

household income. A one-way ANOVA was performed F(3,26)=3.15, p=.042. Tukey post Hoc

tests revealed that those individuals who reported their parents or guardians to earn one hundred

thousand dollars or more a year M=25.47, SD=2.12 scored significantly higher on the BCBDS

scale than those individuals who reported their household income to be fifty to seventy five

thousand dollars annually M=21.0, SD=5.0, mean difference= 4.47, p=.031.

Perceptions of percentages of students who binge drink

Students were asked to estimate the percentage of college students who partake in binge

drinking at least one time per week. The following are the frequencies of perceived percentages:

1-10% n=2, 11-25% n=4, 26-40% n=12, 41-55% n=6, 56-70% n=6, 71-85% n=4, 86-95% n=3.

Three one way ANOVAs were performed to investigate these differences in perceptions of binge

drinking totals. Significant differences were found between groups in reports of typical student

weekly totals of drinks F(6,29)=3.73, p=.007. Tukey post hoc tests revealed that those

individuals who perceived 86-95% of college students to be binge drinking reported significantly

higher weekly totals than those individuals who perceived 26-40% of college students to binge

drink mean difference= 12.76, p=.008. Significant differences were not found between groups in

Table 6
Perceptions of the health effects of alcohol organized by self reported consumption habits, perceptions were measured using the BCBDs.

	Mean	SD
Non- drinker (0)	23.3	2.4
Light Drinker (1-5)	24.2	2.29
Moderate Drinker (6-12)	24.47	3.16
Moderate to Heavy Drinker (13+)	21.23	3.54

Table 7

A one-way ANOVA measured difference in BCBDs scores according to self reported consumption habits

	M1-M2	Mean Difference
Moderate to Heavy drinker-non drinker	21.23-23.3	-2.07
Moderate to heavy drinker-light drinker	21.23-24.2	-2.96*
Moderate to heavy drinker-Moderate drinker	21.23-24.47	-3.24*
Moderate drinker-nondrinker	24.47-23.3	1.16
Moderate drinker- light drinker	24.47-24.2	.28
Light drinker- nondrinker	24.2-23.3	.89

*Note *=P<.05*

reported weekly totals of one's own drinking habits $F(6,30)=.527$, $p=.784$ or in best friend's habits $F(6,30)=1.45$, $p=.230$.

GPA

A one-way ANOVA was performed to investigate any possible differences in grade point average (GPA) among different categories of drinkers. The results of this ANOVA found no significant differences between individual weekly totals and GPA $F(4,49)=.039$, $p=.997$. There were also no significant differences between groups of reported best friend weekly totals in GPA $F(4,49)=1.08$, $p=.375$. And lastly no groups organized by perceptions of typical student weekly totals differed significantly from one another in GPA $F(3,50)=1.01$, $p=.358$.

Discussion

Hypothesis 1

The results of the two brief information based interventions only partially supported the first hypothesis. Scores on the contemplative and action subscales of the RTC scale did not change significantly from the baseline to the follow up in either of the intervention groups. However, scores on the pre-contemplative subscale were significantly lower at the follow up assessment in the group which was exposed to information relating to the social norms of drinking behavior. Thombs and Briddick (2000) found that out of heavy drinking college students, those who scored high on the pre-contemplative scale had lower scores of alcohol use than those individuals who were further along the stages of change spectrum. Those individuals, who score high on the pre-contemplative subscale, answer in agreement with statements such as "It's a waste of time to think about my drinking habits" and "There is no need for me to think about changing my drinking". It seems like on the surface that individuals high in pre-contemplation may have a serious problem drinking but are in denial. This was a hypothesis of Lewis (2005) which was disproved:

> The results did not support the hypothesis that higher levels of pre-contemplation
> will be associated with greater alcohol use intensity and drinking consequences.
> This finding seems counterintuitive, given that students who fail to acknowledge a
> personal drinking problem are assumed to be the ones who consume the most.

This leaves the interpretation of a drop in pre-contemplative scores after a brief social norm based intervention. Initially it seems that the intervention was successful starting to pull individuals out of a state of denial, a state in which one is not thinking about changing drinking habits. However, it is also important to remember that as was shown by Lewis (2005) and Thombs and Briddick (2000) that those individuals who report high scores on the pre-

contemplative scale are not among the individual who report the highest alcohol use. Therefore, the reduction in pre-contemplative scores may not stem from the most at risk population. It will also be important to remember the research of Collins Logan and Neighbors (2009) who found that high readiness to change did not produce changes in drinking behavior longitudinally. So although it may seem that the intervention nudged participants forward along the progression of the stages of change it is not certain that an increase in readiness will lead to behavior change.

One limitation of the intervention to take into account is the differences in format of the interventions between groups. The social norms intervention was only 241 words, while the physiological effects focused intervention was 935 words. The greater length of the physiologically based intervention may have led to fatigue in the reader, loss of interest or frustration. Another possibly confounding difference between the interventions was that the social norms intervention had graphical representations of data while the physiological intervention relied on verbal representation alone. Additionally the wording of the instructions for the letter writing tasks was slightly different between the interventions.

Time and resources limited the current study, a future intervention could retain design of the current study with three groups, social norms, physiological effects and control, but expose the participants to multiple information sessions. It also may be beneficial to add a fourth group which would be exposed to information on both social norms and physiological effects. Future studies should incorporate opportunities for participants to become more engaged with the information, and collaborate with other participants. An example of such an opportunity could be collaboration on the creation of a poster, the purpose of which would be to display pertinent information regarding either the social norms or physiological effects of alcohol consumption to the student body. Additionally a semester long class could be offered, in which students could be

exposed more thoroughly to the information. Though in this circumstance it may be

unreasonable to offer two classes, one dedicated solely to social norms and the other to

physiological effects, therefore the class should incorporate information from both topics, as well

as other topics relating to alcohol use such mental health, tension reduction theory, and sensation

seeking theory.

