

Celebratory Drinking Among College Students: Facilitating Prevention with Social
Norms Marketing and Curriculum Infusion in a Multidisciplinary Environment

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By

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ABSTRACT

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High-risk drinking among college students remains an issue despite ever increasing prevention programs. At the University of Virginia, social norms marketing campaigns have been used to attempt to reduce participation in the Fourth-Year Fifth, a university specific high-risk drinking event; however, there has been relatively little change in participation levels over time. The first study in this dissertation evaluated who participates, perceptions about participation, and motivations for participation in the Fourth-Year Fifth. This information provided some understanding as to why previous prevention efforts had not been successful at reducing participation. A survey of 1,335 fourth-year students revealed that many students were either underestimating participation or overall perceptions regarding participation were correct. Given that social norms marketing is effective when a misperception exists where students overestimate participation, a social norms marketing campaign is not indicated in this case. Additionally, the practice is specific to one subgroup of the total college population, again suggesting population-based social norms marketing is not a viable prevention intervention.

Based on the results of the first study, a second study was created to evaluate curriculum infusion as an alternative to a social norms marketing intervention. This study assessed infusing health promotion content into a Systems Information and Engineering course and included two class sections. One section received a case study which included university specific Fourth-Year Fifth data, while the other section

received a case study which included non-university specific distracted driving data. Both sections were instructed to review and analyze the data. Both sections were then surveyed to determine if infusing the curriculum with social and health promotion content affected students' self-reported behavior associated with high-risk drinking or increased their knowledge of health promotion information. Further, the sections were surveyed to determine if infusing social and health promotion content into academic curriculum increased student engagement in the material. The results indicated that students in both sections reported learning something new and talking with friends about the case. Both groups also indicated an increased ability in confidence in the overall learning objectives of the class. Further, both groups indicated the case was personally relevant and more interesting than other cases in the course. While the results were not significant in most areas, a post-hoc analysis of the results indicates a larger sample size is needed to achieve .80 power in all outcome analyses. While curriculum infusion is not significantly effective at changing self-reported behavior associated with high-risk drinking, the use of health promotion-infused case studies does increase overall interest, learning and student engagement.

These studies measured two types of social norms prevention programs. The results revealed that although social norms marketing is successful in some cases, there are instances where alternative prevention programs are indicated. The results also showed that integrated case study curriculum can be effective for increasing student learning and engagement. This finding warrants further study on curriculum infusion as a method of educating students on both academic and health promotion content. However,

the findings do not indicate that either social norms marketing or curriculum infusion are effective at changing a specific high-risk behavior.

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APPROVAL OF THE DISSERTATION

This dissertation, *Celebratory Drinking Among College Students: Facilitating Prevention with Social Norms Marketing and Curriculum Infusion in a Multidisciplinary Environment*, has been approved by the Graduate Faculty of the Curry School of Education in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Date of Defense

DEDICATION

I dedicate this dissertation to my father, Edward Lundstrom. Without his continued support, encouragement and constant motivation, this would not have been possible. And to my beautiful daughter, Kaylee Foster, and to Delano Foster, who were willing to move and create new lives in a new place just to support me in this journey. I could not have done it without any of you. Thank you.

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CHAPTER 1:

INTRODUCTION

It is well known that college students drink and that high-risk drinking can be a part of college culture. But how pervasive is it and what are the motivations for such high-risk behaviors? According to Weschler & Wuethrich (2002), “College students nationally spend \$5.5 billion on alcohol each year, more than they spend on soft drinks, tea, milk, juice, coffee, and schoolbooks combined” (p. 4). As many as 90% of college students have reported consuming alcohol during their college years, and 43% of students reportedly engaged in high-risk, or binge, drinking in celebration of an event (Glidenmann, Wiegand & Geller, 2007). Alcohol consumption is clearly very persistent across college students as a population, with higher and lower rates on specific campuses and among specific populations (Glidenmann et al., 2007).

Wechsler, Lee, Kuo, Seibring, Nelson & Lee (2002) evaluated data from 1993-2001 College Alcohol Study (CAS) surveys and noted that while high-risk drinking rates did not significantly change, with 48% of responding institutions reporting a decrease in high-risk drinking, and 52% reporting an increase, the number of students reporting extreme drinking behaviors increased significantly.

While drinking among college students occurs throughout the year, high-risk drinking is often centered around celebratory events (Hembroff, Atkin, Martell, McCue & Greenamyre, 2007; LaBrie, Migliuri & Cail, 2009; Patrick, Morgan, Maggs & Lefkowitz, 2011; Wechsler, Kuh & Davenport, 2009; White, Odioso, Weaver, Purvis, Bass & Bruce, 2008). There are many options for addressing hazardous drinking associated with major campus events. One strategy that has been noted in research is to

employ a social norms approach to educate students on accurate drinking norms and the extent of use of protective behaviors (Haines, 1996; Martens, Page & Mowry, 2006; Perkins, Meilman, Leichliter, Cashin, & Presley, 1999).

In particular, the social norms interventions of social norms marketing and curriculum infusion have proven to be successful methods of reducing high-risk drinking. According to Berkowitz (2004), “the social norms approach provides a theory of human behavior that has important implications for health promotion and prevention” (p. 5). Within the social norms approach, the theory predicts that perceptions of peers’ attitudes and behaviors – whether those perceptions are accurate or inaccurate – have a large effect on an individual’s own attitudes and behaviors. According to the National Social Norms Institute (NSNI), the social norms approach is an evidence-based, data-driven process that is very cost-effective and can achieve large-scale positive results when properly employed. Social norms interventions is a general term that encompasses a number of different types of interventions that focus on peer influence (Berkowitz, 2004), including social norms marketing, individual personalized feedback, small group social norms, and curriculum infusion. This research will focus on two specific types of social norms interventions: social norms marketing and curriculum infusion.

Social norms marketing applies traditional social marketing techniques to support healthy behaviors and can be an effective way to reach a population, such as students at a college or university, with messages about the prevalence of healthy attitudes and behaviors. Social norms marketing is effective when students overestimate their peers’ alcohol consumption, since the campaigns provide accurate information on student drinking behaviors. Effective social norms marketing programs are based on an

assessment of students' attitudes and behaviors and employ standard social marketing techniques to increase the likelihood of message retention and behavior change (Andreasen, 1995; Haines, 1996). Successful social norms marketing campaigns follow a multi-step process in which the initial step is the collection of baseline data (Haines, 1996). Once established, those norms can be marketed to students to raise awareness of how their peers are actually behaving.

Curriculum infusion is an educational approach that brings together classroom learning and life experience. Specifically, it involves blending alcohol prevention content into academic courses as a method of positively affecting students' attitudes and behaviors towards alcohol. This infused curriculum increases students' knowledge of alcohol-related issues and provides students with the information needed to make more informed choices. At the same time, because students are actively involved in learning about issues that directly affect their lives, they are better prepared to bring about positive change either in their own behaviors or among their peers (Lederman, Stewart & Russ, 2001; Riley, Durbin & D'Ariano, 2005; Swanson, Zegers & Zwaska, 2004).

Both types of social norms interventions have shown success in previous research and will be relevant to this dissertation, which begins with the questions: Why are students participating in the Fourth-Year Fifth, a high-risk drinking event at the University of Virginia, and why are social norms marketing campaigns designed to reduce participation ineffective at reducing participation in this specific event? These initial questions led to the first study in this dissertation, conducted with the University of Virginia's Gordie Center for Substance Abuse Prevention, which showed that the Fourth-Year Fifth practice is primarily limited to a particular group of students, specifically

Greek-affiliated males. Therefore, the levels of participation are not easily described in marketing campaigns because while approximately 20% of the fourth-year population participates, less than 10% of non-Greek affiliated females participate whereas over 50% of Greek-affiliated males participate (Foster, Bass & Bruce, 2011). For this reason, standard social norms marketing campaigns are not appropriate for this population as a whole because there is no population norm. Further, there is no common misperception to correct regarding overall participation as many students are either underestimating participation or correctly estimating overall participation in this practice.

With the first questions addressed, a second set of questions was developed to determine if an alternative social norms intervention might be more effective at reducing self-reported high-risk drinking behaviors associated with the Fourth-Year Fifth. Specifically, does infusing health promotion content into academic curriculum positively impact student self-reported behavior associated with high-risk drinking? And, does infusing social and health promotion norms content into academic curriculum increase student engagement and overall learning of the academic or health promotion content? In coordination with Ellen J. Bass, Ph.D., R. Reid Bailey, Ph.D., the University of Virginia Systems and Information Engineering department, and a learning assessment grant from the University of Virginia, a case study lesson was created based on the Fourth-Year Fifth data. While the second study did not demonstrate a significant decrease in self-reported high-risk drinking or a significant increase in health promotion content knowledge, it did reveal a significant increase in overall learning and engagement in the material through the use of case studies. Students overwhelmingly reported learning something new. Also, most students reported discussing the material outside of class,

which is an effective method of spreading knowledge to a larger community. This study also showed increased engagement through students' report of interest in the case study topics. This validates an area for further use of case studies to enhance learning in the classroom both for academic lessons as well student affairs social and health promotion lessons that are presented in an academic setting.

This dissertation brings together several areas, each important in its own domain and interconnected through student learning. These studies suggest it is most important in substance abuse prevention programming to evaluate the high-risk drinking event in depth and be aware of the specific population and motivations associated with high-risk drinking, so that a targeted intervention can be created to correct misperceptions that may exist. Correcting these misperceptions is critical in reducing the negative consequences associated with high-risk drinking. Given that each school, event, population and motive is unique, it is important that student affairs professionals do not rely on 'one size fits all' intervention programs. It is critical to ensure that each intervention reaches the correct audience, with the appropriate message, at the right time in order to ensure maximum effectiveness and ultimately student safety.

DEFINITIONS OF KEY TERMS

- **High-risk or binge drinking** -- Refers to a pattern of drinking that raises blood alcohol content (BAC) levels to 0.08 g/dL, which usually occurs after approximately 4 drinks for women and 5 drinks for men in about two hours (National Institute on Alcohol Abuse and Alcoholism).
- **Drink** – A standard drink is 12-ounces of beer, 4 ounces of wine, or 1 ounce of liquor. Each of these contains about one-half ounce of pure alcohol, which is a little more than the average amount of alcohol that the body can metabolize in one hour (Gordie Center for Substance Abuse Prevention).
- **Fourth-Year Fifth** - a practice at the University of Virginia, started in the mid-1980's, whereby fourth-year (college seniors) students attempt to consume a fifth of liquor (750 mL) on the day of the last home football game. This practice is an 'informal' tradition that has taken hold over many years.
- **First-Year** – A University of Virginia undergraduate who is in his or her first year in college (college freshman).
- **Fourth-Year** – A University of Virginia undergraduate who is in his or her fourth year in college (college senior).
- **Greek-affiliated student** – A student belonging to a social fraternity or sorority.
- **Social Norms Marketing** – A positive message marketed to a general population emphasizing the normative, healthy attitudes or behaviors of a population (National Social Norms Institute).
- **Curriculum Infusion** - an educational approach in which social and health content is introduced into academic courses that do not traditionally address these topics, can be

an effective way to address health promotion concerns (Network for Dissemination of Curriculum Infusion).

- **Universal preventive interventions** – a broad approach to prevention that is often directed at the entire population regardless of individual risk. Universal prevention interventions typically target entire communities. (Substance Abuse & Mental Health Services Administration).
- **Selective preventive interventions** – an approach that is often directed towards specific individuals or subpopulations at higher than average risk for developing substance abuse disorders. Selective interventions typically target biological, psychological, or social risk factors prominent within a specific group. (Substance Abuse & Mental Health Services Administration).
- **Indicated preventive interventions** – an approach that is often directed at specific high-risk individuals who may be showing signs or symptoms of substance abuse disorders, but prior to an actual diagnosis of such disorder. Indicated interventions typically focus on the immediate risk and surrounding the individuals. (Substance Abuse & Mental Health Services Administration).

CHAPTER 2:

LITERATURE REVIEW

The Problem

College students have been consuming alcohol since colonial colleges were established in the earliest days of college life (Thelin, 2004). American drinking customs were brought to this country by the first settlers, and over time have been affected by changing political, religious, economic, military, philosophical, and other factors (Strauss & Bacon, 1953). Alcohol has always been a part of the college culture and it is customary for many to consume alcohol while in college (NIAAA, 2002).

While a seminal work in its time regarding alcohol use among college students, Strauss & Bacon's (1953) *Drinking in College* lacked research about factors that influence high-risk drinking among college students. However, in the 60 years since its publication, there has been a considerable increase in the amount of research devoted to understanding college students' high-risk drinking behaviors and motivations. With 90% of college students having reported consuming alcohol during their college years, and 43% of students reportedly engaging in high-risk drinking in celebration of an event (Glidenmann et al., 2007), drinking is clearly very persistent across college students as a whole population, with higher and lower rates on specific campuses and among specific populations.

Today, college students overwhelmingly drink alcohol whether in moderation or to excess. They often drink before legally permitted and tend to consume alcohol in more high-risk methods such as drinking games and consuming large quantities in short periods of time, without monitoring or pacing alcohol consumption. Unfortunately, the

negative consequences of these drinking behaviors can range from decreased academic performance to death (Hingson, Heeren, Winter & Wechsler, 2005). The numbers vary depending on how calculated, but it is estimated that 1,400 college students aged 18 to 24 are killed each year as a result of drinking (Wechsler & Wuethrich, 2002). This extreme number is significant and indicative of a very serious problem that college administrators must continue to address.

Negative Consequences.

The negative consequences associated with high-risk drinking have been studied in depth. Specifically, many students experience academic, interpersonal, and legal difficulties as a result of their excessive alcohol use (Hingson et al., 2005; Wechsler, Lee, Kuo & Lee, 2000). Understanding the effect alcohol has on the developing brain is vital to substance abuse prevention education and programming. In general, alcohol abuse has been associated with memory and executive cognitive dysfunction, including problems with attention-concentration and regulation of behavior (Blume, Schmalzing & Marlatt, 2005). The attention-concentration and behavior components are especially important for the success of college students. Chronic alcohol abuse has been associated with short-term memory and learning problems, which can be exacerbated by task complexity. Further, drinking to intoxication has been associated with difficulties in learning associated with verbal memory tasks (Blume et al., 2005).

Blume et al. (2005) discuss that while it was once thought that only long-term chronic alcohol abuse was associated with cognitive problems, evidence suggests that even adolescent abusers of alcohol may be at risk for cognitive impairment. This

knowledge, while important, is not as widely known or disseminated as it should be. Students may not be aware of the negative impact their drinking behaviors have on their brains. Although moderate alcohol consumption does not necessarily lead to major problems, alcohol abuse by college students, particularly binge drinking, is a serious problem that is often addressed in higher education research (Burggraf, Durbin & D'Ariano, 2005; Lederman, Stewart, Barr & Perry, 2001). Specifically, research (Glindenmann et al, 2007; NIAAA, 2002; Swanson, Zegers & Zwaska, 2004) shows that alcohol abuse by college students has been strongly correlated to poor academic performance and high attrition rates, and negative consequences associated with high-risk drinking can range from minor outcomes such as a hangover to major consequences such as physical injury or death. Despite the negative consequences associated with high-risk drinking, many students continue to drink at high-risk levels.

Motivations

It is critical that college administrators and substance abuse prevention practitioners understand what motivates students to drink in high-risk ways. Recognizing and considering these motivations is important in terms of what administration can do to create change. There are several specific motivations relevant to this dissertation and included here.

Event-specific high-risk drinking.

While drinking among college students occurs all year long, high-risk drinking tends to be centered around celebratory events, which can vary across colleges and

universities (Hartford, Weschler & Muthen, 2003; Jones, Oeltmann, Wilson, Brener & Hill, 2001). While much of the research concerning drinking on college campuses focuses on typical drinking behaviors, there is research on celebratory drinking, which examines high-risk periods such as fraternity recruitment or spring break (Patrick et al., 2011; Wechsler et al., 2009), and singular events such as Halloween, 21st birthdays and annual sporting events (Hembroff et al., 2007; LaBrie et al., 2009; Neighbors, Spieker, Oster-Aaland, Lewis & Bergstrom, 2005; White et al., 2008). These are significant because many students engage in potentially dangerous drinking behaviors on a single day.

High-risk drinking, while common on typical weekend nights, is especially prevalent during specific events. Research on event-specific high-risk drinking shows not only are drinking levels higher on such days (Merlo, Hong & Cottler, 2010; Neal & Fromme, 2007; Patrick, Lewis, Lee & Maggs, 2013), but in some cases, the levels of drinking or the populations most at-risk have been misunderstood. For instance, Glidenmann et al. (2007) sought to determine if students would be significantly more intoxicated during Halloween and St. Patrick's Day compared to the same nights of a different week. Their research showed that intoxication on Thursday nights was consistently high, and Thursday night alcohol consumption needs to be studied further to understand how this new trend is affecting how students drink. As such, Thursday nights may need to be evaluated as a specific high-risk drinking event.

Another such study hypothesized that consumption rates would be significantly higher during celebratory events as compared to typical weekends, but the results were contrary and indicated the number of drinks consumed during a typical weekend were

significantly higher than during celebration (Woodyard & Hallam, 2010). Clearly, each institution must evaluate its own population and students' motives for high-risk drinking to ensure interventions are appropriate and maximally effective. Similarly, game days at many colleges and universities are considered celebratory events where students consume an increased amount of alcohol. Several studies indicate that game day alcohol consumption is greater than during non-game day drinking occasions (Glassman, Dodd, Sheu, Rienzo & Wagenaar, 2010; Glassman, Werch, Jobli & Bian, 2007; Merlo et al., 2010; Neal & Fromme, 2007). Game day consumption should be considered celebratory with specific motives evaluated to create a targeted prevention program in the same way as any other holiday or high-risk event.

While it is important to focus on events as a motivator, not all events are the same. Several studies evaluated drinking levels at the Foxfield Races, a celebratory event in close proximity to the University of Virginia known for high levels of alcohol consumption. The research shows somewhat conflicting results. One study (Guha, Bass & Bruce, 2006) reported a significant increase in alcohol consumption at the Foxfield Races as compared to a typical week, Halloween, and regular home football games. Interestingly, research done the following year showed that the number of drinks consumed at Foxfield was not significantly higher than Halloween, but was significantly higher than a typical Saturday night (Guha, Bass & Bruce, 2007). The 2006 study included a beta sample of 78 participants, and the 2007 study included a stratified random sample by class year of those who attended Foxfield, which included 244 participants. The difference in sample validity likely explains the varying results. Of note, while the researchers previously believed the high-risk drinking at Foxfield Races to be a

predominately Greek-affiliated issue, their study indicated that was not the case, and they concluded that prevention efforts would need to be expanded (Guha et al, 2006).

Neighbors, Walters, Lee, Vader, Vehige, Szigethy & DeJong (2007) evaluated how drinking rates during specific events compare to standard, or non-event, days. Not only did they find that drinking rates increased during celebratory events, they found that perceived drinking norms are likely to be different for specific events than for general drinking occasions as well. Each event is different; much like each college and student population is different, so each must be evaluated independently. In one study, Lefkowitz, Patrick, Morgan, Bezemer & Vasilenko (2012) focus on a student-constructed holiday, where students created, advertised, and participated in an event that was not otherwise acknowledged or sanctioned. In this study, researchers evaluated several data sources to determine how drinking on that day compared to other days. They found that students consumed twice as much on this day as on other typical weekend days, and were four times more likely to participate in heavy drinking as compared to other days (Lefkowitz et al., 2012). The phenomenon of a student-constructed holiday isn't unique. The Fourth-Year Fifth practice at the University of Virginia is a student-constructed holiday/tradition as well. As such, the Lefkowitz et al. (2012) study is especially relevant. Overall, research focusing on drinking levels associated with specific events is varied and the results are often inconsistent. While understanding how event-specific drinking may differ from standard drinking, another important consideration is who is participating in a drinking event and how that factors into prevention interventions.

Population-specific high-risk drinking.

There are many subpopulations of students on college and university campuses such as first-year students, athletes and Greek-affiliated students. The focus of this section is on students who self-identified as Greek-affiliated specifically. Several studies evaluated specific subpopulations of students to determine how their drinking varied from the college population as a whole (Bruce & Keller, 2007; Chauvin, 2012; Hutching, Lac, Hummer & LaBrie, 2011). Two studies hypothesized that Greek-affiliated students would exhibit higher rates of high-risk drinking and engage in more alcohol use than non-Greek affiliated students (Chauvin, 2012; Hutching et al., 2011). Both studies concluded that Greek-affiliated students do report significantly higher levels of high-risk drinking and alcohol consumption. According to Bruce & Keller (2007), the challenge of working with Greek-affiliated populations is that the norms reflected within their community are often not comparable with the greater school community. They also found that Greek-affiliated students tend to have accurate estimates of peer consumption, so campus wide behavioral norms may not be helpful for that specific group.

Turrisi, Mallett, Mastroleo & Larimer (2006) and O'Brien, McNamara, McCoy, Suffin, Wolfson & Rhodes (2013) had similar conclusions stating that it can be difficult to 'norm' drinking behavior among Greek-affiliated students because of how risky the normal level is in many cases. They further declare that while some interventions have emerged that show promise in the general college student population, much of that same success hasn't been shown in the Greek communities. As such, once a specific population has been identified, it is not always easy to target that population directly since each subpopulation is often seamlessly blended into the larger community.

Tradition.

In addition to general celebratory alcohol consumption, Weschler & Wuethrich (2002) discuss school rituals as an important motivating factor when it comes to high-risk drinking. There have been few studies evaluating undesirable college student traditions, but there is extensive literature about the positive aspect of traditions (Cheng, 2004; Nichols, 2004; Van Jura, 2010). The positive literature focuses on how traditions build community among students and how maintaining such traditions is an important responsibility of student affairs professionals. However, when focusing on the undesirable traditions, there is far less research. Clement (2002) discusses specific steps that student affairs professionals can take to mitigate the negative consequences associated with particularly dangerous traditions. Her suggestions include event management aspects such as agency coordination, information dissemination with ticket distribution, access to events and general staffing. This research focuses mostly on institutional sanctioned traditions.

While many traditions are sanctioned by colleges and universities, there are many that are student developed and simply become traditions over time. It is these traditions that can often be difficult to stop unless students are getting injured or dying. Such is the case with the Texas A & M bonfire which left 12 students dead and another 27 injured. Other events are difficult to stop completely, but can be altered to increase safety, such as the Slippery Slope event at Cornell University where inebriated students slide down a hill causing countless injuries annually. After a year with 114 incidents, administration limited the number of alcoholic drinks a student could bring and also instituted non-

alcoholic alternative events. Still other traditions are so entrenched in the culture, that despite university efforts, no changes have been made (Weschler & Wuethrich, 2002).

Other motivations.

In addition to perceptions, past experiences serve as a guide, or in some cases a motivator, for many students in terms of future decisions related to alcohol consumption (Mallett, Lee, Neighbors, Larimer & Turrise, 2006). Mallett et al. (2006) posit that another type of information individuals use to make decisions about the quantity of alcohol to consume is intrapersonal such as an individual's prior drinking experiences. Often, individuals draw from past experiences as a guide to future decisions. For example, if a student wakes up after a night of heavy drinking and is injured or in a strange place, then he or she may adjust future drinking to minimize such events. However, if a student engaged in heavy drinking with friends and had a positive social experience, then he or she may feel comfortable with engaging in the same behavior in the future (Mallett et al., 2006).

Mohr, Brannon, Mohr, Armelli & Tennen (2008) also studied the influence of personal experiences on college students' drinking. They discuss that in much of the literature, attention is placed on normative influences and students' motivation to drink to have fun with others, yet at least some students also drink to alleviate negative experiences (Mohr et al., 2008). Students with higher social anxiety may experience increased negative consequences associated with high-risk drinking, and the trait of self-consciousness may be particularly relevant in the college student population, where peer influence and desire to succeed could work to increase self-awareness (LaBrie, Pedersen,

Neighbors & Hummer, 2008). They further discuss self-consciousness as it relates to social influence, which may have a unique relationship to alcohol among students where social influences and social identity issues are a factor. The social context of college itself is a challenging environment particularly to those with social anxiety where students are regularly faced with social scenarios involving meeting new people and experiencing new situations, especially decisions about alcohol use (LaBrie et al., 2008). Pressure from other students has been documented as a major source of influence on students' drinking rates, and public self-consciousness (Borsari & Carey, 2001).

Research on Current Drinking Patterns

Large-scale longitudinal research has been conducted to determine the extent to which high-risk drinking has changed, or not changed, over time. A study conducted in 2009 reviewed data from 20 annual administrations of the National Survey on Drug Use and Health over a 27-year period which yielded over 500,000 data points. This longitudinal study showed no decrease in high-risk drinking among college men and an increase in high-risk drinking among college women, despite ever increasing prevention programs (Grucza, Norberg & Bierut, 2009).

In response to Wechsler et al.'s (2002) findings that 52% of responding institutions reported an increase in the number of students reporting extreme drinking behaviors, Ziemelis, Bucknam & Elfessi (2002) further analyzed the CAS data and limited their study to institutions which have noted prevention programs. All results were compared against CORE Institute Alcohol and Other Drug Survey data and the results showed significant variation in high-risk drinking change among institutions.

Interestingly, while 47% of the CAS sample showed a decrease in high-risk drinking, 64% of the CORE sample shows a decrease. While these two studies evaluate similar data, the CORE sample includes prevention programs as a variable, which highlights the importance of such programs. In addition to prevention programs as a variable, other variables such as specific events, specific populations, or specific norms messages should be considered.

Prevention

Under the standard of in loco parentis, college administrators are often considered responsible for the behavior of students during their four years at college. For this reason, college administrators have to set policies associated with alcohol consumption. In recent years, more and more colleges have substance abuse prevention education programs to serve students. Current research shows the presence of substance abuse prevention programs can help mitigate the negative consequences associated with high-risk drinking (Ziemelis et al., 2002). While most prevention offices have the same goal of reducing negative consequences associated with high-risk drinking, the programs developed often report minimal rates of effectiveness overall (Burke & Stephens, 1999).

Colleges and universities often engage in a variety of health promotion campaigns such as campus-wide marketing events, campus-wide speakers, and safety events to raise awareness of health promotion topics. These are great tools for providing general information in that they provide opportunities to disseminate materials and information to large numbers of students in relatively short time periods and at low expense. However, there is no evidence that these programs are effective at decreasing negative

consequences associated with high-risk drinking (Croom, Lewis, Marchell, Lesser, Reyna, Kubicki-Bedford, Feffer & Staiano-Coico, 2009). As such, more targeted initiatives are needed. While there is significant research on prevention in general, there is also research on specific types of prevention.

Types of prevention.

According to the National Institute of Medicine (IOM), there have been several differing definitions of prevention. In 1994, the IOM adapted Gordon's (1987) categories of universal, selective, and indicated, to create an overall continuum of care model, which includes promotion, prevention, treatment, and maintenance. Social norms marketing is typically a universal intervention targeting the campus population in general and not any one specific person or group of people. Social norms marketing campaigns are widely used with success in correcting misperceptions while maintaining low risk to the population. Alternatively, curriculum infusion is a selective prevention initiative where the intervention is targeted to a specific population such as the students in a class. Research suggests this method is also effective at correcting misperceptions in some cases while maintaining a moderate cost with minimal risk (O'Connell, Boat & Warner, 2009).

Other types of prevention include brief motivational interventions (BMIs), which have shown to be effective in reducing estimated blood alcohol concentrations (eBACs), but not at reducing drinking and alcohol-related negative consequences (Cronce & Larimer 2011). However, Cronce & Larimer (2011) state that BMI is more effective when used for mandated students. They further suggest that BMI, when used in

conjunction with personalized feedback intervention (PFI), shows increased alcohol knowledge among students receiving the intervention. However, the intervention showed equivocal or negative effects on drinking rates and subsequent negative consequences. An issue with using BMI and PFI is that they are targeted and specific to individuals. As such, attempting to target a larger but specific population with the information can be challenging.

Other prevention programs include late night programming, personalized normative feedback, and web-based brief motivational interventions, among others. Similar to the prevention methods discussed above, each of these may be challenging when focusing on a specific-event, specific-population, or students who are not mandated to receive an intervention.

Social Norms Theory

In thinking about how to approach social norms and social norms theory, it is important to first consider Strauss & Bacon's (1953) idea that:

broad generalizations are often made about specific types of behavior or kinds of people on the basis of prominent characteristics exhibited only by certain members of the group. Thus college professors are described as absent-minded and women as poor drivers. The fact that the majority in these groups do not display the behavior in question tends to be overlooked. Popular stereotypes of this kind are continually reinforced by isolated episodes of a humorous or dramatic nature and are thus perpetrated in folklore. Behind each of these beliefs can be found convincing but faulty reasoning. (p. 36)

While written over 40 years before social norms became a common prevention initiative, this faulty reasoning is the basis for social norms marketing, and why it has proven effective in many studies. The reality is that people tend to notice what is most

extreme or exaggerated and fail to notice more common behaviors. A major influence on social norms is the media, which has been a powerful source of influence shaping attitudes, beliefs, norms, and behavior. This can work both ways, perpetuating the falsities as well as correcting them (Perkins, 2002). The ‘group think’ process that so often occurs is the basis of social norms theory, which states that behaviors are often influenced by incorrect perceptions of how members of a social group think and act (Ramos & Perkins, 2006).

Fundamental to understanding norms is accepting variation in human behavior. Group norms which are reflected in the dominant attitudes, expectations and behaviors not only serve to characterize these groups, but also regulate group actions which in turn perpetuate the collective norm (Perkins, 2002). Perkins (2002) further discusses that it is common for many people to think of themselves as individuals, yet there remains a strong tendency for people to conform to group patterns and expectations. This has been consistently documented in research (Berkowitz, 2004; Haines, 1996; Perkins & Craig, 2006). Further, while more permissive peer norms appear quite influential, research has clearly documented persistent differences between what students believe to be their peer norms and the actual norms. Most students tend to think that their peers’ drinking attitudes are, on average, more permissive than is true. Similarly, most students believe that their peers consume more frequently and more heavily, on average, than is really the norm (Perkins, 2002).

Based on the misperceptions of norms, which are so pervasive among college student populations, the social norms approach is a successful plan to change behavior by correcting misperceptions. In addition, the social norms approach works within a theory

of human behavior that has important implications for health promotion and prevention (Berkowitz, 2004). In particular, social norms interventions focus on peer influences, which have been shown to have a greater impact on individual behavior than any other social influences (Berkowitz, 2004).

Social norms theory focuses on the idea that students misperceive the alcohol consumption levels of their peers. These misperceptions can affect students' own drinking behaviors. According to Berkowitz (2004), misperceptions not only exist, but they exist in mass numbers. He discusses over 20 studies that exist which indicate a positive correlation between misperceptions and drinking behavior. Specifically, two studies using national survey data to evaluate how perceptions affect drinking show that perceptions of norms do matter in how much students consume (Perkins & Wechsler, 1996). Moreover, research shows most students misperceive norms at their schools. This was confirmed by a study with a sample size of over 48,000 students at 100 colleges and universities (Perkins et al., 1999). These misperceptions clearly indicate the importance of social norms to identify and correct such misperceptions in an effort to reduce high-risk drinking.

Levels of misperceptions and how much those levels vary have been studied as well. Lee, Geisner, Lewis, Neighbors & Larimer (2007) researched the relationship between perceived norms, personal approval of drinking, and actual alcohol consumption. They found that alcohol consumption is positively associated with perceived norms. Specifically, they note a positive relationship between perception of friends' drinking and one's own drinking. Broadwater, Curtin, Martz & Zrull (2006) also

evaluated perceptions of peers drinking and personal behavioral intentions. They found that when misperceptions were corrected, actual reported alcohol consumption decreased.

Perkins & Weschler (1996) demonstrate that students' perceptions of social norms concerning campus alcohol use vary considerably. Their research further suggests that alcohol abuse prevention efforts on college and university campuses may be more effective in reducing problem drinking by including a proactive strategy that addresses perceived norms in campus initiatives. That is, if students' misperceptions are exaggerated, then correcting those misperceptions may be an effective step in deterring hazardous drinking.

Social Norms Marketing

Once it is known that misperceptions exist, implementing a campaign to correct those misperceptions, and to subsequently reduce the negative consequences associated with high-risk drinking is critical. Extensive research has been done evaluating social norms marketing campaigns, and while many researchers have found social norms campaigns to be highly effective at reducing high-risk drinking (Cox & Bates, 2011; Haines, 1996; LaBrie et al., 2009; Perkins & Craig, 2006), there have been a few studies that have found the intervention to be less effective (DeJong, Schneider, Towvim, Murphy, Doerr, Simonsen, Mason & Scribner 2009; Montealegre, Bass, Bruce & Foster, 2011; Swanson et al., 2004).

In one of the earliest campaigns, Haines (1996) discusses a study in which researchers implemented a campaign geared at correcting the misperceptions about actual drinking rates among students. The result of correcting misperceptions was an 18%

reduction in perceived binge drinking and a 16% reduction in actual binge drinking. This was the most promising reduction across the many differing types of campaigns that were implemented, and the following year saw even further reduction in binge drinking rates (Haines, 1996).

Additional research (Martens et al., 2006; Wolfson, 2000; Trockel, Williams & Reis, 2003) focused on social norms marketing and correcting the misperceptions associated with binge drinking on college campuses. Each of these studies focused on assessing students' perceptions of drug and alcohol use among peers, and how perceptions related to individual student's own use. They found that misperceptions occur because the abuse of alcohol in student groups is often recalled more vividly than non-drinking events, thereby getting disproportionate attention. This inordinate recollection of the behaviors of intoxicated peers at campus drinking events may inflate a student's sense of what is normal peer behavior.

DeJong, Schneider, Towvim, Murphy, Doerr, Simonsen, Mason & Scribner (2006) reported the success of a social norms marketing intervention through an 18-site randomized trial with a large sample size ($n=2,939$). However, in 2009 a replication of the study failed (DeJong et al., 2009). DeJong et al. (2009) concluded that additional factors in the studies must be analyzed along with social norms marketing to determine why the results vary and how to increase consistency.

Lee et al.'s (2007) study recognized that research has shown that perceiving drinking is more prevalent among peers and is associated with increased drinking. Their study evaluated the unique influences of such perceptions. They found a positive relationship between perceptions of closest friends' drinking behavior and one's own

drinking, and found it is stronger for students who believe their friends are highly approving of risky drinking. They also found that misperceptions associated with peers' drinking were higher among students who consumed alcohol for social reasons as opposed to other reasons.

Perkins' (2002) prepared a literature review that focused on social norms marketing and its successes. He provided a review of theoretical and empirical studies and found that program interventions using an intensive social norms marketing approach are promising. Several institutions with such programs experienced significant reductions in high-risk drinking rates of as much as 20% in a relatively short time period.

Intervention Variables.

One theme evident in the research on social norms marketing is that numerous variables can affect a campaign. The variables must be evaluated to determine which are helping or hindering the success of a given campaign. Four of the environmental variables, which have appeared in the research, are highlighted here.

Message believability. In addition to considering various motivations or specific variables such as events or populations, there is the variable of the social norms marketing message itself and whether it is believable. The message comes in many forms and can be disseminated through media, personalized feedback, mass campus-wide marketing, or at specific events. No matter how the message is disseminated, the specific message is important, as believability can factor into overall effectiveness. Park, Smith, Klein & Martell (2011) concluded that social norms marketing campaigns may be more effective if message believability is considered. This finding is further supported by

Moore, Williams, Moore & Murphy (2013), who concluded that social norms campaigns may be more effective if factors such as ad believability are considered.

Outlet density. Outlet density refers to the number of alcohol establishments in a given area. Scribner, Theall, Mason, Simonsen, Schneider, Towvim & DeJong (2011) evaluated alcohol outlet density to determine what affect that might have on the effectiveness of social norms marketing campaigns. The results indicated that social norms marketing campaigns may be less effective on campuses with higher density alcohol outlets within three miles. DeJong et al. (2009) cite outlet density as a possible reason their replication failure may have occurred.

Referent groups. Another variable that has been researched in conjunction with social norms interventions is referent groups.. Cox & Bates (2011) evaluated distal vs. proximal referent groups, types of norms, and campus culture to determine what effect, if any, these variables may have on the success of the social norms marketing campaigns. The results do indicate that referent groups play a significant role in reported alcohol use, but the study used a small sample size of 10% reporting alcohol use among a low-use demographic of a predominately Mormon campus.

Saturation. In cases where social norms marketing is reported as ineffective at correcting misperceptions, it may be that evaluating social norms interventions in the context of specific events or with specific populations is key to understanding the lack of effect. Perkins & Craig (2006) successfully implemented a social norms marketing

campaign targeted at athletes and found significant declines in personal alcohol use within this population. They concluded that social norms can work, but that targeted saturation is necessary. Another study (Montealegre, Bass, Bruce & Foster, 2011) evaluated a social norms marketing campaign and concluded similarly, that while not statistically significant in overall effectiveness for this particular study, saturation has been shown to be a factor in effectiveness of other campaigns and should be studied further.

There has been extensive research on social norms interventions as evidenced by several meta-analyses conducted on the subject. Carey, Scott-Sheldon, Carey & DeMartini (2007) conducted a meta-analysis of 62 randomized trials and the 2010 Cochrane review evaluated 22 controlled trials involving over 7,000 college students. Carey et al. (2007) found that social norms marketing programs are sometimes effective at reducing alcohol misuse, though not always. Overall the results are inconsistent indicating further research is needed.

Curriculum Infusion

Curriculum infusion research is somewhat limited, but has grown in recent years. A survey of 22 alcohol prevention coordinators in 2011 indicated that 40.9% are not using curriculum infusion at all, and that only 4.5% are using curriculum infusion with intensity (Ringwalt, Paschall & Gitelman, 2011). Interestingly, some research on curriculum infusion merely explains the programs that were implemented, and while claiming success, lack any real evaluation of the effectiveness of the programs (Buettner,

Andrews & Glassman, 2009; Mitchell, Darrow, Haggerty, Neill, Carvalho & Uschold, 2012).

Research on curriculum infusion is pointing to success in correcting misperceptions, but less success in changing behavior related to high-risk drinking (Cordero, Israel, White & Park, 2010; White, Park & Cordero, 2010). While these studies indicate less success in changing behaviors, the success in the correction of misperceptions, which is what the social norms model is intended to do, could be seen as a positive indicator for the programs. Other studies also indicate positive results because the unit of measurement is misperceptions. Specifically, Lederman et al., (2001), Lederman, Stewart & Russ (2007), Pugsley & Clayton (2003), and Riley, Durbin & D'Ariano (2005) all indicate success in curriculum infusion in various areas of correcting misperceptions, improving attitudes towards material, and in some cases even self-reported desire to change own drinking habits.

Lederman et al. (2001) made clear that media campaigns alone often fail to get students to personalize messages about alcohol consumption, and that experience-based activities, such as infused curriculum, allow students to examine their own behavior and other students' perceptions of those behaviors. They conclude that beyond adding richness and context to conceptual classroom learning, curriculum infusion provides opportunities for students to examine and reflect on their own attitudes and behaviors through examination of compelling and relevant social and health issues. Further, Kolb (1984) states that students are more engaged and retain information better when they are involved in the learning process through interaction with the content. This interactive learning process is what Lederman et al. (2001) term the socially situated experiential

model of learning. They demonstrate that learning needs to be interactive and experiential in order to be maximally effective. In order for students to effectively learn what is being taught, whether academic course content or health promotion material, students must be provided the information in a concrete way that is relevant to their own experiences. Activities that involve the learner in an experience, such as creating or evaluating case studies or reflective observation, are useful. These activities require students to step back and evaluate their experiences using a variety of methods, which helps students think more broadly about the topic (Kolb, 1984).

While curriculum infusion has been cited as a promising educational approach to substance abuse prevention in higher education, in order to be truly effective interventions should go beyond providing information and ultimately lead to changes in student attitudes and behaviors. Researchers hypothesize that behavior change requires relevant examples that actively involve students in the content in a truly engaging way (Lederman et al., 2007; Lederman et al., 2001; Lederman, 1992). To further the process of engaging students in the classroom, Venville, Wallace, Rennie & Malone (2001) advocate the use of problems, issues and concerns that are relevant to the students in their everyday lives, bringing together classroom learning and real life.

The use of case studies as a learning tool has been studied within specific disciplines, such as Business and Science, and they have been found to be successful in increasing learning and engagement (Jerrard, 2005; Yurco, 2014). Kreber (2001) evaluated case studies as the primary tool for experiential learning and found that case studies prove useful because the educational goal is to provoke students' involvement and active experimentation with the issue. This self-directed learning is potentially the first

step in attitudinal and behavioral change among students. Kreber (2001) argues that the guidelines for the most effective case study approaches are those which raise a thought-provoking issue, provide elements of conflict, lack an obvious answer, and encourage students to take a position on an issue.

Research suggests that building on current substance abuse prevention programs, curriculum infusion using case studies may be beneficial because it encourages student engagement with the material being taught. However, according to Lederman et al. (2001), while perceptions about social norms were more accurate for students in the infused courses, curriculum infusion was not deemed effective in reducing self-reported high-risk drinking. Evaluation studies of this approach suggest that while the strategy made students more knowledgeable about characteristics of alcohol, it rarely produced any notable benefit in terms of reductions in problem drinking (Lederman, 2001). These studies are promising in terms of correcting misperceptions, but it should be noted that the quantity of research related to curriculum is far less than that of social norms marketing.