Hypothesis 2

Perceptions of social norms. The hypothesis that individuals who more accurately perceive

social norms would have more moderate drinking behavior was partially supported. Those

individuals who perceived the typical student to be a light drinker drank significantly less than

those students who perceived that the typical student was heavy-drinker, see tables 4 and 5 for

detail. These results support data from the Harvard School of Public Health College Alcohol

Study's survey of 17,592 students at 140 colleges and universities across the United States which

found that the average (median) number of drinks consumed by college students was 1.5 per

week. In the present study those participants who perceived the typical student to drink 1-5

drinks per week, had a mean drinks per week of 1.5, which could be seen as more moderate than

the mean of 10.5 drinks per week reported by those students who perceived the typical student to

consume 20+ drinks per week.

Perceptions of the physiological effects of alcohol. In the current study it was found that

alcohol consumption habits are linked to perceptions both of consumption and of alcohol's

effects on the brain and body. Participant's perceptions of the physiological effects of alcohol

were measured by the Biological Consequences of Binge Drinking Scale (BCBDS) which was

developed by the researchers in the current study. This scale is limited in that it has not

previously been tested. It was also not modeled after any scales as no scales pertaining to the

perceptions of physiological effects of alcohol were found by the researchers.

Because of these limitations the results which were found through the BCBDS should be

interpreted with caution. The results did find that individuals who reported moderate-heavy

drinking 13-19 drinks in a typical week, score significantly lower on the BCBDS than those

individuals who reported moderate levels of drinking 6-12 drinks per week. These results lend

support to the hypothesis that individuals who perceive alcohol's physiological effects more

accurately are more likely to consume alcohol in a safer, more controlled manner. Results also

demonstrated that individuals with who reported their household incomes to be over one hundred

thousand dollars a year score significantly higher on the BCBDS than those individuals who

reported their household incomes to be fifty to seventy five thousand dollars a year. This result is

limited by a small sample of individuals who reported their household income to be fifty to

seventy five thousand dollars a year, n=3. Many participants chose to abstain from answering the

demographic question about household income.

Future research could build upon the BCBDS to create a better scale which could more

accurately measure perceptions of the physiological effects of alcohol consumption. Some

additional information that may be beneficial to include in a new scale could be more specific

statements about the development of the young adult brain and its susceptibility to harm from

alcohol and information on alcohol's effects on various neurotransmitter systems such as

dopamine.

Limitations

A limitation in the design of the present study is the omission of a brief screening which

would have created a more targeted sample set of risky drinkers for the purpose of the

intervention. The sample which was collected, which contained a spectrum of drinking habits, was valuable in comparing the perceptions of typical student drinking and the physiological effects of alcohol among different categories of drinkers. However, the Readiness to Change questionnaire (RTC; Rollnick et al., 1992) was designed to interpret the cognitions of someone who consumes alcohol and is not applicable to a non-drinker. The scale includes statements like "My drinking is problem sometimes" which a non-drinker could not reasonably respond to.

In addition to the study's imperfect design, the applicability of the two scales responsible for measuring reports and perceptions of drinking behavior the Drinking Norms Rating Form (DNRF; Baer et al., 1991) and the Daily Drinking Questionnaire (DDQ; Collins, Parks & Marlatt, 1985) is also limited. The DRNF asked for reports of one's own drinking habits. It is unclear if these reports accurately represent actual drinking behavior. Doubts may arise in individual's reports of drinks consumed, both in their ability to accurately record frequency of drinks and in underreporting due to perceptions of what is socially desirable. However, there is evidence from sources such as Miller, Taylor and West (1980) which suggests that self reports are significantly correlated with reports of that individual's habits by collaterals (family members or significant others). This correlation between self and collateral reports was found in a sample of individuals who had significant problems with alcohol and had a mean age of 41.6 years. Hagman, Cohn, Noel and Clifford (2010) found only modest correlations between self reports and collateral reports in college students. Collaterals in this case consisted of peers, and the researchers concluded that self report was a reasonably accurate measure of drinking behavior. Hagman et al. (2010) also reported that discrepancy analyses found that individuals tended to overestimate in their self reports in comparison to collateral reports. With this information from Hagman et al. (2010) the validity of the self reports of drinking behavior in the present study

should be interpreted with caution. Future research in interventions for risky drinking should incorporate collateral checks on self-reports of drinking behavior.

Additionally it is not guaranteed that each participant's conception of an alcoholic drink is constant. Bergen-Cico and Kilmer (2010) found that college student's reports of drinking habits significantly increased only five minutes after receiving a brief education of what constitutes a standard drink. These results from Bergen-Cico and Kilmer (2010) suggest that prior to exposure information on standard alcoholic drinks students not only misperceive what constitutes a standard drink but also tend to underreport the amount of alcohol they are consuming. In the present study it is unclear whether students had been exposed to information on standard drinks. In future research it may be beneficial to incorporate a measure which records individual's perceptions of what makes up a drink. The standard definition developed by NIAAA states that a standard alcoholic drink contains 14g or .6 fluid ounces of pure alcohol. In terms of common alcoholic beverages a standard drink can be defined as 12 ounces of 5% alcohol beer, 8-9 ounces of 7% alcohol malt liquor, 4-5 ounces of 12% alcohol wine, 1.5 ounces of 40% alcohol hard liquor. In the minds of some individuals it may be unclear how many drinks they are really consuming when pouring a glass of wine or creating a mixed drink with hard liquor. Some standard drinks are easier to record such as drinking one 12 ounce can of beer or taking a single shot from a 1.5 ounce shot glass.