Conclusion

There is an abundance of research indicating that misperceptions about alcohol consumption exist among college students, and that correcting those misperceptions can reduce high-risk drinking behaviors. However, the research on how to reduce high-risk drinking remains rather mixed and somewhat inconclusive. There is also research on social norms interventions, specifically social norms marketing, but the research includes solid studies indicating both positive and negative results. The newer research is

beginning to tackle the factors present in the research studies that may be affecting the overall results. Specifically, the variables of event-specific high-risk drinking and population-specific high-risk drinking are key. The research in this dissertation will first evaluate a specific high-risk drinking event at one institution to determine why social norms marketing is ineffective. Second, it will evaluate a curriculum infusion intervention study as an alternative prevention method.

CHAPTER 3:

CHARACTERIZATION OF EVENT

Based on the literature, it is clear that high-risk drinking among college students is a serious issue and is often a result of misperceptions of others' drinking. In addition to simply identifying the high-risk drinking event, it is important to also determine which specific subpopulations of students are participating and what motivations for participation exist. All of these variables must be identified and understood before a successful social norms intervention can be implemented. The Fourth-Year Fifth practice at the University of Virginia is no different. The Fourth-Year Fifth is a practice whereby fourth-year students attempt to consume a fifth of liquor (750 mL) on the day of the last home football game. This practice has been in place for approximately 25 years though research regarding the practice is more recent.

Over the last ten years, multiple social norms marketing campaigns have been implemented which advertised that 20% of fourth-year students attempted the Fourth-Year Fifth. The baseline studies consistently showed that 20% of all fourth-years were participating. The actual levels of participation and misperceptions regarding participation were relatively unchanged each year. As such, additional research must be conducted to determine what potential variables are impacting this specific event in order to create better, more effective campaigns (Triplett & Foster, 2008; Foster, 2009).

The following research focuses on gathering information about the Fourth-Year Fifth practice in an attempt to determine what variables are present and how those variables could be impacting the effectiveness of the social norms marketing campaigns

that have been implemented in the past. Specifically, this study includes both quantitative and qualitative data. The qualitative data provides more detailed information about motivations, while the quantitative data evaluates participation and perceptions associated with participation. Once evaluated, the effectiveness of previous campaigns targeted at reducing participation in the Fourth-Year Fifth will be better understood. The increased knowledge will aid U.Va. substance abuse prevention professionals in creating more effective future interventions.

The following article, “Are Students Drinking Hand Over Fifth? Understanding Participant Demographics in Order to Curb a Dangerous Practice” was published in the Journal of Alcohol and Drug Education in December, 2011.

MANUSCRIPT

Are Students Drinking Hand Over Fifth?

Understanding Participant Demographics in Order to Curb a Dangerous Practice.

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Abstract

High-risk drinking remains an issue on college campuses. Limited research focuses on drinking associated with single events where students are encouraged to drink a predetermined amount of alcohol. Fourth-year undergraduate students (N=1,205) completed a survey about motivation, behaviors and perceptions surrounding participation in a practice where some students attempt to consume a fifth of liquor (750 ml) on the day of the last home football game. Results revealed 18.0% of fourth-year students participated; predominately Greek-affiliated males. Of those who self-reported consuming a fifth, 75.4% consumed at least 6 more drinks than they do on a typical Saturday night. Motivating factors for participation included challenge, tradition and sociability. As students generally underestimated participation rates, social norms marketing approaches may not be effective.

Introduction

Celebratory drinking remains a serious issue on college campuses (Glassman, Werch, Jobli & Bian, 2007; Glidenmann, Wiegand & Geller, 2007; Neal & Fromme, 2007). Research on celebratory drinking examines high-risk periods such as fraternity recruitment or spring break (Patrick, Morgan, Maggs & Lefkowitz, 2011; Wechsler, Kuh & Davenport, 2009). Singular events such as Halloween, 21st birthdays and annual sporting events are important to study because many students engage in potentially dangerous drinking behaviors on a single day (Hembroff, Atkin, Martell, McCue & Greenamyre, 2007; LaBrie, Migliuri & Cail, 2009; Neighbors, Spieker, Oster-Aaland, Lewis & Bergstrom, 2005), while engaging in lower-risk drinking as a typical pattern (Montealegre, Bass, Bruce & Foster, 2011; Purvis, Odioso, Weaver, White, Bass & Bruce, 2008; White, Odioso, Weaver, Purvis, Bass & Bruce, 2008).

With respect to college sporting events, celebratory drinking has been associated with single events (Glassman et al., 2007) as well as entire seasons (Neal & Fromme, 2007). Drinking before sporting events, commonly called pregaming, includes a range of behaviors including drinking before entering the stadium where alcohol may be expensive or difficult to obtain (Borsari, Boyle, Hustad, Barnett, Tevyaw & Kahler, 2007). Such pregaming can lead to hazardous drinking defined as blood alcohol concentrations (BAC) of 0.08 gram percent and above, typically occurring by consuming five or more drinks (males), or four or more drinks (females) over a two hour period (Sharma & Kanekar, 2008). Primary and secondary negative problems associated with hazardous drinking can range from minor outcomes such as a hangover to major

consequences such as physical injury or death (Glindemann et al., 2007; Incerto, Montealegre, Tuttle, Bruce, Foster & Bass, 2011).

Celebratory drinking events can vary across colleges and universities (Hartford, Weschler & Muthen, 2003; Jones, Oeltmann, Wilson, Brener & Hill, 2001). At a large public research institution in the Southeast, the University of Virginia, one annual hazardous drinking event, called the “Fourth-Year Fifth,” involves fourth-year students (college seniors) attempting to consume a fifth of liquor (750 ml) on the day of the last home football game. Although similar to drinking events at other campuses where students plan to drink a targeted quantity for a specific occasion, the Fourth-Year Fifth also focuses on a single sporting event and a very high quantity. The Fourth-Year Fifth practice began about 25 years ago and remains a part of the university culture. The university’s Gordie Center for Substance Abuse Prevention found that most fourth-year students (96.6%) are aware of the practice, and participation numbers over the past four years, although low (16.0% - 19.8%), have remained relatively stable despite efforts to reduce them (Harris, 2007; Nangle, 2008; Foster & Triplett, 2009, Foster, 2010). While the overall number of students participating is relatively low, this event is cause for great concern due to the volume of alcohol participants consume.

There are many options for addressing hazardous drinking associated with major campus events, and the act of focusing on such events can energize a community to work together on more comprehensive prevention efforts (Neighbors, Walters, Lee, Vader, Vehige, Szigethy & DeJong, 2007). One strategy is to employ a social norms approach, which educates students on healthy drinking norms and the extent of protective behaviors

(Haines, 1996; Lee, Geisner, Lewis, Neighbors & Larimer, 2007; Perkins, Meilman, Leichliter, Cashin & Presley, 1999; Purvis et al., 2008).

Social norms marketing applies traditional marketing techniques to support healthy behaviors (Andreasen, 1995; Haines, 1996) and can be an effective way to reach students with messages about the prevalence of healthy behaviors. Effective social norms marketing programs are based on an assessment of students' needs and behaviors and employ standard marketing techniques to increase the likelihood of message retention and behavior change. Successful social norms marketing campaigns follow a multistep process in which an initial step is the collection and analysis of baseline data in order to determine healthy norms and whether misperceptions exist (Haines, 1996; Linkenbach, 2003).

Overview of the Current Study

This study involved collecting and analyzing data in order to understand the extent of the Fourth-Year Fifth practice including participation levels, perceived risks and benefits of participation, and motivations for participating. In quantifying the self-reported alcohol consumption associated with the event, it also provided comparisons with other campus celebratory events. Students at this campus report consuming a mean of 6.85 alcoholic drinks on Halloween, 7.63 drinks at an annual off-campus celebratory event, 4.64 drinks at a typical home football game and 6.74 drinks on a typical Saturday night (White et al., 2008). The following research questions guided our investigations:

- 1) Why do students participate in this hazardous drinking event? What are their motivations?

- 2) Is there an identifiable subculture of university students that attempt the Fourth-Year Fifth? For example, are males more likely to participate? Are members of fraternities and sororities more likely to participate?
- 3) When do students learn about this practice? Is there a relationship between when students learn about the practice and their likelihood of participating?
- 4) Do perceptions of who engages in this practice affect whether students participate? Do students participate because their friends plan to participate or in defiance of marketing campaigns that encourage them not to participate?
- 5) Are the students who attempt to drink a fifth of alcohol consuming significantly more alcohol than what is typical for them? Are students aware that a fifth contains 17 to 21 standard drinks? Are drinking behaviors surrounding the Fourth-Year Fifth practice different from other events such as Halloween?

Method

A mixed methods approach was employed. Three focus groups of fourth-year students were conducted in the month preceding the last home football game to better understand reasons for participation and reactions to potential educational messages. In addition, a behaviors and perceptions survey was administered to all fourth-year students on the day after the last home football game regarding their behaviors on the day of the last home football game.

Participant Recruitment

The focus group participants were recruited via a message posted to a university listserv with a short explanation about the study, information about incentives for participation (food and \$20.00), and a link to provide basic demographics and scheduling availability. These incentives were provided by a grant from the Virginia Department of Alcoholic Beverage Control. A link to the behaviors and perceptions survey was emailed to all 3,122 fourth-year students.

Focus Groups

Three focus groups were conducted with fourth-year students. Each focus group included between six and ten participants and lasted approximately 90 minutes. Participants were provided name tags for ease of discussion facilitation, but were encouraged to provide an alias. Focus group discussions were recorded and transcribed with identifying information removed. In the focus groups, participants were asked specifically about the Fourth-Year Fifth to attempt to gain knowledge about the origin, motivation and other information about the tradition. They were asked how and when they learned about the Fourth-Year Fifth, what kinds of actions they take to protect themselves and their friends from risky behavior due to drinking, and why they choose to participate or not participate in high-risk drinking events.

The focus group transcripts were reviewed for motivating factors for participation. The codes developed included challenge, socializing, and tradition. They were also analyzed with respect to perceptions of participation and demographics such as Greek affiliation and gender.

Survey Instrument

The behaviors and perceptions survey was co-developed in 2006 by one of the authors, and was revised in 2007 and 2008 in conjunction with the other two authors (Harris 2007; Nangle, 2008). Each survey was tested in focus groups to ensure clarity. In order to address validity concerns, a number of survey questions were drawn from national survey instruments including questions about negative consequences from the *CORE Alcohol and Drug Survey*, questions about protective behaviors from the *American College Health's Association's National College Health Assessment*, and questions about typical Saturday night drinking from the *Daily Drinking Questionnaire* (ACHA-NCHA, 2008; Collins, Parks, Marlatt, 1985; CORE, 2006; Presley, Meilman, Cashin & Lyerla, 1996). Further, the consistent results of the behaviors and perceptions survey over all three years indicate reliability in the survey. The survey consisted of 17 questions and was administered using Survey Monkey. Respondents answered questions regarding demographics (gender and fraternity/sorority membership), general drinking behaviors (at typical football game days and at the last home game), and second hand effects of other students' drinking on the day of the last home football game. Those who participated in the Fourth-Year Fifth also answered questions about motivations for participation and any consequences of participation.

Students were asked if they knew about the Fourth-Year Fifth practice. Survey logic prompted the participants who responded positively to having knowledge of the Fourth-Year Fifth practice to indicate when they first learned about it with the following

possible responses: Prior to arriving at the university; first-year; second-year; third-year; fourth-year.

To assess participation in the Fourth-Year Fifth practice, students could choose from six options regarding drinking behaviors on the day of the last home football game:

- Yes, I drank a fifth of liquor
- Yes, I drank a fifth of champagne/wine
- Yes, I split the fifth with a friend and we finished it together
- Yes, but I did not finish a whole fifth of liquor
- No, but I did drink that day
- No, and I had nothing to drink that day

Based on these responses, those who answered the first three yes choices were considered to have completed the Fourth-Year Fifth. Students who answered the fourth yes choice were considered to have attempted but not completed.

Two questions were designed to determine if students had accurate perceptions about the extent of the Fourth-Year Fifth practice. One question asked, “what percent of fourth-years do you think attempted or completed the Fourth-Year Fifth this year?” and the second asked, “what percent of your friends do you think attempted or completed the Fourth-Year Fifth?”

One derived dependent variable measured the students’ perception accuracy. Fourth-Year Fifth participation rates (whether or not the fifth was completed) have fluctuated from as low as 16.0% to as high as 20.0% over the past four years. The students estimating participation within that range were considered to have accurate perceptions. If students estimated less than 16.0% attempted the Fourth-Year Fifth then they were considered to have underestimated participation rates; if students estimated

greater than 20.0% of students attempted, then they were considered to have overestimated.

Results

Survey Participation Demographics

The initial survey response rate was 42.8% (1,335 responses). Duplicate responses and those who did not answer the question about drinking behaviors on the day of the last home football game were removed. Of the remaining 1,205 respondents, 385 (32%) were male (a smaller percentage than the actual university population, which is 44% male), and 370 students (30.7%) indicated fraternity or sorority membership, nearly matching the university-wide membership rate of 30%.

Attempting the Fourth-Year Fifth

A total of 217 of the 1,205 (18.0%) respondents reported attempting or completing the Fourth-Year Fifth (Table 1). Those who attempted or completed the Fourth-Year Fifth were analyzed as a single group and are described as attempters. The associations between attempting and gender and attempting and sorority/fraternity membership were both significant. In particular, males were more likely to attempt than females and sorority/fraternity students were more likely to attempt than non-sorority/fraternity students ($\chi^2 = 49.3$, $p < .001$; $\chi^2 = 56.8$, $p < .001$, respectively).

When Students Learned About the Fourth-Year Fifth

Most students learned about the Fourth-Year Fifth practice during their first year in college (59.6%), followed by in their second year (16.7%), and then prior to arriving at

the university (Table 2). A Chi-Square test of association indicates a significant relationship ($\chi^2=29.802$, $df=4$, $p<0.001$) between whether a respondent self-reported participating and when that person learned about the practice. Thus participation rates decrease the later students learn about the Fourth-Year Fifth. While only 9.0% of students learned about this practice prior to arriving at college, that group comprised 27.8% of those who attempted. While 14.8% of all students learned about the practice during their third and fourth years, they comprised only 13.5% of those who attempted. 68.6% of all attempters learned about the practice either before arriving at the university or during their first year of attendance, and 85.3% of all attempters learned before their third year.

Perceptions of Participation

Fourth-year students tended to underestimate how many of their classmates participate in the Fourth-Year Fifth (Table 3). Overall, 48.1% underestimated and 34.0% overestimated participation rates. Of students who attempted the Fourth-Year Fifth, 53.5% underestimated the actual number of participants, while only 26.7% overestimated participation. Of students who did not attempt the Fourth-Year Fifth, 47.0% underestimated participation, while only 35.6% overestimated participation rates.

When asked about friends' behaviors, of those who attempted the Fourth-Year Fifth, 26.7% believed a greater percentage of their friends participated compared to the actual norm, while 65.9% believed a lower percentage of their friends participated compared to the actual norm. Among those who did not attempt the Fourth-Year Fifth, 30.5% believed a greater percentage of their friends participated compared to the actual norm, while 63.9% believed a lower percentage of their friends participated compared to

the actual norm (Table 4). Thus, fourth-year students underestimate actual participation numbers, both among their friends and all fourth-year students, at approximately the same level regardless of whether they did or did not participate in the Fourth-Year Fifth.

Comparing Fourth-Year Fifth Drinking Patterns to a Typical Saturday Night

For students who reported completing the Fourth-Year Fifth, most students (75.4%) reported consuming at least six standard drinks more than they do on a typical Saturday night, including 26.3% who reported consuming at least 12 standard drinks more than on a typical Saturday night. A few students report consuming as many as 15 to 17 drinks more than on a typical Saturday night (See Table 5).

Motivations for Participating in the Practice

Several themes emerged from focus group data regarding reasons for participation. These included challenge, sense of accomplishment, wanting to participate in a tradition, and socialability (having friends who were participating). Students noted that there is a distinct challenge associated with attempting the Fourth-Year Fifth. Concurrent with that challenge comes a great sense of accomplishment for students who complete it. One student said, “It’s an ‘earn your stripes’ type thing. It’s your last year and you’ve gone to football games and done drinking, but this is the apex of drinking at a football game.” Students at this institution participate in and respect a wide range of campus traditions. Students in every focus group cited “tradition” as a major driving force behind the Fourth-Year Fifth. Students said, “we love tradition” and “[this] is a big tradition school.” Friends encouraged participation in the Fourth-Year Fifth both directly

in the weeks leading up to the event, and also indirectly, since many students indicated they first learned about the practice from their friends.

Negative Consequences

All students who reported attempting the Fourth-Year Fifth indicated experiencing at least one negative consequence ranging from minor to serious. In particular, 48.1% of attempters reported experiencing a memory loss, 7.5% reported being injured or hurt and 6.2% felt they might have a drinking problem. While all participants reported experiencing at least one negative consequence, 26.3% reported experiencing at least three negative consequences, and 5.5% reported experiencing at least five consequences.

Discussion

An important goal of substance abuse prevention efforts is to reduce the adverse consequence of drinking. Celebratory drinking events are, by their nature, prone to encouraging hazardous drinking. The Fourth-Year Fifth is a celebratory drinking event that, while unique to one university, is similar to drinking events at other campuses where students plan to drink for a specific occasion and with a target quantity in mind (e.g. 21st birthday celebrations). Surveys from 2007, 2008 and 2009 (Harris, 2007; Foster & Triplett, 2009; Foster, 2010; Nangle, 2008) indicate a stable level of participation in the practice from 16% to 20%. This is cause for concern because participants attempt to drink a specific hazardous amount, a fifth of liquor in one day, with some completing the target in only a few hours.

Some students drink significantly more than what is typical for them, creating the potential for serious adverse consequences, including alcohol overdose. While alcohol overdose is less common, students self-reported more common negative consequences including hangover, memory loss, engaging in behaviors later regretted, engaging in sexual activity they would not have otherwise engaged in, and being injured or hurt. Given that all participants experienced at least one negative consequence, and over a quarter of participants experienced at least three negative consequences, messaging on protective behaviors could be effective at reducing harm.

Others who attempt the Fourth-Year Fifth are already hazardous drinkers, with self-reported drinking levels of 15 to 17 drinks on a typical Saturday night. These students are probably experiencing many negative consequences of hazardous drinking and may minimize the potential risks of consuming a fifth of liquor. In fact, several students remarked in focus groups that in hindsight, consuming a fifth of liquor was *less* alcohol than what they typically consumed before and during a football game.

Participation rates vary across the student body. Fraternity members represented the majority of attempters (with 50% attempting) while non-sorority females were the least likely to attempt (with 9.1% attempting). This pattern has been consistent across the last few years (Harris, 2007; Foster & Triplett, 2009; Foster, 2010; Nangle, 2008). Although there are long-standing healthy traditions to celebrate the last home football game (e.g., the Fourth-Year 5K race), these events do not appear to resonate with the heavy drinking population. Students who attempted the Fourth-Year Fifth were primarily motivated by a sense of tradition and felt a sense of accomplishment afterwards. The earlier students learn about the practice, the more likely they are to attempt it. Thus

anticipation may lead to a sense of accomplishment in completing the Fourth-Year Fifth. This anticipation is similar to the special circumstances surrounding other high-risk celebratory drinking events such as weddings, game days, and other culturally associated drinking events (Glassman, Dodd, Sheu, Rienzo, & Weagenaar, 2010).

Social norms marketing is a strategy that has seen positive results (Andreason, 1995; Carter & Kahnweiler, 2000; Haines, 1996), and has resulted in reduced negative consequences on this campus (Turner, Perkins & Bauerle, 2008). However, without a clear misperception to correct, a social norms campaign would not be indicated. While some students may anticipate the event for several years, a large percentage of fourth-year students actually underestimate the number of students who participate in the Fourth-Year Fifth. The low-risk groups overwhelmingly underestimated the overall rates of participation among all fourth-year students. Thus a social norms campaign to market the low participation rate may not be effective for the students who do not have a perception gap or for whom the misperception is in a positive direction. In addition, publicizing the campus-wide social norm of 18-20% attempting the Fourth-Year Fifth may be dismissed by those in high-risk groups and would exaggerate participation rates among the lowest risk groups.

Another issue surrounding message selection and intervention is that campus-wide marketing efforts may have the unintended effect of educating younger students about the existence of the practice and may drive participation rates up due to the sense of anticipation and tradition. Given the high level of typical drinking reported by students who attempt the Fourth-Year Fifth and the fact that they are generally underestimating participation rates, educational efforts may need to focus on harm reduction messages

targeted to those groups most likely to participate. Since students who are typically low-risk drinkers are unlikely to consider participation, campus-wide messages could encourage bystander intervention and describe how to effectively assist an intoxicated friend.

The first step in curbing hazardous celebratory drinking events is conducting research as was completed herein: to identify which student populations participate, learn about student perceptions of participation rates, and understand participant motivations. This information can aid in determining what type of educational approach will be most effective to reduce participation and encourage safer drinking practices. Additional research should be conducted on the motivations of students who do not participate. These may provide additional information to support the development of effective messages to reduce participation.

Conclusion

This study provides insight into how best to reduce the numbers of students who participate in a time-specific celebratory drinking practice by targeting limited resources to the specific populations most likely to participate. While the research was initially undertaken to evaluate behaviors in preparation for a social norms marketing campaign, the results are indicative of a case where reporting low participation rates would not be an appropriate strategy since students were not likely to underestimate their peers' behaviors.

More effective messages may be ones that include healthy social norms of protective drinking behaviors and intervention behaviors that are part of a broader

campaign. Additional research should be conducted to determine the reasons why students do not participate and to learn if positive injunctive norms (i.e., whether students disapprove of those who participate) exist. While changing the culture surrounding a hazardous drinking practice can be difficult, it is important to understand the many motivations for student participation in order to create targeted educational programs that have the greatest chance of success.

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TABLES

Table 1: Attempting the Fourth-Year Fifth Based on Gender and Greek Affiliation

	Attempted by demographic	% attempted by demographic	Total respondents by demographic
Greek Male	61	50.0%	122
Non-Greek Male	52	19.8%	263
Greek Female	52	21.0%	248
Non-Greek Female	52	9.1%	572
Totals	217	18.0%	1205

Table 2: Attempting the Fourth-Year Fifth as a Function of when Students Learn About it

Year when learned	Attempted	When learned totals	% of when learned	% of when learned of total responses
Prior to arrival	30	108	27.8%	9.0%
First-year	148	718	20.6%	59.6%
Second-year	27	201	13.4%	16.7%
Third-year	9	89	10.1%	7.4%
Fourth-year	3	89	3.4%	7.4%
Total	217	1205	N/A	100%

Table 3: Accuracy of Overall Participation Estimates as a Function of Participation

Participation	Estimation of Participation			
	Underestimate	Accurate	Overestimate	Total
Attempt	116	43	58	217
Not attempt	464	172	352	988
Total	580	215	410	1205

Table 4: Accuracy of Friends' Participation Estimates as a Function of Participation

Participation	Estimation of Participation			
	Underestimate	Accurate	Overestimate	Total
Attempt	143	16	58	217
Not attempt	631	56	301	988
Total	774	72	359	1205

Table 5: Drinking Patterns of Completers; N = 110 (completers whose typical Saturday drinking behaviors were reported).

Drinking Pattern	n	Percent
consumed less than 3 drinks more than typical	14	12.7%
consumed 3 - 5 drinks more than typical	13	11.8%
consumed 6 - 8 drinks more than typical	29	26.4%
consumed 9 - 11 drinks more than typical	25	22.7%
consumed 12 - 14 drinks more than typical	25	22.7%
consumed 15 - 17 drinks more than typical	4	3.6%

CHAPTER 4:

CURRICULUM INFUSION INTERVENTION

Based on the results of the previous research, the fact that social norms marketing campaigns have been relatively ineffective at correcting misperceptions and reducing levels of high-risk drinking associated with the Fourth-Year Fifth is clear. Given that most students either underestimated or accurately estimated participation in this practice, there is no common misperception to correct. Further, this practice, while well known throughout campus, is attempted far more within the Greek-affiliated community than outside the Greek-affiliated community. As such, it is difficult to norm the overall population. Specifically, 50% of fourth-year Greek-affiliated males who responded to the survey are attempting the Fourth-Year Fifth. When it is advertised that 20% of fourth-year students attempt, the statistics may lack believability among students who have different perceptions. Similarly, when it is advertised that 20% of all fourth-year students attempt this practice, it is misleading because less than 10% of non-Greek affiliated females are attempting. Providing the higher number without explanation could lead to adverse consequences.

Since standard social norms marketing is not an ideal intervention due to the population-specific nature of this practice, the best option is to target the Greek-affiliated male population directly. Specifically, developing an alternative social norms intervention within the academic community might be more effective than traditional social norms mass marketing programs as this population may be less likely to seek out those traditional programs. In an effort to reach this population in a new, innovative way this research focused on the academic classroom. In order to reach as many target

students as possible, a Systems Information and Engineering course is identified as a potential starting point. In particular, the School of Engineering and Applied Science at the University of Virginia has over 2,500 undergraduate students and is 69% male.

Within the school, many courses, including a third-year Systems Information course uses case studies as a primary pedagogical process in the curriculum (School of Engineering, 2014).

This intervention was a new experience in reaching this population through an academic class, so an exploratory study was conducted as a way to gather information on the implementation and effectiveness of infusing Fourth-Year Fifth data into the academic classroom. While students were not directly given the norms associated with the practice, through their group project assignment they derived those numbers on their own using the previously collected data on the Fourth-Year Fifth. This unique method of using social norms was explored through integrated curriculum infusion where students worked directly with the data. For this study, curriculum infusion was selected on the basis of efficiency, willing collaborators, and research that shows early promising results.

**Health Promotion Curriculum Infusion Delivered Through
Systems Engineering Case Studies**

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ABSTRACT

Health promotion-oriented case studies were introduced in two System Engineering class sections ($n = 52$ and $n=36$) with the dual purpose of increasing student engagement in engineering and health promotion material and influencing behavior. Institution-specific case studies were critical to engagement and interest, despite not significantly affecting self-reported behavior change. The use of case studies positively impacted student learning overall. Results suggest that academic course and student affairs faculty should collaborate to create and further evaluate such integrated educational experiences.

Introduction

Colleges and universities engage in a variety of health promotion campaigns such as campus-wide marketing events, campus-wide speakers, and safety events such as substance abuse prevention week to raise awareness of health promotion topics. These prevention tools provide opportunities to disseminate materials and information to large numbers of students in relatively short time frames and at low expense (Croom, Lewis, Marchell, Lesser, Reyna, Kubicki-Bedford, Feffer, Staiano-Coico, 2009). While generally positive, and typically capable of reaching large numbers of students with a single campaign or event, there are some students who may feel the information is not applicable to them. Further, students often do not actively pursue the attainment of such knowledge by purposefully attending a workshop or a special lecture. Thus, information should be provided to students who may not seek out such knowledge on their own (Cordero, Isreal, White & Park, 2010).

A good way of reaching students is through classroom interventions such as in-class speakers, movies, and the distribution of safety information and pamphlets. These interventions have been shown to be effective at providing students with information; however, there has been no research to indicate whether these classroom-based interventions are capable of changing behavior associated with health promotion concerns. Similar to the campus-wide programs, students may feel the material is not relevant to them personally. Further, while the intervention content may be relevant to health promotion, it is often disconnected from the learning objectives of the academic course. This disconnect from academic objectives could make faculty buy-in

challenging. Similarly, the disconnect from the academic content may also contribute to decreased engagement of the students.

Building on the current substance abuse prevention programs, curriculum infusion may be a beneficial tool because it encourages student engagement with the material being taught. Curriculum infusion is an educational approach to instruction that brings together classroom learning and life experience where faculty integrate important social issues into the academic content of a course (Jones & Stanford, 2003; Lederman, Stewart, Barr & Perry, 2001; White, Park & Cordero, 2010). It is considered to be an effective way to address concerns such as alcohol abuse and other social and health promotion issues. According to Lederman & Stewart (2005), the intent of curriculum infusion is to find matches between theoretical course content and compelling contemporary social and health issues.

While curriculum infusion has been cited as a promising educational approach to substance abuse prevention in higher education, in order to be truly effective, interventions should go beyond providing information and ultimately lead to changes in student attitudes and behaviors. Researchers (Lederman, Stewart, & Russ, 2007; Lederman et al., 2001; Lederman, 1992; Lederman & Stewart, 1991) hypothesize that behavioral change requires relevant examples that actively involve students in the content in a truly engaging way. Kolb (1984) states that students are more engaged and retain information better when they are involved in the learning process through interaction with the content. This interactive learning process is what Lederman et al. (2001) term the socially situated experiential model of learning, and demonstrates that learning needs to be interactive and experiential in order to be maximally effective. Kolb (1984) further

emphasizes that in order for students to effectively learn what is being taught, whether academic course content or health promotion material, students must be provided the information in a concrete way that is relevant to their own experiences. Activities that involve the learner in an experience, such as creating or evaluating case studies or reflective observation, requires students to step back and evaluate their experiences using a variety of methods. Active experimentation where students apply principles learned in problem-solving should all support the learning process (Kolb, 1984). To build this more interactive curriculum and potentially engage students fully in the curriculum and health promotion content, a fully integrated curriculum is needed.

In order to build upon the success of in-classroom interventions and curriculum infusion, faculty can create an even more integrated form of curriculum infusion where academic faculty integrate health promotion education with the domain specific course content of the discipline. This resulting integrated curriculum begins with problems, issues and concerns specific to the audience, whereby students are able to examine the problems, issues and concerns of a topic as it applies to them, bringing classroom learning and life outside the classroom together (Venville, Wallace, Rennie & Malone, 2001). Ultimately, faculty develop a combined holistic module with assigned readings and applied domain-specific curriculum that ties the academic content to the health promotion content. In integrated curriculum infusion, modules should incorporate the learning objectives for both the academic and health promotion goals.

In determining the best ways to change student behavior through education, particularly when encouraging healthier behaviors among students, the type of curriculum used is vital to the overall research. While experiential learning is a primary

method of changing student behaviors and attitudes, determining the best form of experiential learning is also important. Research using case studies as a curriculum infusion tool has been relatively rare in the past. However, Kreber (2001) evaluated case studies as the primary tool for experiential learning to determine if this method was effective in increasing student retention of information and increased learning objectives. He states that case studies should prove useful because the educational goal is to provoke students' involvement and active experimentation with the issue. According to Kreber (2001), "the case study approach to teaching in higher education has the potential to involve students in all four experiential learning phases and, more importantly, to foster skills necessary for self-directed learning" (p. 217). This self-directed learning is potentially the first step in attitude and behavior change among students. It is critical to educate students on social and health promotion content as well as academic course content with a single case study.

Overview of Case Studies

The formal development of case studies is significant because they must be relevant to the students. The case studies should be selected to focus on campus-specific issues that are relevant to the students of a single campus and also to a health promotion issue at large. For this study, the goal was to investigate the use of integrated case studies in class and evaluate the effect of health promotion cases. For this reason, the two case studies created included a university-specific case study involving a celebratory drinking event (Celebratory Drinking Case) and a general health promotion case study involving distracted driving (Distracted Driving Case). Although two very different case studies

are being used, not only are they both relevant to students and health promotion in general, they are also geared towards the learning objectives of both the academic content and the health promotion content.

The Celebratory Drinking case study included a social norms marketing intervention, which involves correcting misperceptions about the prevalence and acceptability of hazardous behaviors such as alcohol abuse (Perkins, 1997; Perkins & Berkowitz, 1986). The description highlighted the social norms approach, which is useful when most students overestimate the actual prevalence of alcohol consumption, thus leading them to consider high-risk drinking to be the norm. Such misperceptions can lead to indirect peer pressure to drink heavily. Further, students who hold permissive views on alcohol use are more likely to drink heavily if they perceive their peers to be tolerant of alcohol abuse (Perkins & Berkowitz, 1986; Perkins & Wechsler, 1996).

While this research can occur in any number of academic settings, this study occurs in engineering classrooms. Curriculum infusion is underrepresented in engineering classrooms, with no research to date on this process in that setting. Further the curriculum has technical content that affords analysis of health promotion data. For this reason, we expect that the students will learn the academic content by using the health promotion data and creating real-world relevant results they can identify with outside the classroom. The current research study is designed to evaluate the following research questions:

1. Does infusing celebratory event-specific drinking health promotion content into academic curriculum positively impact student self-reported behavior?

2. Does infusing celebratory event-specific drinking health promotion norms content into academic curriculum increase student confidence and ability in the academic or health promotion content?
3. Does integrating celebratory event-specific drinking health promotion into interactive academic case studies increase student interest and engagement in the material as compared to non-health promotion topics?

This study serves to fill a gap in the research literature by presenting a case study approach to curriculum infusion. The underlying pedagogy is to create case studies with guided questions to be analyzed in small groups, thereby combining the success of case studies as interactive lessons where curriculum is infused with health promotion content. As students learn domain specific content, such as analysis of variance in a statistics course or usability methods in a human factors engineering course, they are assigned case studies that require them to apply the principles to problems that address health promotion topics. These case studies will also provide students with real world data that they can apply to other areas of their lives.

Methodology

Approval from the institution's Institutional Review Board was obtained before the start of the research.

Participants

System Evaluation is a required third-year course in the undergraduate Systems Engineering degree program at the study institution. Two sections, one with fifty-two

(52) students and one with thirty-six (36) students, participated. Participation in the case study analyses was part of the graded homework assignments for the course. Participation in the pre-test, post-test, and the end-of-semester course evaluation were optional and not part of the students' final grades.

Case Study Interventions

Celebratory Drinking case.

A case about the Fourth-Year Fifth (where some fourth-year students at the study institution attempt to drink a fifth of liquor [750 mL] before the start of the last home football game) was created.

The case study text stated that many students falsely believe that encouraging a severely intoxicated friend to vomit, or providing the person with water, food or coffee, will help sober the person up or prevent alcohol poisoning, even though these strategies have the potential for increasing intoxication levels. The text further stated that the only effective strategy is to closely monitor the person for signs of alcohol poisoning and to call for help when needed. The text described a web-based survey developed to collect data about student drinking norms and related behaviors associated with the Fourth-Year Fifth as well as student perceptions of others' drinking behaviors.

The case study included the survey and de-identified survey data from 1,335 respondents. It instructed the students to analyze the Fourth-Year Fifth survey data and to help identify the value of potential marketing interventions by considering:

- At the high level, is the Fourth-Year Fifth an event to investigate or would resources be better utilized on other events?

- How many students attempt the Fourth-Year Fifth?
- Does when a student hears about the Fourth-Year Fifth impact participation?
- Would social norms marketing work (are there misperceptions associated with the Fourth-Year Fifth)?
- What alternative drinking options did students choose in lieu of attempting to drink a fifth of alcohol?
- What are the positive and negative consequences of participating in the Fourth-Year Fifth?
- Are there certain sub-populations for whom the answers to the questions above change?

The assignment required submission of a presentation (main slides with backups) and the preparation of an accompanying 10-minute verbal presentation tailored to a student affairs client (not a statistician). It required documentation for all statistical tests conducted, including data used, data cleansing methods, statistical hypotheses tested, checks for model adequacy, results, and conclusions drawn.

Distracted Driving case.

A second case study about distracted driving was developed based on the 2008 General Estimates Systems (GES) data, which is used to identify highway safety problem areas. This data provides a basis for regulatory and consumer information initiatives, and forms the basis for cost and benefit analyses of highway safety initiatives. The 2008 data were compiled from a nationally representative probability sample selected from the estimated 5.8 million police-reported crashes that occur annually.

The case study instructions included access to the GES data and required students to determine if distracted driving prevention is deserving of investment by auto insurance companies or if resources would be better utilized to lobby for other policies. If resources are applied to reduce the negative effects of distracted driving, the instructions required the students to identify where resources should be targeted. The following guiding questions were included in the case study:

- What types of distracted driving are the most prevalent?
- Are crashes involving distracted driving more severe? Do they lead to more rollovers? Do different types of distraction lead to different crash severities and/or to different rollover frequencies?
- Are injuries from crashes involving distracted driving more severe? Does the number of people who are injured vary between distracted and non-distracted driving? Do different types of distraction lead to different injury severities? Does the number of people who are injured vary among different types of distracted driving?
- Do crashes involving distracted driving occur at different speeds than non-distracted driving? Do different types of distraction occur at different speeds?
- Do crashes involving distracted driving have more occupants in the car than non-distracted driving? Does the number of occupants differ for different types of distraction?
- Are there any sub-populations for whom the answers to the questions above change? This may include more than just demographics. For instance, are people who wear seatbelts more likely to be distracted by certain distraction types?

- Underreporting of distracted driving (both subconscious and conscious) may be a problem when dealing with crash data from police reports. How does potential underreporting affect the meaning of your results?

The assignment required similar deliverables as the Celebratory Drinking case (a written presentation, preparation of a 10-minute verbal presentation, and accompanying documentation with analysis details).

Pre-tests and post-tests.

A pre-test was administered the week prior to the case study intervention and an identical post-test was administered in the class immediately following the end of the case study assignment. To ensure that students were learning the academic content, and that the infusion of health promotion cases did not reduce overall learning objectives, we tested systems engineering knowledge. Nine questions asked for ability ratings with respect to the following objectives using a 5-point ability scale (Excellent (5), Good (4), Moderate (3), Little (2), or No (1)) and to report their confidence in each rating via a 5-point confidence scale (Very high (5), High (4), Moderate (3), Little (2), and No (1)):

1. If given an unknown data set, please rate your ability to evaluate data quality and apply basic data-cleansing methods.
2. If given a data set, please rate your ability to identify where (and if) one of the many forms of t-tests could be used to analyze those data.
3. If given a data set, please rate your ability to identify where (and if) one of the many forms of ANOVA could be used to analyze those data.

4. If given a data set, please rate your ability to identify where (and if) one of the many forms of tests of proportions could be used to analyze those data.
5. If given a data set, please rate your ability to identify where (and if) a contingency table/chi-square test statistic could be used to analyze those data.
6. If given a data set, please rate your ability to identify where (and if) the Wilcoxon signed-rank test statistic could be used to analyze those data.
7. If given a data set, please rate your ability to identify where (and if) the Kruskal Wallis test could be used to analyze those data.
8. If given a data set, please rate your ability to identify where (and if) the Mann Whitney test could be used to analyze those data.
9. Please rate your ability to manage time effectively on a team.

To test health promotion-related knowledge, students were asked to select the best options (check all that apply) for dealing with an intoxicated friend where the correct answer is the first option. The options are: 1) sit and watch the person, 2) let the person sleep it off alone, 3) give the person water, 4) give the person coffee, 5) give the person food, and 6) make the person throw up.

Students were also asked to identify and list the four main signs of alcohol poisoning. They were also asked to what extent they agree (Strongly agree, Agree, No opinion, Disagree, Strongly disagree) with the following statements:

- If you or your friends are hurt or ill from alcohol, it is important to go to the (local) Emergency Room.
- The (local) Emergency Room respects confidentiality for an alcohol related visit and does not contact parents, administration or police.

- Drinking alcohol mixed with an energy drink poses no additional risks compared to drinking alcohol alone.

End-of-semester course evaluation.

Seven specific questions were added to the standard end-of-semester course evaluation where students in both classes compared their Celebratory Drinking (Distracted Driving) case study to other case studies in the course. They stated their level of agreement (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree) with the following three statements:

- I learned something new about alcohol or drinking (distracted driving) in the Celebratory Drinking (Distracted Driving) case.
- I have changed my drinking (driving) behavior because of things I learned from doing the Celebratory Drinking (Distracted Driving) case.
- I have talked to others about things I learned about drinking (distracted driving) from the Celebratory Drinking (Distracted Driving) case.

They rated their level of agreement (Much Less, Less, About the Same As, More, Much More) by filling in the blank of the following three statements:

- Compared to other cases, the Celebratory Drinking (Distracted Driving) case was ____ interesting.
- Compared to other cases, the Celebratory Drinking (Distracted Driving) case was ____ engaging.
- Compared to other cases, the Celebratory Drinking (Distracted Driving) case was ____ relevant to me personally.

They rated their use of outside resources (Many Fewer, Fewer, About the Same As, More, Many More) for the statement “Compared to other cases in this course, I researched ____ outside resources for the case.”

Protocol

At the beginning of the semester, students were invited to participate in the pre-test administered via Survey Monkey. The course faculty assigned groups of five to six students to complete the assignments (ten groups for the Celebratory Drinking case and seven for the Distracted Driving case). Before the case assignment, a health promotion professional presented the health promotion knowledge to the group assigned to the distracted driving case.

After the groups submitted the written portion of the assignment, faculty reviewed the submissions. The health promotion professional and a non-course Systems Engineering faculty attended the Celebratory Drinking case presentations. A non-course Systems Engineering faculty and a trained graduate research assistant attended the Distracted Driving case presentations. The faculty who reviewed the submissions called on a subset of the groups to present findings.

After the case studies were presented, all students were invited to participate in the post-test, which was also administered via Survey Monkey. On both the pre-test and post-test, students in both groups were asked to provide the first two letters of their mother’s maiden name and the two-digit day of their birthday, in order to assist with identifying responses for paired analysis comparing each student’s pre-test and post-test

responses. At the end of the semester, all students were invited to participate in the end-of-semester course evaluation.

Independent variables

The study involved two independent variables: the health promotion topic (Celebratory Drinking and Distracted Driving) and timing of student responses (pre-test/post-test).