Also the concept of a typical week may be limited as a measure of consumption habits, as was pointed out by one participant; a typical week for certain athletes can vary depending on whether the individual is "in season" or not. As the concept of a typical week may be variable, asking for the drinking habits of a typical Connecticut College student could also be problematic. One participant gave the feedback that there was no such thing as "a typical student". The

researchers interpreted the response from this participant as an attempt to demonstrate that every

student is unique in his or her beliefs, values and behavior. If our dissenting participant is correct

then the validity of the typical student as a construct may be in jeopardy. However, the behavior

of the typical student could be seen as an average of many different students' behaviors.

Perceptions of this average student behavior could bring insight to the behavior of all students,

but as the results of the current study have shown it may be more likely that the perceptions of

typical student behavior tell more about the individual who owns those perceptions.

In the selection of the DNRF by the researchers the construct of the typical student could

have been more carefully examined. In future research other more accurate constructs could be

explored for the examination of student drinking habits. For example other possible constructs to

examine could be "friend who drinks the most" or "friend who drinks the least".

The Readiness to Change questionnaire (RTC; Rollnick et al., 1992) is another measure

which it may be valuable to examine the validity of. The current study did not find that there

were differences in scores on the RTC subscale according to self reports of drinking habits.

However, the current study found that those individuals who reported their best friends to be

moderate-heavy drinkers, consuming 13-19 drinks per week, scored significantly higher on the

contemplative subscale of the RTC than those individuals who reported their best friends to be

light drinkers, consuming 1-5 drinks per week. These results are related to previous research by

Lewis (2005):

> Partial correlation analysis revealed that contemplation had the second highest
> bivariate relationship with drinking consequences and the highest relationship
> with alcohol use intensity. Thus, students who are ambivalent about their drinking
> behavior tend to engage in greater levels of alcohol involvement. (Lewis, 2005)

As Lewis (2005) found that higher scores on the contemplative subscale were correlated with higher levels of alcohol use, the present study found that higher scores on the contemplative subscale were indirectly associated with higher alcohol use through reports of best friend consumption. So what does this mean? It may be possible that reports of best friend drinking habits as a projection of one's own habits are actually a more accurate representation of drinking behavior than self report. If so the RTC would be an accurate measure of drinking behavior. Or it may be the case that having a best friend who is drinking at moderate-heavy levels leads individuals to think about changing their own drinking. Either way the current study did find that self reports and reports of best friends were significantly correlated with one another. Therefore it seems like individuals tend to drink in a similar way to their best friends but there is some difference between the reports which allows for the difference in scores on the RTC scale.

Collins, Logan and Neighbors (2009) investigated the extent to which RTC was a valid construct for measuring drinking behavior in college students. They found that previous research had shown some validity for the construct as a measure of drinking behavior such as Harris, Walters and Leahy (2008) and Shealy et al. (2007) but were interested in investigating its validity longitudinally. Collins, Logan and Neighbors found that high RTC and high levels of drinking predicted high levels of RTC and drinking in the future. So although an individual may have what the measure defines as readiness to change it seems that this readiness does not actually predict a reduction in frequency or quantity of drinking in the future.

Gender Differences

The current study found gender differences in perceptions of the typical student alcohol consumption habits but not in actual reported habits of the individual. Men perceived the typical man to consume more than women perceived the typical woman to. Differences were also found

in reports of best friend's habits on Saturday nights. Men reported their best friend to consume

more drinks on Saturday nights than women reported their best friends to be consuming.

However, there were no significant differences between genders in reports of individual's own

drinking habits. Previous research by Lewis and Neighbors (2004) found that students tended to

overestimate the frequency and quantity of their non-gender specific and gender specific peers. It

is possible that overestimation in peer habits caused the above mentioned gender differences in

the current study.

References

Asch, S.E. (1951). Effects of group pressure on the modification and distortion of judgements. In

H. Guetzkow (Ed.), Groups, leadership and men (pp. 177–190). Pittsburgh: PA Carnegie

Press.

Armeli, S., Mohr, C., Tennen, H., Todd, M., Carner, M. A., Affleck, G., Hromi, A. (2003) A

process examination of the stress-response dampening effects of alcohol consumption.

Psychology of Addictive Behaviors. 17(4) 266-76.

Baer, J. S., Stacy, A., & Larimer, M. (1991). Biases in the perception of drinking norms among

college students. *Journal of Studies on Alcohol,* 52, 580–586.

Battista, S. R., MacDonald D., and Stewart S. H. (2012) The effects of alcohol on safety

behaviors in socially anxious individuals. *Journal of Social and Clinical Psychology*, 31

(10) 1074-1094.

Bergen-Cico, D., and Kilmer, J. (2010) Reported changes in students' alcohol consumption

following a brief education of what constitutes a standard drink. *Journal of Alcohol and

Drug Education*, 54 (2) 72-84.

Beyond Hangovers: Understanding alcohol's impact on your health. (2010). NIH publication no.

10-7604

Boileau, I., et al. (2003) Alcohol promotes dopamine release in the human nucleus accumbens.

Synapse 49:226–231

 Breedlove S. M., Watson N. V., and Rosenzweig M. R., (2010) *Biological Psychology: An

Introduction to Behavioral, Cognitive, and Clinical Neuroscience*, Sixth Edition,

Sunderland, MA, Sinauer Associates.

Brodie, M.S. (2002) Increased ethanol excitation of dopaminergic neurons of the ventral

tegmental area after chronic ethanol treatment. *Alcohol Clin Exp Res,* 26:1024–1030

Budygin, E. A. et al. (2007) Effects of chronic alcohol exposure on dopamine uptake

    in rat nucleus accumbens and caudate putamen. *Psychopharmacology* 193:495–501

Collins, S. E., Logan, D. E. and Neighbors, C. (2010) Which came first: the readiness or the

    change? Longitudinal relationships between readiness to change and drinking among

    college drinkers. *Addiction*. 105, 1899–1909.

Collins, R. L., Parks, G. A., & Marlatt, G. A. (1985). Social determinants of alcohol

    consumption: The effects of social interaction and model status on the self-administration

    of alcohol. *Journal of Consulting and Clinical Psychology,* 53, 189–200.

Diclemente, C. C. and Hughes, S. O. (1990) Stages of change profiles in outpatient alcoholism

    treatment. *Journal of Substance Abuse, 2,* 217-235**.**

Dimeff L.A., Baer J.S., Kivlahan D.R.,. Marlatt G.A, (1999) Brief Alcohol Screening and

    Intervention for College Students (BASICS): A harm reduction approach (Guilford

    Press), New York.

Deykin, E.Y., Levy J.C. and Wells, V., (1987). Adolescent depression, alcohol and drug

    abuse. *American Journal of Public Health*, 77(2), 178-82.

Engs, R.C., and Hanson, D.J. (1994) Boozing and brawling on campus: A national study of

    violent problems associated with drinking over the past decade. Journal of Criminal

    Justice, 22:171-189.

Falk, D.E., Yi H. and Hilton M. E. (2008) Age of onset and temporal sequencing of lifetime

    DSM-IV alcohol use disorders relative to comorbid mood and anxiety disorders. Drug and

    Alcohol Dependence 94 234–245

Gonzalez, V., Reynolds, B., & Skews, M., (2011). The Role of Impulsivity in the Relationship Between Alcohol Problems Among Emerging Adult College Drinkers. *Experimental and Clinical Psychopharmacology.* 19 (4) 303-313.

Gorka S. M., Ali B. and Daughters S. B. (2012) The role of distress tolerance in the relationship between depressive symptoms and problematic alcohol use. *Psychology of Addictive Behaviors* 26(3), 621–626

Hagman B.. T. and Cohn A. M., (2011) Toward DSM-V: Mapping the alcohol use disorder continuum in college students. *Drug and Alcohol Dependence* 118 202– 208.

Hagman, B. T., Clifford, P. R., and Noel, N.E. (2007) Social norms theory based interventions: testing the feasibility of a purported mechanism of action. *Journal of American College Health* 56(3) 293-298.

Hagman, B., Cohn, A., Noel, N., Clifford P. (2010) Research Involving College Students Collateral Informant Assessment in Alcohol Use. *Journal of American College Health* 59 (2)

Halim, A., Hasking P., Allen F. (2012) The role of social drinking motives in the relationship between social norms and alcohol consumption. *Addictive Behaviors,* 37, 1335–1341

Harris T. R.,Walters S. T., Leahy M. M. (2008) Readiness to change among a group of heavy-drinking college students: correlates of readiness and a comparison of measures. *Journal of American College Health*; 57: 325–30.

Hayatbakhsh, M. R., Najman J. M., Bor W., Clavarino A., Alati R. (2010) School performance and alcohol use problems in early adulthood: a longitudinal study. *Alcohol.* 45 (7), 701-709.

Joffe, A.H., (1998) Alcohol and Social Complexity in Ancient Western Asia. *Current*

    Anthropology 39 (3), 297-322.

Kidorf, M., and Lang, A.R., (1999) Effects of social anxiety and alcohol expectancies on stress-

    induced drinking. *Psychology of Addictive Behaviors*. 13(2) 134-142.

Lee C.M., Geisner I. M., Patrick M. E., and Neighbors C., (2010) Social norms and alcohol

    related consequences. *Journal of Addictive Behaviors*. 24(2), 342–348

Lewis, M. A, and Nieghbors, C., (2004) Gender-specific misperceptions of college student

    drinking norms. *Psychology of Addictive Behaviors*. 18 (4) 334-339

Lewis, T. F., (2005) Readiness to change, social norms, and alcohol involvement among college

    students. *Joumal of Addictions & Offender Counseling*. 26, 22-37.

Lowinger, R. T. (2012) College students' perceptions of severity and willingness to seek

    psychological help for drug and alcohol problems. *College Student Journal*. 46 (4) 829-

    833

Mandelbaum, D. G., (1965). Alcohol and Culture. *Current Anthropology.* 6(3) 281-293.

McCool B.A., Christian D.T., Diaz M.R. and Lack A.K. (2010) Glutamate plasticity in the

    drunken amygdala: the making of an anxious synapse. Int Rev Neurobiol.;91():205-233.

Merrill J. E., Wardell J. D., and Read J. P. (2009) Associations between tension reduction beliefs

    and mood following alcohol consumption. *Experimental and Clinical*

    Psychopharmacology. 17 (6), 434–444.

Miller, W. R., Taylor, C. A., West, J. C., (1980), Focused versus broad-spectrum behavior

    therapy for problem drinkers. *Journal of Consulting and Clinical Psychology* 48 (5), 590-

    601

Miller, W.R., & Sanchez, V.C. (1994). Motivationg young adults for treatment and lifestyle change. In G. Howard (Ed.), *Issues in alcohol use and misuse by young adults* (pp. 55–82). Notre Dame, IN: University of Notre Dame Press

Mouilso, E., Fischer, S., & Calhoun, K., (2012). A prospective study of sexual assault and alcohol among first-year college women. Violence and Victims, 27 (1).