Dependent variables

Systems engineering learning objective ability ratings.

Pre-test and post-test ratings measure self-reported ability with respect to the systems engineering learning objectives. Confidence in the ratings are used as supporting measures.

Systems engineering learning objective ability difference.

For each individual student, the difference between the post-test and pre-test ability rating is calculated for the purpose of evaluating improvement in self-reported ability for each systems engineering learning objective as a result of the case assignment. Similarly, the difference between each student's self-reported confidence in the ability ratings from pre-test to post-test is also calculated as a supporting measure.

Health promotion learning objective knowledge.

For the three pre-test and post-test health promotion questions concerning emergency room procedures and energy drinks, each student provides a level of agreement with a given statement. For health promotion knowledge concerning the signs of alcohol poisoning the number of correct selections are totaled for each student on both the pre-test and post-test. For further health promotion knowledge concerning how to deal with an intoxicated friend, the number of correct responses to each question are totaled for each group on both the pre-test and post-test.

Health promotion learning objective knowledge difference.

For each health promotion question concerning the emergency room and energy drinks, the difference in response from pre-test to post-test is calculated for each student, in order to evaluate whether material presented during the case studies changed the level of agreement with each of the three given statements. For health promotion knowledge concerning the signs of alcohol poisoning, the difference in the number of correct selections from pre-test to post-test are calculated in order to evaluate improvement in knowledge from the case study assignment.

Exposure to new information.

The end-of-semester course evaluation included one question requesting a rating concerning the level of agreement with the question statement that the students learned something new about the health promotion topic of interest in the given case study assignment.

Potential impact on student behavior.

The end-of-semester course evaluation included two questions addressing the impact on student behavior. The question statements probed changes to behavior and whether students spoke to others outside of the class about the topic (thereby potentially impacting the behavior of others).

Impact on student engagement.

The end-of-semester course evaluation included four questions measuring engagement in the health promotion topic. The students were asked to rate the extent to which the case study was interesting, engaging, and personally relevant relative to other case studies. Students were also asked to rate the extent to which they used outside resources as compared to other case studies used throughout the course.

Sample

Three responses to the post-test (two from the Celebratory Drinking group, one from the Distracted Driving group) were identified as duplicates and removed from the analysis. Forty-eight (48) students in the Celebratory Drinking group and thirty-six (36) in the Distracted Driving group completed the pre-test. Fifty (50) students in the Celebratory Drinking group and thirty-four (34) in the Distracted Driving group completed the post-test. Out of these responses, forty-six (46) students in the Celebratory Drinking and thirty-three (33) students in the Distracted Driving group completed both the pre-test and post-test, and remain for the analysis. Using the identification

information provided by each of these students, the responses were paired for pre-test to post-test comparisons within each group.

Fifty-two (52) students in the Celebratory Drinking group and thirty-five (35) in the Distracted Driving group completed the end-of-semester course evaluation.

Data Analysis

The Wilcoxon Signed Rank test is used to compare pre-test and post-test responses within each group. The Mann-Whitney test is used to compare pre-test and post-test scores across the groups. It is also used to compare the course evaluation scores across the groups. A Proportions test is used for comparing the number of correct answers across the groups for the signs of alcohol poisoning and for helping an intoxicated friend.

Results

Results are considered significant at the $p=0.05$ level and as a trend at the $p=0.1$ level.

Systems Engineering Learning Objectives

Self-reported ability.

Figure 1 depicts the distribution of pre-test and post-test self-reported ability ratings by both the Celebratory Drinking and Distracted Driving groups for each of the nine specified Systems Engineering learning objectives. These self-reported ability ratings correspond to a 5-point numerical scale (1 = No, 2 = Little, 3 = Moderate, 4 = High, 5 = Very High). Table 2 presents the descriptive statistics for the self-reported

ability rating of both the Celebratory Drinking and Distracted Driving groups in the pre-test and the post-test, along with the results of Wilcoxon Signed Rank tests comparing the pre-test and post-test ability ratings for each group, and Mann-Whitney tests comparing pre-test and post-test confidence levels across groups.

From the pre-test to the post-test, the frequency of students in both groups reporting their ability level as “High” or “Very High” generally increases across all Systems Engineering learning objectives, as do the mean and median self-reported ability ratings. Wilcoxon Signed Rank tests comparing the pre-test and post-test ability ratings for both groups indicate significant self-reported improvement in ability in all Systems Engineering learning objectives except for using the Wilcoxon Signed Rank test to evaluate data and managing time effectively while working in a team.

Mann-Whitney tests comparing post-test ability ratings across groups indicate significant differences in all Systems Engineering learning objectives except for using the test of proportions and chi-square test to analyze data and managing time effectively while working in a team. For each objective where significant pre-test to post-test differences are indicated, students in the Distracted Driving group report significantly greater post-test ability ratings.

In evaluating individual differences in self-reported ability ratings from pre-test to post-test (see Table 4), Mann-Whitney tests show that there is only a significant difference in the magnitude of improvement in pre-test to post-test ability for data cleansing ($W = 562.5$, $p = 0.0390$), indicating more significant improvement for students in the Distracted Driving group compared to the Celebratory Drinking group.

Confidence level in self-reported ability.

Figure 2 depicts the distribution of pre-test and post-test self-reported ability ratings confidence levels for both the Celebratory Drinking and Distracted Driving groups for each of the nine specified Systems Engineering learning objectives. These self-reported confidence ratings correspond to a 5-point numerical scale (1 = No, 2 = Little, 3 = Moderate, 4 = High, 5 = Very High). Table 3 presents the descriptive statistics for the self-reported ability ratings confidence levels of both the Celebratory Drinking and Distracted Driving groups in the pre-test and the post-test, along with the results of Wilcoxon Signed Rank tests comparing the pre-test and post-test confidence levels for each group, and Mann-Whitney tests comparing pre-test and post-test confidence levels across groups.

Mean and median self-reported ability rating confidence levels generally improve across all Systems Engineering learning objectives from pre-test to post-test, along with the frequency of students in both groups reporting their confidence as “High” or “Very High.” Wilcoxon Signed Rank tests indicate significant self-reported gains in confidence (in their ability ratings) by students in both groups in using the t-test, and proportions test to evaluate data. For the Distracted Driving group, Wilcoxon Signed Rank tests additionally indicate significant gains in self-reported ability rating confidence levels for using ANOVA to evaluate data and a trend towards significant gain for managing time effectively while working in a team. For the Celebratory Drinking group, a Wilcoxon Signed Rank test indicates a trend towards significant gain in ability rating confidence for data cleansing and using the chi-square test to evaluate data.

Mann-Whitney tests indicate that significant differences between the two groups in post-test confidence levels in ability ratings when using the Kruskal-Wallis and Mann-Whitney tests to evaluate data. A significant trend is also indicated towards a difference between the groups in post-test confidence in ability to use the ANOVA to evaluate data. Evaluating the individual differences in ability rating confidence levels from pre-test to post-test across the two groups (see Table 3), the gains in confidence levels are significantly greater for the Distracted Driving group compared to the Celebratory Drinking group for data cleansing ($W = 539.5, p = 0.020$). There are additional trends indicating gains in confidence levels from pre-test to post-tests for the Distracted Driving group compared to the Celebratory Drinking group for using the proportions test ($W = 583.5, p = 0.062$) and the chi-square test ($W = 589, p = 0.072$) to evaluate data.

Health Promotion Learning Objectives

Knowledge of the best options for dealing with an intoxicated friend.

Table 6 shows the frequencies of correct responses regarding the best options for dealing with an intoxicated friend for both the Celebratory Drinking and Distracted Driving group, along with proportions test results comparing the pre-test and post-test correctness frequencies for and between both groups. While the frequency of correct responses generally improves across all options for both groups, the indicated learning is only significant for the Distracted Driving group for three of the options: “Make person throw up” ($z = -2.57, p = 0.010$), “Give person food” ($z = -3.82, p < 0.001$), and “Give person water” ($z = -4.53, p < 0.001$). There is a trend towards learning for the option “Sit and watch the person” ($z = -1.79, p = 0.073$). Comparing the post-test responses between

the two groups, the frequencies of correct responses for the options “Give person food” ($z = -3.55, p < 0.001$) and “Give person water” ($z = -2.60, p = 0.009$) were both significantly different. These results indicate that students in the Distracted Driving group significantly improved their knowledge of some options for dealing with an intoxicated friend, compared to the Celebratory Drinking group.

Knowledge of the four signs of alcohol poisoning.

Figure 3 depicts the pre-test and post-test scores for knowledge of the signs of alcohol poisoning. Only 13% of the students in the Celebratory Drinking group and none in the Distracted Driving group knew all four signs of alcohol poisoning. The median pre-test score for the Celebratory Drinking group is one and for the Distracted Driving group zero. A Mann-Whitney test comparing the two sets of pre-test scores is significant ($W = 1027.5, p = 0.005$), indicating that more students in the Celebratory Drinking group had already been exposed to the signs of alcohol poisoning.

In the post-test, 17% of the students in the Celebratory Drinking group and 30% in the Distracted Driving group knew all four signs of alcohol poisoning. The median post-test score for the Celebratory Drinking group is one and for the Distracted Driving group one. The median pre-test to post-test difference in scores for the Celebratory Drinking group is zero and for the Distracted Driving group one. While there was no statistical difference indicating learning in the Celebratory Drinking group, a Wilcoxon Signed Rank test comparing the pre-test and post-test scores for the Distracted Driving group is significant ($V = 14, p < 0.001$). Mann-Whitney tests comparing the post-test scores of the two groups ($W = 557.5, p = 0.041$) and the pre-test to post-test difference in

scores of the two groups ($W = 274.5$, $p < 0.001$) are both significant. Thus the original knowledge advantage for the Celebratory Drinking group did not transfer to the post-test.

Taking ill friends to the emergency room.

Figure 4a depicts the distribution of pre-test and post-test responses for the level of agreement with the true statement “If you or your friends are hurt or ill from alcohol, it is important to go to the (local) Emergency Room (ER).” In the pre-test, 89% (41 of 46) of the Celebratory Drinking group and 79% (26 of 33) of the Distracted Driving group indicated that they “Agree” or “Strongly Agree” with the statement. A Mann-Whitney test comparing the level of agreement with the statement found no significant difference between the two groups with respect to understanding the importance of taking an ill friend to the ER.

In the post-test, 87% (40 of 46) of the Celebratory Drinking group and 97% (32 of 33) of the Distracted Driving group indicated that they “Agree” or “Strongly Agree” with the statement. A Wilcoxon Signed Rank test comparing the level of agreement from pre-test to post-test for the Distracted Driving group indicated that there is a significant increase in the level of agreement with the statement ($V = 9$, $p = 0.010$) that an ill friend should be brought to the ER. No such significant change from pre-test to post-test was found for the Celebratory Drinking group. A Mann-Whitney test indicates a trend towards a significant difference in the post-test levels of agreement between the two groups ($W = 601.5$, $p = 0.071$). The median pre-test to post-test change in agreement with the statement that an ill friend should be brought to the ER is zero for both groups, but a Mann-Whitney test comparing the pre-test to post-test changes in agreement with

the statement indicate a significant difference ($W = 501$, $p = 0.0035$) between the two groups.

Emergency room and confidentiality for alcohol-related visits.

Figure 4b depicts the distribution of pre-test and post-test responses for the level of agreement with the true statement “The (local) Emergency Room (ER) respects confidentiality for an alcohol related visit and does not contact parents, administration or police.” In the pre-test, 67% (31 of 46) of the Celebratory Drinking group and 64% (21 of 33) of the Distracted Driving group indicated that they “Agree” or “Strongly Agree” with the statement. A Mann-Whitney test comparing the responses between the pre-test levels of agreement of the groups did not indicate any significant difference in understanding regarding ER confidentiality for alcohol-related visits.

In the post-test, 72% (33 of 46) of the Celebratory Drinking group and 79% (26 of 33) of the Distracted Driving group indicated that they “Agree” or “Strongly Agree” with the statement. Furthermore, 52% (17 of 33) of the Distracted Driving group indicated that they “Strongly Agree” with the statement, compared to 13% (6 of 46) in the Celebratory Drinking group. For the Celebratory Drinking group, there was no significant difference from pre-test to post-test in the agreement that the ER respects confidentiality for alcohol-related visits. For the Distracted Driving group, a Wilcoxon Signed Rank test indicated a significant improvement from pre-test to post-test in understanding ER policy for alcohol-related visits ($V = 12$, $p = 0.003$). This improvement for the Distracted Driving group also resulted in a significant difference between the groups ($W = 516.5$, $p = 0.010$) with respect to their level of agreement regarding ER

confidentiality for alcohol-related visits, as well as a significant difference in the pre-test to post-test changes in agreement with the statement ($W = 475, p = 0.0023$).

Risks of mixing energy drinks and alcohol.

Figure 4c depicts the distribution of pre-test and post-test responses for the level of agreement with the false statement “Drinking alcohol mixed with an energy drink poses no additional risks compared to drinking alcohol alone.” In the pre-test, 83% (38 of 46) of the Celebratory Drinking group and 85% (28 of 33) of the Distracted Driving group indicated that they “Disagree” or “Strongly Disagree” with the statement. A Mann-Whitney test comparing the pre-test responses between the groups indicated no significant difference between the two groups as far as understanding the negative effects of energy drinks mixed with alcohol.

In the post-test, 87% (40 of 46) of the Celebratory Drinking group and 76% (25 of 33) of the Distracted Driving group indicated that they “Disagree” or “Strongly Disagree” with the statement. Although both groups changed from pre-test to post-test in the levels of agreement about the risks of mixing alcohol and energy drinks, Wilcoxon Signed Rank tests comparing the pre-test to post-test responses were not significant for either group. A Mann-Whitney test found no significant difference between the two groups, with respect to the pre-test to post-test changes in agreement about the risks of mixing alcohol and energy drinks. There was, however, a trend towards a significant difference between the Celebratory Drinking and Distracted Driving groups ($W = 598, p = 0.077$) in their post-test responses, though it may be attributed to more students in the Distracted Driving group increasing agreement with the incorrect statement.

Self-reported Learning Something New About the Case Topic

For both cases, students reported that they learned about the topic. Specifically, 71% (37 of 52) of those who participated in the Celebratory Drinking case rated that they “Agree” or “Strongly Agree” that they learned something new about alcohol and drinking, and 77% (27 out of 35) rated that they “Agree” or “Strongly Agree” that they learned something new about Distracted Driving (Figure 5). Using a Mann-Whitney test, there was no statistical difference in the students’ learning ratings between the two case studies.

Self-reported Impact on Student Behavior

Changing behavior about the case topic.

Most students in both groups self-report that as a result of completing the case studies, there is no change in their behavior. For the Celebratory Drinking case, only 8% (4 of 52) rated that they “Agree” or “Strongly Agree” that they have changed their drinking behavior as a result of completing the Celebratory Drinking case, while 17% (6 out of 35) rated that they “Agree” or “Strongly Agree” that they have changed their driving behavior as a result of completing the Distracted Driving case (Figure 6). A Mann-Whitney Test indicates that students who participated in the Distracted Driving case provided significantly higher ratings than students who participated in the Celebratory Drinking case ($W = 663$; $p = 0.024$) with respect to changing their behavior.

Self-reported discussion with others about the case topic.

For both cases, students reported that they talked to others about what they learned from the case. Specifically, 50% (26 of 52) of those who participated in the Celebratory Drinking case rated that they “Agree” or “Strongly Agree” that they talked to others about what they learned about drinking, and 49% (17 out of 35) rated that they “Agree” or “Strongly Agree” that they talked to others about what they learned about Distracted Driving (Figure 6). Using a Mann-Whitney Test, there was no statistical difference in the students’ ratings between the two case studies.

Self-reported Impact on Student Engagement

Level of interest in the case topic.

Students rated the Celebratory Drinking case as interesting. Specifically, 54% (28 of 52) of those who participated in the Celebratory Drinking case rated it as “More” or “Much more” interesting than other cases, while only 37% (13 out of 35) rated the Distracted Driving case as “More” or “Much more” interesting (Figure 7a). Using a Mann-Whitney Test, there was a trend ($W = 1086.5$; $p = 0.0999$) for students to rate the Celebratory Drinking case as more interesting as compared to the Distracted Driving case.

Engagement of the case topic.

Students rated the Celebratory Drinking case as engaging. Where 44% (23 of 52) of those who participated in the Celebratory Drinking case rated it as “More” or “Much more” engaging than other cases, and 40% (14 out of 35) rated the Distracted Driving

case as “More” or “Much more” engaging than other cases (Figure 7b). Using a Mann-Whitney Test, there was no statistical difference in the students’ engagement ratings between the two cases.

Personal relevance of the case topic.

Students rated the Celebratory Drinking case as personally relevant (Figure 7c). Specifically, 52% (27 of 52) of those who participated in the Celebratory Drinking case rated it as “More” or “Much more” personally relevant than other cases, while only 40% (14 out of 35) rated the Distracted Driving case as “More” or “Much more” personally relevant. However, using a Mann-Whitney Test, there was no statistical difference in the students’ personal relevance ratings between the two cases as many students (46%) rated the Distracted Driving case as “about the same as” other cases.

Use of outside resources while completing case.

Compared to other cases, students did not report that they tended to use more outside resources for either case (Figure 8). Only 15% (8 of 52) of those who participated in the Celebratory Drinking case rated using as “More” or “Many more” outside resources than for other cases, and 29% (10 out of 35) rated using “More” or “Many more” outside resources for the Distracted Driving case. However, using a Mann-Whitney Test, there was no statistical difference in the students’ outside resource ratings between the two cases.

Discussion

The results of this study provide insight into the use of case studies to incorporate health promotion content into academic courses. The results of each research question indicate the use of case studies as a way to incorporate health promotion content into academic curriculum. Specifically, the first research question designed to determine if infusing social and health promotion topics into academic course curriculum will positively impact student self-reported behavior related to the topic is supported. This is based on the Distracted Driving group rating significantly higher than the Celebratory Drinking group with respect to changing their behavior. There is no statistically significant difference between the two groups with respect to discussing the case studies with others. While not a promising result for changing the behavior for both groups, any positive behavior change is considered successful.

The second research question designed to determine whether there will be an increase in confidence and ability in the academic content when the topic is university-specific, as compared to those that are not university-specific, is not supported. This is based on the finding that there is more significant improvement for students in the Distracted Driving group compared to Celebratory Drinking group on the point of self-reported ability. There is also a significant trend in the confidence level of the self-reported ability in the Distracted Driving group as compared to the Celebratory Drinking group. While our specific hypothesis is not supported, there is a notable increase in confidence and ability overall, which is significant to the study and to the use of case studies. This result indicates that the use of case studies as a way of improving confidence and ability in the academic content being taught is promising. Further

research on case studies and confidence would be of value to the academic and student affairs communities.

Finally, the third research question designed to determine if there will be an increase in interest and engagement in topics of health promotion as opposed to non-health promotion related topics is not supported with statistically significant data. However, in one data point (level of interest), there is a trend for students to rate the Celebratory Drinking case as more interesting than the Distracted Driving case. For the other three data points (engagement, personal relevance, and discussion), there is no significant difference between groups. While not statistically significant, there is an overall high level of interest in both cases, which indicates a level of success in the use of case studies in general as any increased interest in the academic material is of value overall.

Conclusion

While these results may appear initially disappointing in terms of the original research questions, they are not discouraging. The use of case studies overall is well-received by students and the positive impact on student self-reported behavior change is significant. Given that no previous research exists using case studies as a curriculum infusion tool, these results do support Kreber's (2001) conclusion that self-directed learning is potentially the first-step in attitude and behavior changing among students. Given that students in the Distracted Driving group do indicate a positive behavior change, the use of case studies should be continued.

This exploratory study does have some limitations that should be addressed. First, no follow-up occurred as the semester ended and no plan to contact the students the

following year was implemented. Another limitation is the small sample size used for this study. A larger population will allow for more power and certainty in the overall results. Specifically, a post-hoc analysis of the results indicates a minimum sample size of 450 participants is needed to achieve .80 power on four of the outcomes. For the remaining outcomes, the needed sample size exceeds the total undergraduate population in the Systems Information and Engineering program. There are multiple barriers associated with achieving a sample size this large, most notably that class sizes in engineering courses rarely are this size. Thus new interventions will be required in order to find statistically significant changes. For future research, it is recommended that long-term follow-up be included. Further, it is recommended that a set of questions be asked after each case throughout the semester to gauge confidence, ability, interest and engagement to each case study. This will allow a comparison between health promotion infused case studies and non-health promotion infused cases.

The study provides some initial research on the use of case studies as a curriculum infusion tool, and specifically in engineering classrooms. The results provide an overall understanding of the effectiveness of case studies as a social norms intervention and also provide a baseline for further exploration of the topic.

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TABLES

Table 3. Learning objectives.