Mulder, R. T., (2002) Alcohol and personality. *Australian and New Zealand Journal of Psychiatry*; 36, 44–52.

Neighbors, C., Lewis, M. A., Bergstrom, R. L., Larimer, M. E. (2006) Being controlled by normative influences: self-determination as a moderator of a normative feedback alcohol intervention. *Health Psychology.* 5, 571–579.

Paschall M. J. and Freisthler B., (2003) Does heavy drinking affect academic performance in college? Findings from a prospective study of high achievers. *J. Stud. Alcohol.* 64, 515-519

Pegram, T. R., (1998) *Battling demon rum: the battle for a dry America*, *1800-1933*. Chicago, Ivan R. Dee Publisher.

Perkins, H., W., (2002) Social norms and the prevention of alcohol misuse in collegiate contexts. *J. Stud. Alcohol.*14, 164-172.

Perkins, H. W., Craig, D. W. (2012) Student-Athletes' Misperceptions of Male and Female Peer Drinking Norms: A Multi-Site Investigation of the "Reign of Error". *Journal of College Student Development.* 53 (3) 367-382.

Prochaska, J. O. & Diclemente, C. C. (1986) Toward a comprehensive model of change, in: Miller, W. R. & Heather, N . (Eds) *Treating Addictive Behaviors: Processes of Change* (New York, Plenum Press).

Prochaska, J. O., Veucer, W. P., Diclemente, C .C. & Pava, J. (1988) Measuring processes of change: applications to the cessation of smoking. *Journal of Consulting & Clinical Psychology,* 56, 520-528

Rollnick, S., Heather, N., Gold, R., & Hall, W., (1992). Development of a short "readiness to change" questionnaire for use in brief, opportunistic interventions among excessive drinkers. *British Journal of Addiction*, Vol 87(5), 743-754

Shealy A. E., Murphy J. G., Borsari B., Correia C. J. (2007) Predictors of motivation to change alcohol use among referred college students. *Addictive Behavior*, 32: 2358–2364.

Stinson, S.; DeBakey, S. F., Grant, B. F., Dawson, D. A., (1992) Association of alcohol problems with risk for AIDS in the 1988 National Health Interview Survey. Alcohol Health & Research World, Vol 16(3), 245-252.

Schwarz, R.M., Burkhart, B. R., and Green, S. B. (1978) Turning on or turning off: Sensation seeking or tension reduction as motivation for alcohol use. Journal of Consulting and Clinical Psychology 1978, 46(5), 1144-1145.

Slutske , W. S., (2005). Alcohol use disorders among US college students and their non-college-attending peers. Arch Gen Psychiatry .62(3): 321-327.

Thombs, D, L,, & Briddick, W, C, (2000), Readiness to change among at-risk Greek students and drinkers. *Journal of College Student Development, 41,* 313-321.

Ullman, S., & Najdowski, C., (2010). Understanding Alcohol Related Sexual Assaults: Charecteristics and Consequences. Violence and Victims. 25 (1).

Vengeliene, V., Bilbao, A., Molander, A., and Spanagel, R. (2008) Neuropharmacology of alcohol addiction. *British Journal of Pharmacology*. 154, 299–315

Appendices

Appendix A

Informed Consent

You are invited to participate in a research study conducted by Matthew Boudreau. The focus of the research is alcohol consumption and attitudes. If you chose to participate you will be asked to take part in two separate sessions, one at the beginning and one at the end of a period of 2-3 weeks. You will be asked to fill out a number of surveys concerning perceptions of student drinking and your own drinking habits. You are asked to write down your email address so that you can be sent a link to a the follow up assessment two weeks from now; your email will in no way be associated with your responses on the surveys. The list of emails will also be destroyed after the study is completed. You are also asked to write down your student ID number on the top of both your baseline and follow-up assessments, so the researchers can match the assessments and maintain confidentiality.

The total time of participation from the two sessions will be about 45-60 minutes. We cannot guarantee that any benefit will come to the participants or to society. The researchers may be reached at mboudrea@conncoll.edu.

You may decline to answer any questions and may withdraw from the study at any time. Information will be identified by a code number and not by participant's names. The data that are collected will also be combined with all other participants' information and will not be examined individually. The researcher will be available if there are any questions.

This research has been approved by the Connecticut College IRB. Concerns about any aspect of this study may be addressed to Jason Nier, Chairperson of the Connecticut College IRB, x5057, Janie@conncoll.edu

If you choose to sign below consent is given for the publication of the study results as long as confidentiality is protected.

I am at least 18 years of age and agree to participate in this study on alcohol consumption and attitudes.

_____
Signature of Participant

_____
Typed/printed Name

_____
Date

Appendix B:

Drinking Norms Rating Form (DNRF; Baer et al., 1991) with adapted instructions.

Please estimate the number of drinks a typical Connecticut College Student of the same sex would consume for each day of the week for a typical week. Write a number in each box, if you believe a typical Connecticut College student would not consume any alcohol for on a particular day, please write a 0 in the corresponding box.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of drinks consumed:							

Please estimate the number of drinks your closest friend, who attends Connecticut College, would consume on each day of the week for a typical week. Write a number in each box, if you believe your closest friend would not consume any alcohol for on a particular day, please write a 0 in the corresponding box.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of drinks consumed:							

Appendix C:

Daily Drinking Questionnaire (DDQ; Collins, Parks & Marlatt, 1985) with adapted instructions

Please estimate the number of drinks you typically consume and the number of hours spent drinking on each day of a typical week at Connecticut College.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of drinks consumed:							
Number of hours spent drinking:							

Appendix D:

 Perceived Biological Consequences of Binge Drinking Scale

When answering the following questions please consider the below bolded terms in light of their provided definitions. Please read the questions carefully and answer honestly

Binge drinking: consuming at least 4-5 alcoholic drinks in a single occasion.
Moderate drinking: One drink an hour, no more than 2-3 drinks per day.
Adolescent: 10-19 year olds

1) Consuming alcohol in moderation is beneficial for the physical health of an 18-22 year old.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

2) Alcohol is an addictive drug

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

 3) The adolescent brain is more susceptible to damage from binge drinking than a fully developed adult brain.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

4) The human brain is still in the process of development in the ages of typical college student (18-22).

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

 5) Binge drinking 1-2 times per week can have a negative effect on a young adult's learning and memory function.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

6) Young adults who abuse alcohol are more likely to have higher levels of self-rated anxiety and depression.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

Appendix E:
Readiness to Change Questionnaire (Rollnick et al. 1992)

The following questionnaire is designed to identify how you *personally* feel about your drinking right now. Please read each of the questions below carefully, and then decide whether you agree or disagree with the statements.

1. I don't think I drink too much.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

2. I am trying to drink less than I used to.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

3. I enjoy my drinking, but sometimes I drink too much.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

4. Sometimes I think I should cut down on my drinking.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

5. It's a waste of time thinking about my drinking.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

6. I have just recently changed my drinking habits

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

7. Anyone can talk about wanting to do something about drinking, but I am actually doing something about it.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

8. I am at the stage where I should think about drinking less alcohol.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

9. My drinking is a problem sometimes.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

10. There is no need for me to think about changing my drinking.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

11. I am actually changing my drinking habits right now.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

12. Drinking less alcohol would be pointless for me.

Strongly Disagree   Disagree   Unsure   Agree   Strongly Agree

Appendix F

Demographic Questionnaire

Demographic Questionnaire

How old are you?____

What is your class year?____

What is your Major/s?_____

What is your gender?
Please circle one:
Male   Female   Transgender

What race to most closely identify with?
Please circle one:
American Indian or Alaska Native   Asian   Black/African American   Hispanic/ Latino
Native Hawaiian or Other Pacific Islander   White/ Caucasian
Other:_____

Is there a history of alcoholism in your family?
Please circle one:
Yes   No

Are you a member of a club or varsity sports teams on campus?
Please circle one:
Yes   No

If so which team/s?_____

What is your estimated GPA (grade point average)?_____

What is the estimated annual income of your parents or legal guardians?_____

Appendix G

Debriefing

During this study you were asked to describe your own drinking habits and your perceptions of other students' drinking habits. The scale that was used to record your individual drinking habits was the Daily Drinking Questionnaire (DDQ; Collins, Parks & Marlatt, 1985) and the scale used to record your perceptions of others drinking habits was the Drinking Norms Rating Form (Baer et al., 1991).

You were randomly assigned to one of three groups. Two of the groups received an intervention intended to reduce risky drinking and one did not. Out of the two intervention groups one received information regarding accurate norms of college student drinking and the second group received evidential information regarding the biological consequences of binge drinking. The third group was a used as control and read a short story. The control group was used in an attempt to make sure a change in drinking behavior was due to the interventions and not due to other outside factors. One hypothesis was that the interventions would be equally effective across the two intervention groups in reducing risky drinking behaviors. In addition individuals in the intervention groups where hypothesized to score higher on the contemplation and action subscales of the Readiness to Change Questionnaire (Rollnick et al. 1992) on the follow up assessment. Finally it was hypothesized that perceptions of peer drinking habits would correlate with individual drinking habits.

You were not fully informed of the nature of the study to prevent any biases that could have resulted. To protect the validity of this study we ask you to please not share any information about it with anyone. If you have questions about your participation in the study, please contact Matt Boudreau at mboudrea@conncoll.edu. Concerns about any aspect of this study may be addressed to Jason Nier, Chairperson of the Connecticut College IRB Janie@conncoll.edu (x5057).

Please again accept our appreciation for your participation in this study. The following are references on social norm interventions for college students and the biological consequences of binge drinking:

> Neighbors, C., Lewis, M., Bergstrom R. and Larimer, M., (2006). Being controlled by normative influences: Self determination as a moderator of a normative feedback alcohol intervention. *Health Psychology*. 25(5) 571-579.

> Nixon, K., & McClain J., (2010). Adolescence as a critical window for developing an alcohol use disorder: Current findings in Neuroscience. *Current Opinion in Psychiatry,* 23(3), 227-232.

> Stephens, D., & Duka, T., (2008). Cognitive and emotional consequences of binge drinking: role of amygdale and prefrontal cortex. *Philosophical Transactions of The Royal Society,* 363, 3169-3179.

If this study has raised any concerns for you about your drinking, and you would like to speak to someone about those concerns please consider the following resources:

> Student Counseling Services (x4587), SCS@conncoll.edu

> CC Curtis (x2826), ccurtis@conncoll.edu

Appendix H

INSTRUCTIONS, PLEASE READ: Carefully read the following information because there will be instructions to perform a task after you have finished reading.