Systems Engineering
Ability to apply data quality and apply basic data-cleansing methods
Ability to identify where (and if) one of the many forms of t-tests could be used to analyze data
Ability to identify where (and if) one of the many forms of tests of proportions could be used to analyze data
Ability to identify where (and if) one of the many forms of ANOVA could be used to analyze data
Ability to identify where (and if) a contingency table/chi-square test statistic could be used to analyze data
Ability to recognize when non-parametric methods are required: <ul style="list-style-type: none"> a) Wilcoxon signed-rank test b) Kruskal Wallis test c) Mann Whitney test
Ability to manage time effectively on a team
Health promotion
Knowledge of the best options for dealing with an intoxicated friend
Knowledge of the four signs of alcohol poisoning
Knowledge that it is important to take friends ill from alcohol to the emergency room
Knowledge that local emergency rooms respect the confidentiality for an alcohol related visit and do not contact parents, administration or police
Knowledge that drinking alcohol mixed with an energy drink poses no additional risks compared to drinking alcohol alone

Table 2. Descriptive statistics and test results, self-reported ability ratings for Systems Engineering learning objectives

		Pre-Test			Post-Test			Pre-Test v. Post-Test	Pre-Test v. Pre-Test	Post-Test v. Post- Test
		Mean	SD	Median	Mean	SD	Median			
Data Cleanse	Drink	3.174	0.797	3	3.717	0.688	4	$p < 0.001$ $V=36$	--	$p = 0.021$ $W=554$
	Distract	3.091	0.765	3	4.061	0.556	4	$p < 0.001$ $V=9.5$		
T-test	Drink	3.478	0.862	4	3.935	0.611	4	$p < 0.001$ $V=24$	--	$p = 0.003$ $W=499$
	Distract	3.667	0.777	4	4.364	0.603	4	$p < 0.001$ $V=7$		
ANOVA	Drink	3.152	0.788	3	3.630	0.572	4	$p < 0.001$ $V=46$	--	$p = 0.014$ $W=541.5$
	Distract	3.394	0.827	3	4.000	0.750	4	$p < 0.001$ $V=28.5$		
Proportions test	Drink	2.761	0.993	3	3.783	0.892	4	$p < 0.001$ $V=50$	--	--
	Distract	3.061	0.788	3	4.030	0.728	4	$p < 0.001$ $V=15$		
Chi-Square	Drink	2.565	0.886	3	3.413	0.858	3	$p < 0.001$ $V=52$	--	--
	Distract	2.606	0.659	3	3.576	0.902	4	$p < 0.001$ $V=35$		
Wilcoxon	Drink	2.587	0.956	2.5	2.739	0.773	3	--	$p = 0.039$ $W=559.5$	$p = 0.017$ $W=538$
	Distract	3.061	1.029	3	3.182	0.727	3	--		
Kruskal- Wallis	Drink	1.609	0.682	1.5	3.239	0.822	3	$p < 0.001$ $V=0$	--	$p = 0.011$ $W=515.5$
	Distract	1.818	1.014	1	3.727	0.944	4	$p < 0.001$ $V=0$		
Mann- Whitney	Drink	1.370	0.610	1	3.434	0.750	3	$p < 0.001$ $V=0$	--	$p = 0.039$ $W=565.5$
	Distract	1.455	0.666	1	3.788	0.857	4	$p < 0.001$ $V=0$		
Team	Drink	4.087	0.463	4	4.130	0.499	4	--	--	--
	Distract	4.000	0.661	4	4.030	0.467	4	--		

Table 3. Descriptive statistics and test results, self-reported confidence ratings for Systems Engineering learning objectives

		Pre-Test			Post-Test			Pre-Test v. Post-Test	Pre-Test v. Pre-Test	Post-Test v. Post- Test
		Mean	SD	Median	Mean	SD	Median			
Data Cleanse	Drink	3.413	0.617	3	3.652	0.706	4	$p = 0.066$ $V=140.5$	$p = 0.063$ $W=930$	--
	Distract	3.000	0.901	3	3.758	0.614	4	$p < \mathbf{0.001}$ $V=28.5$		
T-test	Drink	3.587	0.686	4	3.891	0.640	4	$p = \mathbf{0.004}$ $V=42$	--	--
	Distract	3.576	0.708	4	4.091	0.631	4	$p = \mathbf{0.002}$ $V=28$		
ANOVA	Drink	3.391	0.714	3	3.609	0.802	3.5	--	--	$p = 0.099$ $W=604$
	Distract	3.485	0.795	4	3.879	0.740	4	$p = \mathbf{0.013}$ $V=50$		
Proportions Test	Drink	3.435	0.807	3	3.761	0.848	4	$p = \mathbf{0.017}$ $V=81$	--	--
	Distract	3.242	0.751	3	3.909	0.765	4	$p < \mathbf{0.001}$ $V=60$		
Chi-Square	Drink	3.522	0.913	4	3.739	0.713	4	$p = 0.086$ $V=70$	--	--
	Distract	3.273	0.801	3	3.818	0.683	4	$p = \mathbf{0.004}$ $V=47.5$		
Wilcoxon	Drink	3.543	0.836	4	3.435	0.750	3	--	--	--
	Distract	3.485	0.834	3	3.636	0.603	4	--		
Kruskal- Wallis	Drink	3.696	1.190	4	3.543	0.690	4	--	--	$p = \mathbf{0.028}$ $W=563.5$
	Distract	3.667	1.190	4	3.879	0.650	4	--		
Mann- Whitney	Drink	3.761	1.251	4	3.522	0.691	3.5	--	--	$p = \mathbf{0.028}$ $W= 556$
	Distract	3.697	1.262	4	3.879	0.740	4	--		
Team	Drink	4.065	0.442	4	4.065	0.646	4	--	$p = \mathbf{0.050}$ $W=921$	--
	Distract	3.818	0.683	4	4.030	0.467	4	$p = 0.096$ $V= 28$		

Table 4. Descriptive statistics, pre-test to post-test differences in self-reported ability, Celebratory Drinking Group (n = 46)

	Mean	SD	Median
Cleanse	0.5435	0.8871	0
T-test	0.4565	0.8085	0
ANOVA	0.4783	0.7814	0
Proportions test	1.0217	1.1830	1
Chi Square	0.8478	1.0534	1
Wilcoxon	0.1522	1.0534	0
Kruskal-Wallis	1.6304	0.9743	2
Mann-Whitney	2.0652	0.8538	2
Team	0.0435	0.5560	0

Table 5. Descriptive statistics, pre-test to post-test differences in self-reported ability, Distracted Driving Group (n = 46)

	Mean	SD	Median
Cleanse	0.9697	0.8833	1
T-test	0.6970	0.8095	1
ANOVA	0.6061	0.8269	1
Proportions test	0.9697	1.0150	1
Chi Square	0.9697	1.1035	1
Wilcoxon	0.1212	1.0828	0
Kruskal-Wallis	1.9091	1.2591	2
Mann-Whitney	2.3333	0.9574	2
Team	0.0303	0.6840	0

Table 6. Test results by case for pre-test and post-test for the question “What are the best options for dealing with an intoxicated friend?”

	Pre-Test correct answers				Post-Test correct answers				Pre-test v. Post- test: Drink	Pre-test v. Post-test: Text	Post-test Drink vs. Text
	N=46		N=33		N=46		N=33				
	Drink	%	Distract	%	Drink	%	Distract	%			
Give coffee	46	100.0	32	97.0	46	100.0	33	100.0	--	--	--
Let person sleep it off alone	43	93.5	32	97.0	45	97.8	33	100.0	--	--	--
Make person throw up	43	93.5	27	81.8	44	95.7	33	100.0	--	<i>p=0.010</i> <i>Z=-2.57</i>	--
Sit & watch the person	41	89.1	26	78.8	44	95.7	31	93.9	--	<i>p=0.073</i> <i>Z=-1.79</i>	--
Give person food	31	67.4	19	57.6	29	63.0	32	97.0	--	<i>p<0.001</i> <i>Z=-3.82</i>	<i>p<0.001</i> <i>Z=-3.55</i>
Give person water	13	28.3	4	12.1	17	37.0	22	66.7	--	<i>p<0.001</i> <i>Z=-4.53</i>	<i>p=0.009</i> <i>Z=-2.60</i>

Table 7. Descriptive statistics and test results, responses to health promotion questions (1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree), Celebratory Drinking group (n = 46), Distracted Driving group (n = 33)

		Pre-Test			Post-Test			Pre-Test v. Post-Test	Pre-Test v. Pre-Test	Post-Test v. Post- Test
		Mean	SD	Median	Mean	SD	Median			
Take ill friends to the ER	Drink	4.196	0.806	4	4.022	0.830	4	--	--	$p = 0.071$ $W=601.5$
	Distract	3.818	1.103	4	4.303	0.770	4	$p = 0.010$ $V=9$		
ER respects confidentiality for alcohol- related visits	Drink	3.761	1.058	4	3.565	1.128	4	--	--	$p = 0.010$ $W=516.5$
	Distract	3.394	1.391	4	4.000	1.392	5	--		
Alcohol/Energy drink no more risky than alcohol alone	Drink	1.848	0.918	2	1.870	0.859	2	--	--	$p = 0.077$ $W=598$
	Distract	1.970	0.847	2	2.182	0.882	2	--		

Table 8. Descriptive statistics and test results, responses to course evaluation questions addressing case study material (1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree), Celebratory Drinking group (n = 52), Distracted Driving group (n = 35)

		Mean	SD	Median
Learned something new	Drink	3.692	0.853	4
	Distract	3.886	0.758	4
Changed behavior	Drink	2.269	0.843	2
	Distract	2.714	0.957	3
Talked to friends	Drink	3.288	1.091	3.5
	Distract	3.229	1.060	3

Table 9. Descriptive statistics and test results, responses to course evaluation questions addressing case study material relative to other coursework (1 = Much less/fewer, 2 = Less/fewer, 3 = About the same, 4 = More, 5 = Much more), Celebratory Drinking group (n = 52), Distracted Driving group (n = 35)

		Mean	SD	Median
The case was interesting	Drink	3.481	0.804	4
	Distract	3.171	0.891	3
The case was engaging	Drink	3.346	0.789	3
	Distract	3.229	1.031	3
The case was personally relevant	Drink	3.385	1.013	4
	Distract	3.286	0.860	3
Researched outside resources	Drink	2.865	0.817	3
	Distract	3.086	0.702	3

FIGURES

Figure 1. Systems engineering ability learning objective ratings

Figure 2. Systems engineering learning objective ability ratings confidence

Figure 3. Test results by case for pre-test and post-test for the four signs of alcohol poisoning

Figure 4. Health promotion learning objectives

Figure 5. I learned something new about [alcohol or drinking] [distracted driving]

Figure 6. Impact on student behavior

Figure 7. Impact on student engagement

Figure 8. Compared to other cases in this course, I researched ____ outside resources for the case

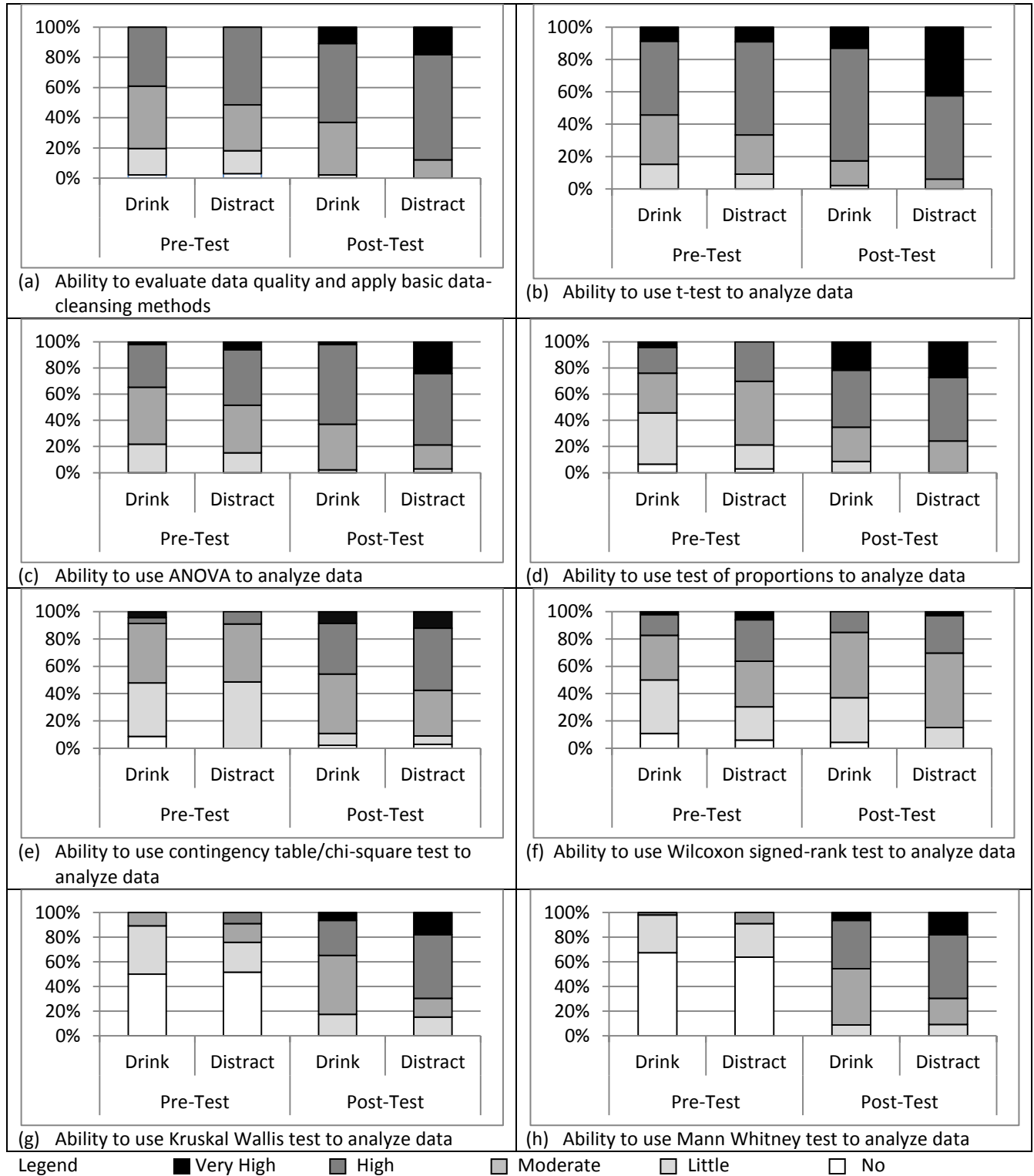


Figure 1. Systems engineering ability learning objective ratings

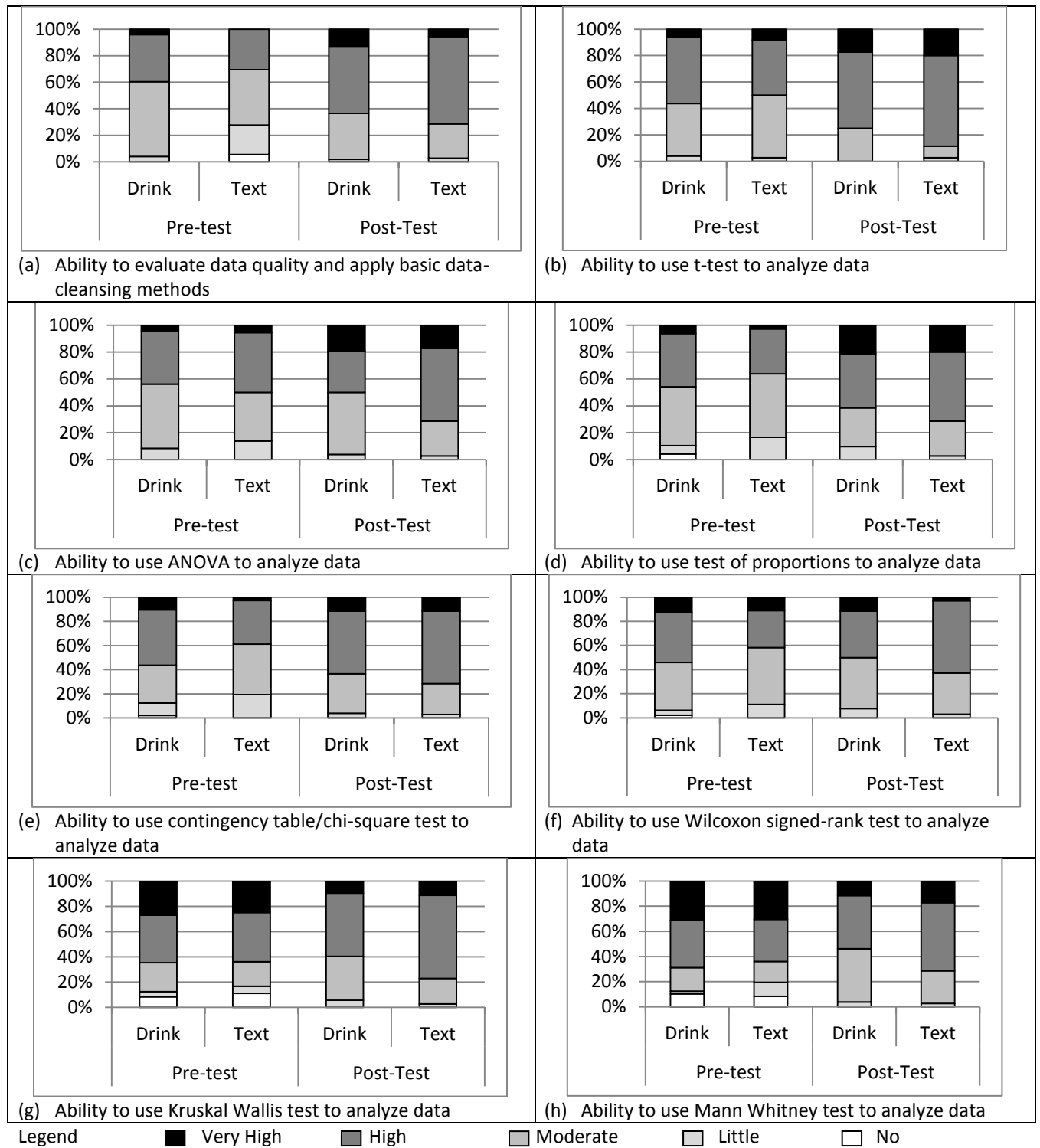


Figure 2. Systems engineering learning objective ability ratings confidence

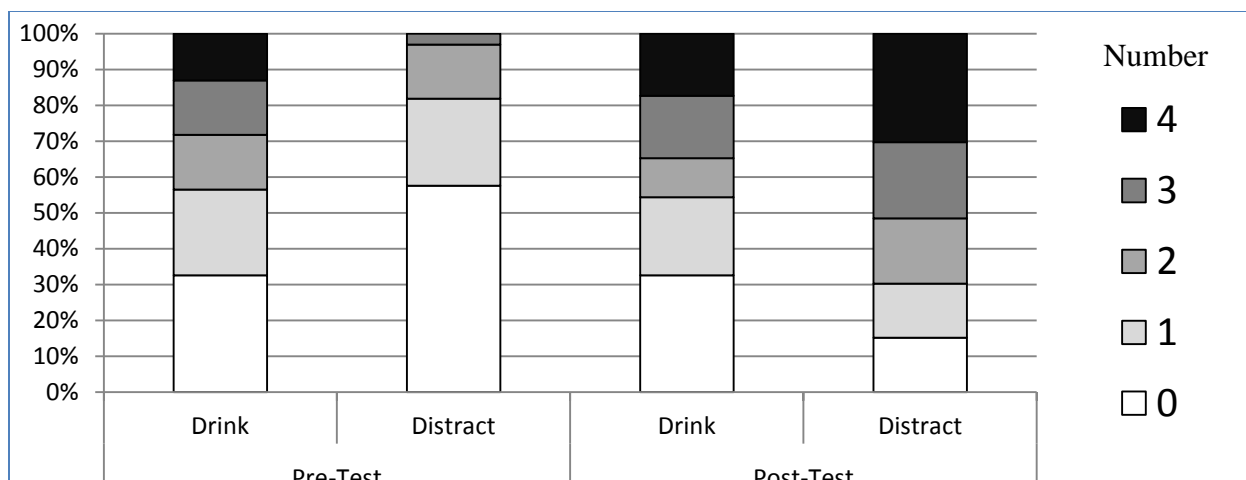


Figure 3. Test results by case for pre-test and post-test for the four signs of alcohol poisoning