Perception vs. Reality

The following data was taken from the American College Health Association's National Collegiate Health Assessment and shows that what student perceptions other student's behaviors are not always accurate.
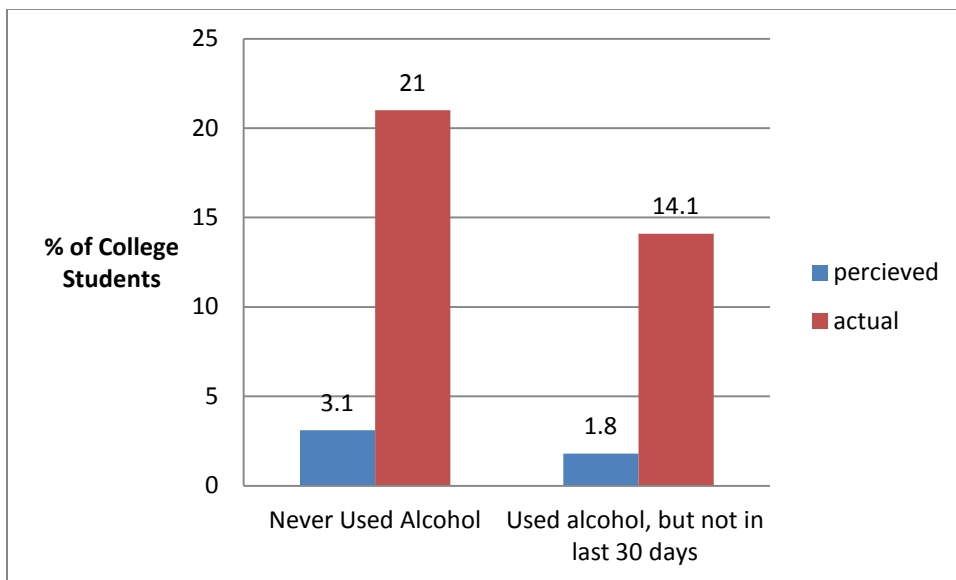
The percentage of college students who:

Never used alcohol:

Perceived: 3.1%
Reported: 21%

Used alcohol but not in the past 30 days

Perceived: 1.8
Reported: 14.1

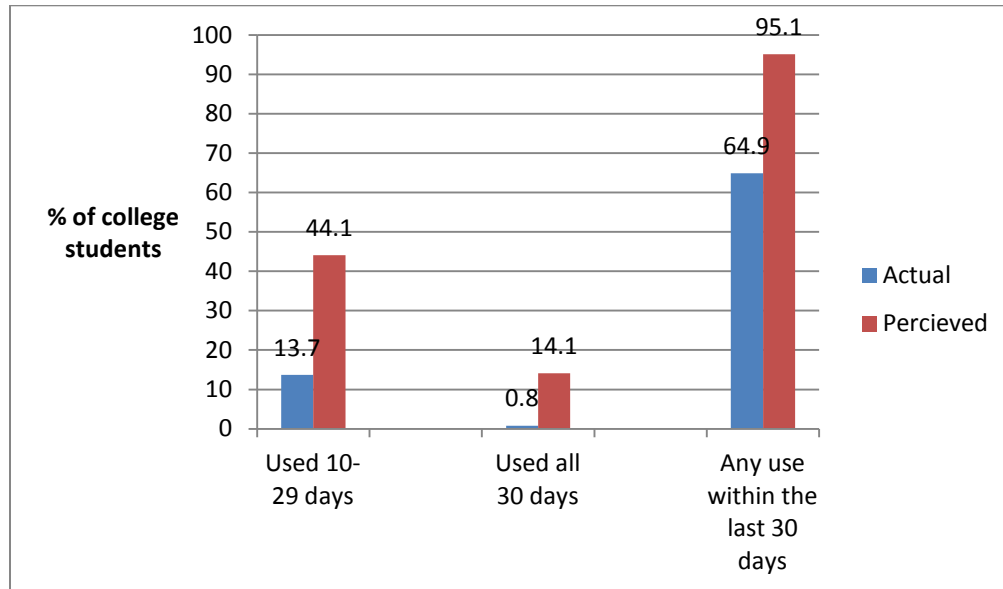The percentage of college students who:

Used alcohol 10-29 days of the month

Perceived: 44.1
Reported: 13.7

Used alcohol all 30 days of the month

Perceived: 14.1
Reported: 0.8

Any use of alcohol within the past 30 days

Perceived: 95.1
Reported: 64.9

The following information is intended to give you an accurate representation of the drinking behavior college students:

Percentage of students who:

Drank 4 or fewer drinks last time they drank:

Reported: 42.3

Drank 5 or 6 drinks last time they drank:

Reported: 14.7

Drank 7 or more drinks last time they drank:

Reported: 16.1

The next set of data was taken from the national Core Alcohol and Drug Survey (2012).

Percentage of college students who reported:

Binge drinking in the past two weeks: **43.9**
        (binge defined as 5 or more drinks in one sitting)

Believe the average student uses alcohol once a week or more: **89.6**

That they would prefer not to have alcohol available at the parties they attend: **29.7**

Thought a sexual partner was not attractive because he or she was drunk: **23.8**

Say alcohol facilitates sexual opportunity: **50.8**

Reported some form of public misconduct (such as trouble with the police, fighting/ argument, DWI/DUI, vandalism) at least once in the past year as a result of drinking or drug use: **34.8**

INSTRUCTIONS: Please use the space below to write a paragraph to a friend who may be feeling pressure to binge drink and does not wish to. Cite some of the information above in attempt to support this individual who may be feeling that all college students binge drink.

Appendix I

INSTRUCTIONS, PLEASE READ: Carefully read the following information because there will be instructions to perform a task after you have finished reading.

Some definitions that may be useful:

Binge Drinking: The consumption of 4-5 alcoholic drinks in a single occasion. (1 alcoholic drink= 12 oz of beer, 8.5 oz of malt liquor, 5 oz of wine, and 1.5 oz of 80 proof liquor)

Alcohol Use Disorder: Clinically significant alcohol abuse or alcohol dependence.