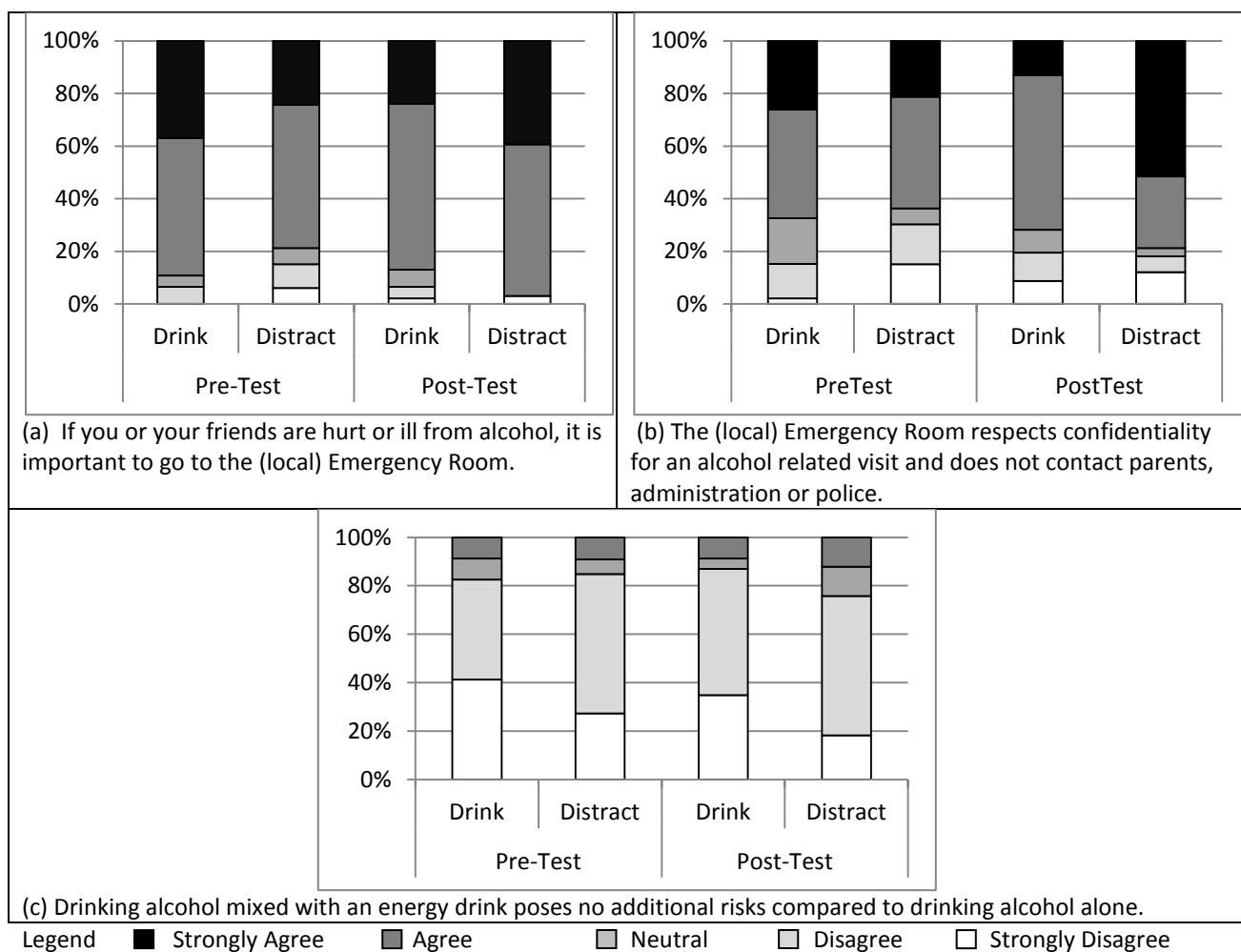


Figure 4. Health promotion learning objectives

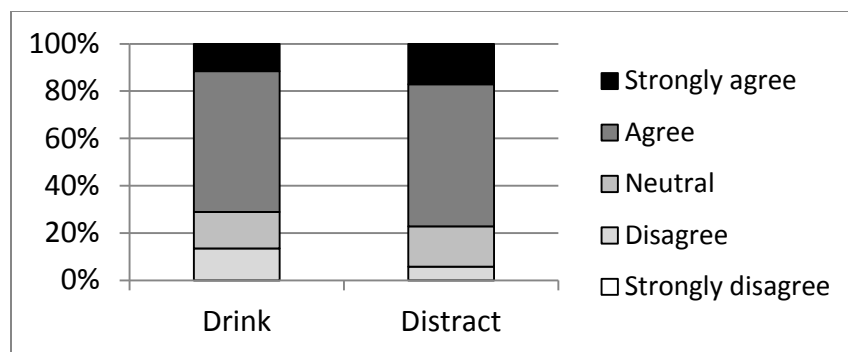


Figure 5. I learned something new about [alcohol or drinking] [distracted driving]

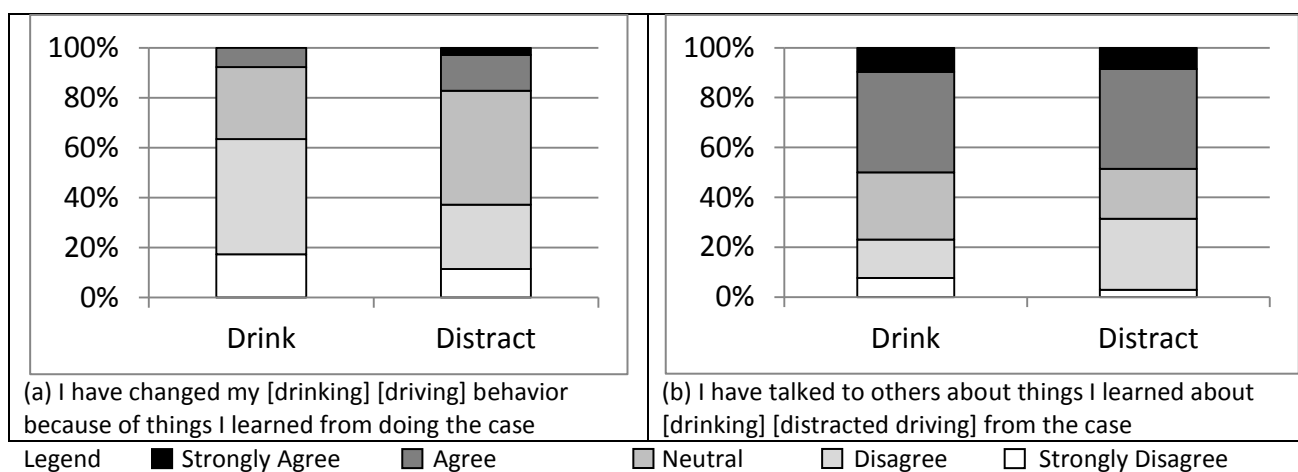


Figure 6. Impact on student behavior

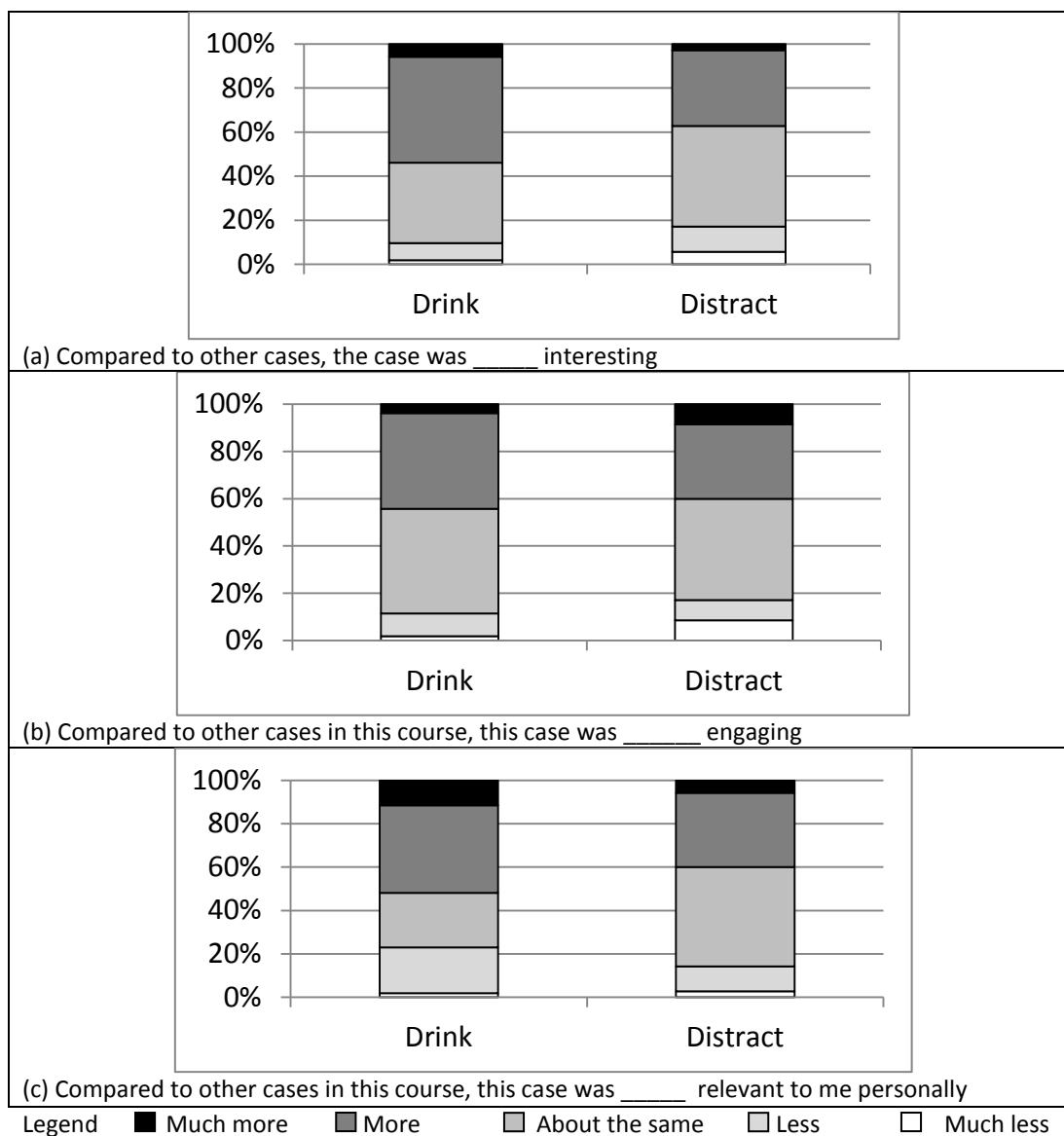


Figure 7. Impact on student engagement

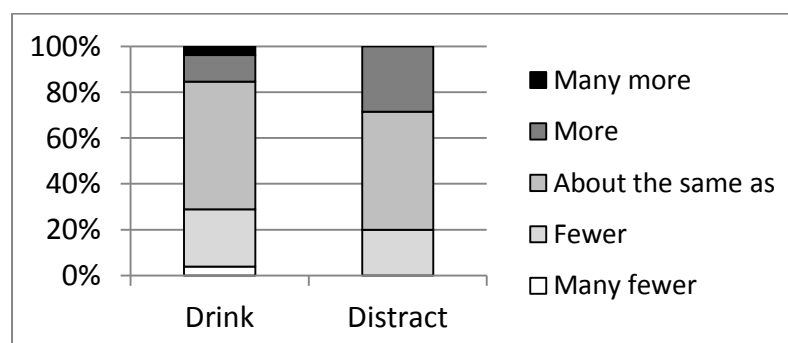


Figure 8. Compared to other cases in this course, I researched ____ outside resources for the case

CHAPTER 5:

DISCUSSION

It is well known that high-risk drinking is an issue across many college and university campuses, and that substance abuse practitioners and researchers are constantly searching for ways to reduce the negative consequences associated with high-risk drinking and to encourage a safer environment (Glidemann et al., 2007; Hingson et al., 2005; Weschler & Wuethrich, 2002). While many different types of prevention programs and interventions have been used over the years with varying degrees of success, the social norms approach is among the most well-known (Berkowitz, 2004; Haines, 1996). Within the social norms approach are many types of interventions. This research focused on social norms marketing and curriculum infusion, both of which have been used with relative success (Lederman et al., 2007; Perkins & Craig, 2006). In order to evaluate them further and apply them to a specific high-risk drinking event, two independent studies were designed to evaluate each type of intervention.

The purpose of the first study was to learn more about the Fourth-Year Fifth practice and attempt to identify why social norms marketing campaigns had been ineffective at reducing participation. Research (Cox & Bates, 2011; Haines, 1996; LaBrie et al., 2009) shows that social norms marketing is an effective method of reducing high-risk drinking, yet research on this specific practice showed a stable level of participation over time despite using social norms marketing campaigns (Foster, 2010; Harris, 2007; Nangle 2008; Foster & Triplett, 2009). The first study concluded that there were no misperceptions to correct, that students of a specific group participated at far

higher levels than other students, and that when a student learns about the practice affects levels of participation. These results indicate that social norms marketing was not the best option in this particular case. The second study was designed to explore an alternative social norms campaign that would be more directed with the goal of reaching the students most at-risk for participating in this dangerous event. Using the results of the first study, which indicated a very specific subpopulation of students were participating and no general misperception about overall participation, curriculum infusion was chosen. Curriculum infusion was chosen in part because it has been proven effective in some research (Lederman et al., 2001; Lederman et al., 2007; Riley et al., 2005).

This chapter proceeds as follows. For each study, there is a summary of the findings from each of the research questions. Each of those findings is then situated in the previous literature, followed by the limitations of each study. The findings and limitations of each study are followed by the implications of the dissertation and a discussion of the studies together further evaluating their connectivity. Finally, suggestions for future research are discussed.

Characterization of Event

Q1: Why are students participating in the Fourth-Year Fifth? What are their motivations?

Findings.

By analyzing why students participate in this particular practice and what motivations are most prominent, it is clear that students primarily participate in the Fourth-Year Fifth because it is a ‘tradition’ that they look forward to over time.

Specifically, the focus group responses were overwhelmingly focused on tradition as a motivating factor. Other themes emerged as well including challenge, a sense of accomplishment, and the social aspect with friends, but none as strong as tradition. The implication of this result is the challenge associated with a general lack of theory regarding tradition-specific high-risk drinking motivations.

Relating findings to literature.

This work is consistent with and reinforces the research on motivations for participation. The study revealed that tradition is the primary motivating factor for participation, which Wechsler & Wuethrich (2002) discuss in detail. They even note that some traditions are so entrenched in the culture, that despite university efforts, no changes can be made. In this case, since the practice cannot be changed, it would be best to address the notion of tradition and determine ways to address tradition as the motivating factor.

The literature focused on other motivations as well that were not supported in this research. Motivations such as drinking games, past experiences and social reasons for drinking in high-risk ways were prominent in the literature (LaBrie et al., 2008; Mallett et al., 2006; Mohr et al., 2008; Weschler & Wuethrich, 2002). The focus groups did not discuss any of these in any detail, but that may be a result of tradition being the primary motivator in this particular high-risk drinking event.

Q2: Is there an identifiable subculture of students that attempts the Fourth-Year Fifth?

Findings.

The results of the study indicate that Greek-affiliated male students participate in the Fourth-Year Fifth at the highest levels of over 50%. Non-Greek affiliated females participate at the lowest rate of less than 10%. This creates several issues when considering why the social norms marketing campaigns do not work. First, if the common perception is that 20% of fourth-year students participate, then those students participating at 50% or higher may not believe that only 20% participate. This finding could affect overall message believability, therefore negatively affecting the entire campaign. The other potential issue is that non-Greek affiliated females participate at 9.1%. If they receive messaging indicating that 20% of fourth-years participate, it could impact message believability or possibly encourage participation.

Since this population is so specific, the implication of this result is that a general social norms marketing campaign may not be effective as it may be challenging to reach them directly. Specifically, the goal is to reach this group with the social norms marketing messages, while intentionally not reaching the rest of the student population. Logistically, this can be quite challenging. This information is also critical in determining effectiveness of current interventions as well as creating future interventions.

Relating findings to literature.

The literature shows that Greek-affiliated males consume alcohol at significantly higher rates as compared to other student populations, which is also supported by this research (Chauvin, 2012; Hutching et al., 2011). The first study in this dissertation shows that Greek-affiliated males in the study participate in the Fourth-Year Fifth at rates of five times those of some other groups. This finding also relates to the literature that indicates

how difficult it is to “norm” alcohol consumption in the Greek community. Specifically, research (Bruce & Keller, 2007; Turrise et al., 2006; O’Brien et al., 2013) states that Greek-affiliated students are generally well-calibrated in terms of overall perceptions of alcohol consumption within their community. They also state the issue is that the normal drinking behavior within the Greek-affiliated community can be so risky that it would be irresponsible of practitioners to advertise that normal level.

Q3: Does when a student learns about the practice affect participation?

Findings.

An analysis of the data on when students learned about the practice and how that affects participation proved useful and also posed a potential challenge. The results showed an association between learning about the tradition and participation. Interestingly, the rates of participation are far higher for those who learn about it before arriving at the university or within the first year. When awareness of the practice develops later in the college career, the levels of participation sharply declined. While this finding poses some challenges to substance abuse practitioners, it also supports the previous finding that tradition is a prominent factor in this practice. The implication associated with this finding is that advertising could provide students the opportunity to learn about the practice earlier. This is especially concerning given that almost 60% of participants learned about the practice in their first-year, and there is an association between when learned and participation.

Relating findings to literature.

There is no literature that evaluates the combination of specific high-risk drinking events, participation in those events and how that relates to when a student learned about the event. As such, this dissertation significantly contributes to the literature on this point. It indicates the need to further study specific celebratory events and time learned in more detail.

Q4: Why are social norms marketing campaigns designed to reduce participation ineffective at reducing participating in this specific event?

Findings.

This question was designed with the knowledge that evaluating each part of the high-risk drinking practice in terms of levels of participation, who is participating and why, that some conclusions could be made about why the previous social norms marketing campaigns had not been effective at reducing participation. Based on the results of the survey data, it can be determined that social norms marketing campaigns have been ineffective because many students (48%) underestimated participation in the Fourth-Year Fifth. The implication associated with this finding is that the ‘norm’ that 20% of fourth-year students attempt the Fourth-Year Fifth may not be a believable statistic. This is particularly true for the Greek-affiliated males who participate at a rate of 50% and likely see a far higher numbers of fellow students participating.

Relating findings to literature.

Social norms marketing has been proven as a successful way to correct misperceptions when students are overestimating their peers alcohol consumption (Haines, 1996; LaBrie et al., 2009; Perkins & Craig, 2006). One researcher (Haines, 1996) discusses how correcting misperceptions positively affects actual drinking rates. He states that in one case, correcting misperceptions resulted in a 16% reduction in actual high-risk drinking behaviors and an 18% reduction in perceptions associated with peers' high-risk alcohol consumption. However, the first study in this dissertation indicates that students are either accurate in their perceptions or are underestimating perceptions, so there can be no realistic expectation that a social norms marketing campaign would be effective at changing behavior or perceptions; at least not positively. Further, the issue of a specific population participating at much higher levels than the general student population raises another issue in that message believability becomes a factor when the numbers do not accurately reflect levels of participation within certain populations. That message believability is critical in order for campaigns to be effective (Park et al., 2011). Finally, the social norms marketing message, if disseminated campus-wide, may educate first-year students on the practice, which could promote increased participation as those students reach their fourth-year, which could negate any possible positive that may have come from the messaging. In this case, finding alternative interventions is necessary.

The findings of the first study are significant in providing an overview of the practice in terms of how students view it and their motivations for participation. Specifically, understanding that tradition is a primary motive is important for moving

forward as prevention programs should at a minimum address traditions in some way. Also, the knowledge that primarily Greek-affiliated males attempt this practice is important for the development of targeted prevention programs. Also significant is the knowledge that social norms marketing initiatives have been ineffective for several reasons such as a general underestimation of participation, a specific subculture participating at much higher levels, and lack of targeted saturation. The finding that the earlier students learn about the practice, the more likely they are to participate presents a bit of a challenge to substance abuse prevention practitioners as there is a potential issue between educating students about safe behaviors and educating about the actual practice. The adverse consequence of introducing the practice to students who may not otherwise learn about it remains possible, but not studied in depth.

Characterization of Event Limitations

While this study was successful in some areas, there are a few potential limitations worth noting that could have limited the data set and subsequent results. One limitation is the survey instrument itself. The survey instrument was not originally created for this study. Instead, the instrument used was similar to those used for several years prior in order to track longitudinal data. As such, while longitudinal trends were available, it limited the ability to obtain more detailed information about participation, motivation, attitudes and behaviors.

The sample poses another limitation. The sample for the first study included all fourth-year students, and the overall response rate was 42.8% which is quite good. However, the response rate was 68% female. This is not indicative of the actual fourth-

year class, which is 46% female. This predominately female response rate could have skewed the overall results in terms of who is participating, especially given the practice is predominately male. However, 30% of the respondents identified as Greek-affiliated, which is indicative of the actual student population.