Alcohol's affects through various neurotransmitter systems

(source: The HAMS Harm Reduction Network 2012):

Alcohol easily makes its way to the brain by absorption into the bloodstream through linings of the esophagus, stomach or intestines.

Neurotransmitters are the chemical messengers which neurons (brain cells) use to communicate with one another. GABA, endorphins, glutamate and dopamine are all neurotransmitters.

GABA: Alcohol affects the GABA system and leads to relaxation and drowsiness

Endorphins: Alcohol affects the endorphin system in a manner similar to opiates, acting as a pain-killer and giving an endorphin "high". This "high" may be associated with the buzzing euphoric feeling one may experience after consuming a few alcoholic drinks.

Glutamate: It is alcohol's effects on the glutamate system which lead to staggering, slurred speech, and memory blackouts

Dopamine: All drugs which lead to dependence appear to affect the dopamine system. Stimulants like amphetamine and cocaine affect dopamine directly whereas other drugs appear to affect it indirectly. Alcohol affects the dopamine system indirectly through its effects on the GABA and endorphin systems. This activation of the dopamine reward system, and the release of dopamine is associated with a reinforcing pleasurable experience. The same dopamine system is used to reward and reinforce certain basic survival behaviors in humans such as eating and sexual reproduction.

Alcohol abuse as special concern for adolescents and young adults:

In the human cerebral cortex there seems to be a net loss of synapses from late childhood until mid-adolescence. This synaptic remodeling is evident in thinning of grey matter in the cortex as pruning of dendrites and axon terminals progresses (dendrites and axon terminals are the components which form connections between cells in the brain). The thinning process continues in a caudal-rostral (back to front) direction during maturation so the prefrontal cortex is affected last. Since the prefrontal cortex is important for inhibiting behavior, this delayed brain maturation may contribute to teenager's impulsivity and lack of control. (Breedlove, Watson and Rosenweig, 2010)

These impulsive traits in adolescents and young adults may make it more likely for them to abuse alcohol if it is available. Excessive alcohol use by adolescents can have a negative impact on brain structures causing important short and long term cognitive and behavioral consequences. The following are empirical evidences of these consequences:

 Moss, Kirischi, Gordon and Tarter (1994) found that adolescents around 15 years of age who were diagnosed with an Alcohol Use Disorder (AUD) had poorer language skills as compared to controls who were not diagnosed with an AUD.

 Sanhueza, Garcia-Moreno and Exposito (2011) found that Spanish moderate and heavy drinkers aged about 19 years performed similarly to a group of elderly non drinkers (average age of 69) on a series of neuropsychological tests (including tasks that measure memory and executive functioning). These same Spanish moderate and heavy drinkers performed worse on the neuropsychological tests than their non-drinking age matched peers.

 Hartley, Elsabagh and File (2004) found that binge drinking British University students aged 18-23 performed worse than non-drinking controls in tests of sustained attention, episodic memory and planning ability. These British binge drinkers also had higher levels of self rated anxiety and depression as compared the non-drinking controls.

Possible health benefits

(source: USDA Dietary Guidelines 2005, Chapter 9 "Alcoholic beverages"):

Alcoholic beverages supply calories but few essential nutrients. As a result, excessive alcohol consumption makes it difficult to ingest sufficient nutrients within an individual's daily calorie allotment and to maintain a healthy weight. Although the consumption of one to two alcoholic beverages per day is not associated with macronutrient or micronutrient deficiencies or with overall dietary quality, heavy drinkers may be at risk of malnutrition if the calories derived from alcohol are substituted for those in nutritious foods.

The effect of alcohol consumption varies depending on the amount consumed and an individual's characteristics and circumstances. Alcoholic beverages are harmful when consumed in excess. Excess alcohol consumption alters judgment and can lead to dependency or addiction and other serious health problems such as cirrhosis of the liver, inflammation of the pancreas, and damage to the heart and brain. Even less than heavy consumption of alcohol is associated with significant risks. Consuming more than one drink per day for women and two drinks per day for men increases the risk for motor vehicle accidents, other injuries, high blood pressure, stroke, violence, some types of cancer, and suicide. Compared with women who do not drink, women who consume one drink per day appear to have a slightly higher risk of breast cancer.

Moderate alcohol consumption may have beneficial health effects in some individuals. In middle-aged and older adults, a daily intake of one to two alcoholic beverages per day is associated with the lowest all-cause mortality. More specifically, compared to non-drinkers, adults who consume one to two alcoholic beverages a day appear to have a lower risk of coronary heart disease. In contrast, among younger adults alcohol consumption appears to provide little, if any, health benefit, and alcohol use among young adults is associated with a higher risk of traumatic injury and death. As noted previously, a number of strategies reduce the risk of chronic disease, including a healthful diet, physical activity, avoidance of smoking, and maintenance of a healthy weight. Furthermore, it is not recommended that anyone begin drinking or drink more frequently on the basis of health considerations.

INSTRUCTIONS: Please use the back of this page to write a paragraph to a friend who may be feeling peer pressure to binge drink and does not desire to. Use some of the information you have just read in an attempt to give your friend support in his or her decision to drink moderately or not at all.

Appendix J

Questions form survey monkey follow up

15. About what percentage of college students do you think binge drink at least one time per week?

☐ 1-10%

☐ 11-25%

☐ 26-40%

☐ 41-55%

☐ 56-70%

☐ 71-85%

☐ 86-95%

☐ 96-100%

16. Binge drinking 1-2 times per week has little to no negative effects on the physical or mental health of a college aged individual

Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
○	○	○	○	○