These responses may have had an impact on the overall results regarding who is participating. Specifically, the female response rate of 68% along with the overall female participation rate of approximately 10% could be a sampling issue. The same would be the case for the Greek-affiliated population, where Greek-affiliated males participated at the highest level of 50% of those sampled. What is not clear is if these males are members of specific fraternities or if this sample is across the various fraternities. As such, it is unknown if all Greek-males are participating at these high rates, or if those affiliated with specific fraternities are participating at much higher rates, while those with other fraternities are participating at lower rates. It might be useful to not only ask Greek-affiliation, but to determine which fraternity or sorority the respondent belongs. That, however, could result in a lower response rate, so additional research would be needed to determine if this is a reasonable change.

While the high female response rate may skew the results of this first study, the results do support the research of the previous years; therefore, the total numbers of student participating in the fourth-year fifth do appear accurate. This particular study also included a qualitative component to further evaluate the motivations for participation. The consensus across several focus groups indicates accuracy among the responses; therefore, the motivations should be considered believable.

Finally, for the respondents who indicated they had not heard of the Fourth-Year Fifth, the remaining questions on the survey regarding the practice were skipped. It is unclear how this survey design may have impacted the overall results, particularly for those who have not heard about the practice. Given that when students hear about the practice is a factor in how likely they are to participate, a separate set of questions for those students would have been useful. Specifically, providing an explanation of the practice, since it has already passed at the time of the survey, and questions about their thoughts on it such as if they would consider participating if their friends were participating, and what they think of the practice and those who participate. This may provide some valuable data on perceptions of those who learn of it very late in their college career.

Curriculum Infusion Intervention

Q1: Does infusing celebratory event-specific drinking health promotion content into academic curriculum positively impact student self-reported behavior related to the topic?

Findings.

While the use of case studies to incorporate health promotion content into academic content did not change behavior significantly, the results showed that students learned something new about a health promotion issue. Specifically, while there was no significant finding regarding the importance of taking hurt or ill friends to the emergency room from the students in the Celebratory Drinking group, there was a significant trend from the Distracted Driving group on the same point. Further, students were asked to

rate agreement with behavior change as a result of completing the case studies. While only 8% of students in the Celebratory Drinking group indicated they would change their behavior, 17% of the Distracted Driving group indicated they would change their behavior. The implication of this finding is that case studies may be effective for teaching new material, but additional research is required for case study design to impact behavior change.

Relating findings to literature.

The literature on curriculum infusion indicated that it has shown success, but not in all cases. While not shown to affect behavior change, it has shown success in engaging students in content as well as correcting misperceptions (Lederman et al., 2001; Lederman et al., 2007; Riley et al., 2005). As such, it was hoped that this infused curriculum would be successful at educating students on the health promotion content infused into the academic curriculum and encourage behavior change related to the topic. While this finding did not reflect the findings in the literature, it is clear that the use of case studies overall was successful as Kreber (2001) found in his research.

Q2: Does infusing celebratory event-specific drinking health promotion norms content into academic curriculum increase student confidence and ability in the academic or health promotion content?

Findings.

While irrespective of health promotion content, the use of case studies as a way of improving confidence and ability in the academic content is promising. Specifically, the

results showed that overall ability level improved across several statistical tests in both groups, but the Distracted Driving group reported significantly greater post-test ability ratings. As such, the health promotion norms associated with Celebratory Drinking case did not positively affect overall ability. However, given the high Distracted Driving ratings, the use of case studies with relevant data was effective.

The results regarding confidence in ability were mixed. Specifically, students in the Distracted Driving group indicated significant self-reported gains on some statistical tests, while students in the Celebratory Drinking group indicated significant self-reported gains in confidence for other statistical tests. However, the gains for the Distracted Driving group were significantly higher than those for the Celebratory Drinking group. Again, while the Celebratory Drinking case itself was not found to be more effective than the Distracted Driving case, the use of relevant case studies does show improvement in confidence in abilities in performing the academic coursework. The implication of this finding is that the use of case studies is valuable in increasing confidence and ability.

Relating findings to literature.

Interestingly, while this research was initially focused on substance abuse prevention and how to reach students who were engaging in a high-risk drinking event, the second study in this dissertation brought to light the real value of interactive learning in the academic classroom and how useful it is to bring case studies, especially socially relevant and personal case studies, to the classroom to encourage confidence and ability in the academic content. The use of case studies as a learning tool has shown promise at increasing student retention of academic information (Kreber, 2001). Researchers have

shown that in order to affect behavior change in the classroom, particularly as it relates to students' personal confidence and ability to understand the curriculum, relevant examples provided in engaging and interactive ways are necessary (Lederman et al., 2007; Lederman et al., 2001).

Q3: Does integrating celebratory event-specific drinking health promotion information into interactive academic case studies increase student interest and engagement in the material as compared to non-health promotion topics?

Findings.

The findings here indicate that the students rated health promotion case studies as at least as or more interesting, engaging and personally relevant than other case studies throughout the semester. Yet, there was no difference between the two cases in terms of overall engagement, personal relevance, and use of outside resources. Students reported the celebratory drinking topic to be more interesting, but that interest does not correlate to increased engagement, relevance and added outside research. As such, while the increased interest is important in gaining the attention of the students, it is not a significant factor in overall learning as related to interest and engagement. The implication of this finding is that the cases are equally or more positively received by students as compared to the other cases in the class.

Relating findings to literature.

The research on case studies as a tool for experiential learning has found that case studies are useful because the educational goal of provoking interest and involvement in a

topic is potentially the first step towards behavior change (Kreber, 2001). However, while the interest and engagement was validated in some areas, it was not overwhelmingly reported in multiple areas across case studies, so this study did not follow the literature. However, curriculum infusion in general has been found to be effective at educating students on important social and health promotion topics by integrating the topics into the classroom (Jones & Stanford, 2003). Again, while some promise is shown in this research, additional research needs to be done on curriculum infusion and the effect of health promotion case studies integrated into the academic curriculum.

Curriculum Infusion Intervention Limitations

The second study was conducted as an exploratory study to examine if curriculum infusion might be an appropriate alternative to standard social norms marketing campaigns. One primary limitation of this exploratory study is that it lacked follow-up after the semester ended. With no plan to contact the students, it is impossible to know if the infused curriculum impacted their behavior after the course, specifically as it relates to the Fourth-Year Fifth. A longitudinal study with follow-up would be indicated as a way to determine how students use information after the cases have been completed. Specifically, the third-year students should be surveyed again in during their fourth-year both before and after the Fourth-Year Fifth event. This survey should ask the same questions asked on the pre-test including personal drinking behaviors, attitudes about the Fourth-Year Fifth, and perceptions associated with the Fourth-Year Fifth. This should be done annually for each class to attempt to determine if the Celebratory Drinking case

study is changing behavior over time, either with personal high-risk drinking or associated with participation in the Fourth-Year Fifth.

There are also sampling issues that should be considered. Specifically, two sections of a third-year systems engineering course were selected for this study. While the course was chosen in part for the access to the third-year predominately male students, the classes were ultimately chosen because access was available and there was a convenience factor in effect. Further, since all the students in this sample were engineering majors, this could have skewed the data as they may not be representative of all students. In addition, future research would benefit from larger study populations to allow for more power and certainty in the results.

Another limitation associated with the sample is that it is unknown who the participants in the study were and what behavior change was needed. Audience segmentation for assessment would address this limitation. Specifically, demographic data as well as personal behaviors associated alcohol consumption, knowledge about the Fourth-Year Fifth, and perceptions associated with the Fourth-Year Fifth should be obtained on the pre-test for all participants. This will allow researchers to determine what high-risk drinking behaviors, if any, exist that need to be changed, and what misperceptions may exist that need to be corrected.

A limitation associated with the pre-test and post-test is the lack of clarity associated with the questions about how and with whom information about the cases was shared. Specifically, if students are talking about the cases positively, then the result is indicative of behavior change. However, if students are talking about the cases negatively, then the result will not be considered positive. To determine exactly how the

students are discussing their cases, with whom they are discussing the cases, and what they are saying about the cases, additional questions should be added to the post-test and the end-of-semester course evaluation. Additional questions directed at gaining such information will address this limitation. Further, adding a few questions after each case throughout the semester will serve as a control to compare the health promotion cases against. Specifically, if a standard set of questions is asked after each case study, then the intervention cases can be compared to each other and to multiple cases used throughout the semester.

Discussion of the Combined Results

Overall this dissertation contributes to and advances the literature in several areas including motivations for high-risk drinking, the effectiveness and ineffectiveness of social norms marketing, curriculum infusion and case studies. Further, this research also contributes to the literature as it focuses on two different methods of prevention for a single high-risk celebratory event. The first study was an opportunity to gain information about a specific practice. The results of that first study provided a basis for building the second study. While not directly connected, the information found in the first study such as Greek-affiliated male populations participating at higher rates, allowed for exploration throughout the university to determine where this population may best be targeted. The class in Systems Information and Engineering was a natural place given the high level of Greek-affiliated males in the school.

Other findings from the first study were used to guide the second study as well. For example, the first study indicated that students were not overestimating participation

and as such, the actual statistics were not provided for the students in the second study. Instead, the students were given the raw data from the first study to form conclusions on their own about the event. Finally, students in the Celebratory Drinking group in the second study were asked to consider the social norms approach to prevention based on the information given. This allowed the students the opportunity to study the social norms approach, better understand how and why it works, and then also connect it to the data. In this case, students in the Celebratory Drinking group had the opportunity to learn more about how substance abuse practitioners evaluate data and determine what campaigns to use and while not measured specifically, having that knowledge may be useful in the future as students view other social norms marketing messages.

Implications

Substance abuse prevention in higher education is a field that is continuing to grow and develop with new ideas for addressing high-risk drinking events. Some interventions are overwhelmingly successful in many cases, and others are newer and showing promise. Lessons learned from this research can assist substance abuse prevention practitioners in evaluating their study body, the college-specific and general celebratory drinking events, and the current prevention initiatives to determine levels of effectiveness. This research can also provide practitioners with early research on alternative forms of prevention when one may not be effective, or as effective as hoped. Specifically, I make two recommendations for those in the field.

Recommendation 1: For celebratory drinking events that are population specific and motivated by tradition, the social norms marketing approach is not an appropriate approach.

Some interventions are created and implemented without previous evaluation of the event, population, motivations or other factors associated with it. This practice could be damaging depending on what messages are disseminated and to whom the messages are distributed. In the case of the Fourth-Year Fifth, the standard norm of 20% of Fourth-year students participate was marketed for several years prior to this research. It is unknown what the effects of those marketing campaigns may have been, but it is clear that had the evaluation of the event occurred earlier, the messaging would have been different. Specifically, it is important that social norms are not distributed unless there is a misperception to correct, the messages are believable, they are reaching the appropriate audience, and are distributed to reach appropriate saturation. Also, it is critical that the motivations behind each event are studied as well. To understand why a student participates in a high-risk drinking event will help the substance abuse prevention practitioner to create interventions that address those motivations directly. The participants in the focus groups were very focused on tradition as a primary motivating factor, so it may have been more effective to prepare marketing campaigns associated with positive and negative traditions as opposed to how many students are actually participating.

Recommendation 2: When social norms marketing is not effective, curriculum infusion could be a viable alternative. However, extensive research and iterative case development is needed prior to implementation.

With so many different substance abuse prevention programs and interventions available, it is important to not only explore the event as indicated in recommendation one, but also to evaluate which intervention would be most effective based on the information learned about the event. Because social norms marketing is often considered the standard prevention intervention, it is often used without event-specific consideration. Specifically, it is important to remember that students, populations, motivations and learning styles change. As such, it is important to evaluate new and existing interventions regularly. While the results of the curriculum infusion intervention show that curriculum infusion could be effective, it should not be automatically used in every future case. It should be continually tested and evaluated with the appropriate future research to be sure it is the best option at the time. Taking the time to test new ideas and develop plans for implementation is worth the time and effort.

Suggestions for Future Research

Based on the limitations of this research, there are several suggestions for improvement in future research. Most important is proper assessment of each high-risk drinking event to determine who is participating and why they are participating. Once these questions are better understood, developing the appropriate intervention can begin.

For the first study, while the data collected was helpful and relevant to the overall study and it identified who is participating and why, additional survey questions would

have been helpful. Such questions could have provided additional insight into perceptions, participation and attitudes. Also, it would be helpful to conduct additional focus groups with more time spent on motivations to determine not only what the motivations are for participation, but to better understand why students respond so strongly to those motivations. The information would be helpful in addressing motivations in future campaigns. It would also be helpful to discuss general attitudes towards the practice to determine how attitudes may be affected by perceptions of participation.

Another suggestion for improvement is to consider grouping the negative consequences into minor and serious negative consequences. This will separate minor issues like a hangover from major issues like injury. Once separated, it would be helpful to evaluate the serious consequences compared to drinking rates and participation levels. This may provide some additional information regarding how negative consequences affect participation.

For the second study, the sample size should be increased. An increased sample size will allow for more power and certainty in the results. The increased sample size will also allow for audience segmentation for assessment. In addition to the increased sample size, it will be possible to gather demographic data without compromising the anonymity of the participants. A post-hoc analysis of the results indicates a minimum sample size of 450 participants is needed to achieve .80 power on four of the outcomes. For the remaining outcomes, the needed sample size exceeds the total undergraduate population in the Systems Information and Engineering program. There are multiple barriers associated with achieving a sample size this large, most notably that class sizes in

engineering courses rarely are this size. Thus new interventions will be required in order to find statistically significant changes. For future research, it is recommended that long-term follow-up be included. Specifically, gender, Greek-affiliation, personal behaviors associated with high-risk drinking, perceptions about the Fourth-Year Fifth, and intentions associated with participation.

Another recommendation for future research is the implementation of surveys after each case study used throughout the semester. If multiple case studies included several questions designed to determine confidence, engagement and interest, the results of those surveys would allow a deeper comparison of the health promotion cases to all other cases used in the course. This should continue beyond the academic course as well. Follow-up after the semester ends and then again as students move into their fourth-year will be important. Specifically, the surveys designed to capture demographic data as well as personal behaviors associated with alcohol consumption, personal experience with and perceptions associated with the Fourth-Year Fifth can capture the data during the pre-test, again after the course is over and finally after the Fourth-Year Fifth event has passed. This will allow researchers to determine if there is any actual behavior change over time after completing the Celebratory Drinking case study.

Also, in order to better determine how the students are discussing their cases, with whom they are discussing the cases, and what they are saying about the cases, additional questions should be added to the post-test and the end-of-semester course evaluation. Specifically, if students are talking about the cases positively, then the result is indicative of behavior change.

Finally, while the academic content alone was not the specific focus of this research, it is clearly significant when reviewing the overall outcomes. Specifically, future research should be conducted on just the academic content and the use of case studies, which should be tested separately from the interactive curriculum that uses social and health promotion information that the students will find personally relevant. This should then be measured for specific impact on students' overall learning.

Conclusion

There is a growing concern regarding the large numbers of college students who engage in high-risk drinking and who suffer the negative consequences that may result. Student affairs practitioners who specialize in substance abuse prevention are constantly researching and developing new ideas for reducing the negative consequences students suffer as a result of high-risk drinking.

This dissertation evolved from an initial desire to understand why students were participating in a specific high-risk drinking practice and why prevention efforts were relatively unsuccessful despite using social norms marketing, a proven successful method of prevention (LaBrie et al., 2009; Lee et al., 2007; Martens et al., 2006). The results of the first study were clear and indicated that standard social norms marketing campaigns were not the best option. The second study was then developed to test an alternative option for this particular high-risk drinking event. While there was no significant decrease in self-reported behavior change, it did demonstrate how case studies can have a significant impact on student learning and engagement in academic content. Further, this research has shown that practitioners can infuse academic case studies with health

promotion information without weakening the overall academic learning objectives of the course.

Although this dissertation research is specific to one high-risk drinking event at one university, the results are worthy of note and consideration for high-risk events at other colleges and universities as well. At the same time, it is important to keep in mind that events and student populations are unique, so some trial and error in creating new prevention programs is necessary. Not all programs work for all students at all colleges and universities, but investing time and resources in understanding the population and the event can work to provide solutions as well as reveal new ideas.

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Appendix A: U.Va. Fourth-Year Fifth Survey - 2008

UVA 4th Year 5th Survey - 2008

As a fourth-year student, please participate in an ANONYMOUS survey to assess fourth-year student drinking behaviors at the last home football games. EVEN IF YOU DID NOT ATTEND THE GAMES OR DID NOT DRINK ALCOHOL, your response to this survey is important to gain a full and accurate picture of student drinking behaviors.

The data collected from this survey are a component of the research for our Capstone project on celebratory drinking.

The survey will take approximately 5 minutes to complete. You will be asked about your drinking behaviors, your perceptions of other students' drinking behaviors, protective behaviors in which you engaged and any problems you experienced.

This survey is COMPLETELY ANONYMOUS and VOLUNTARY. We *will not* ask for your name or any personally identifying information. The survey *will not* track which internet browser you use or from which machine you submit your information. Consequently, there will be no electronic trail that would enable us to trace a particular set of responses to a particular machine or individual. If you would like to withdraw from the study, just close your web browser.

Questions marked with an asterisk (*) are required.

At the end of the survey you will receive instructions for entering your name into the drawing for a \$20.00 gift certificate from the U.Va. bookstore.

Thank you very much for your contribution to our research project in support of our master's degree in the Curry School. If you have any questions, please contact us:

Holly Foster and Lindsey Triplett
Graduate Students in the Student Affairs Practice in Higher Education Program
924-5276
haf6n@virginia.edu or lat8a@virginia.edu

The following survey questions refer to the practice of the 4th year 5th (attempting to consume a fifth of liquor) on the day of one of the last home football game.

A "drink" is defined as:

- * One 12-ounce can or bottle of beer
- * One 4-ounce glass of wine (12% alcohol)
- * One shot glass of liquor (1oz. of 100 proof or 1.5oz. of 80 proof)
- * A mixed drink with one shot of liquor (*for mixed drinks with more than one shot, count each shot as a separate drink*).

***1. Gender:**

- ☐ Male
- ☐ Female
- ☐ Transgender

UVA 4th Year 5th Survey - 2008

***2. Do you belong to an IFC/ISC/MGC/NPHC fraternity or sorority?**

- ☐ Yes
- ☐ No

***3. Have you ever heard of the 4th year 5th?**

- ☐ Yes
- ☐ No

4. When did you first learn about the 4th year 5th?

- ☐ Prior to arriving at UVA
- ☐ First-year
- ☐ Second-year
- ☐ Third-year
- ☐ Fourth-year

5. How did you learn about the 4th year 5th? (Check all that apply)

- ☐ Roommate/Suitemate
- ☐ Friend
- ☐ Sibling
- ☐ Chapter member

Other (please specify)

6. How much do you think people risk harming themselves if they engage in the 4th year 5th?

- ☐ No risk
- ☐ Slight risk
- ☐ Moderate risk
- ☐ Great risk
- ☐ It depends on the person

7. What percent of 4TH YEARS do you think attempted or completed the 4th year 5th this year?

8. What percent of YOUR FRIENDS do you think attempted or completed the 4th year 5th?

UVA 4th Year 5th Survey - 2008

9. Have you ever consumed a fifth of liquor in a day before?

- ☐ Yes
☐ No

*10. Did you attend the last home football games?

- ☐ Yes
☐ No

11. Please indicate whether or not you experienced any of the following prior to the last home football game on November 22.

	Yes	No
I signed the fourth-year class pledge against the 4th year 5th	<input type="checkbox"/>	<input type="checkbox"/>
I ran Int he Fourth-Year 5K	<input type="checkbox"/>	<input type="checkbox"/>
I received an alcohol education flyer and "Say Something" button	<input type="checkbox"/>	<input type="checkbox"/>
I saw a full-page ad in the Cavalier Daily with a letter from President Casteen	<input type="checkbox"/>	<input type="checkbox"/>
I received an email about alcohol safety from a university official	<input type="checkbox"/>	<input type="checkbox"/>
I attended the "Hookin' Up and Hanging Out: Sex on Campus" presentation by Dr. Robin Sawyer	<input type="checkbox"/>	<input type="checkbox"/>
I attended the "Haze" movie at Newcomb Theatre	<input type="checkbox"/>	<input type="checkbox"/>
I attended the "Hoos In Recovery panel discussion"	<input type="checkbox"/>	<input type="checkbox"/>
I received free bottled water and alcohol information on the Corner	<input type="checkbox"/>	<input type="checkbox"/>
I received free bottled water at the game	<input type="checkbox"/>	<input type="checkbox"/>

*12. Did YOU participate in the 4th year 5th this year?

- ☐ Yes, I drank a fifth of liquor
☐ Yes, I drank a fifth of champagne/wine
☐ Yes, I split the 5th with a friend and we finished it together
☐ Yes, but I did not finish a whole fifth of liquor
☐ No, but I did drink that day
☐ No, and I had nothing to drink that day

The following questions relate to your alcohol consumption on the day you attempted/completed the 4th year 5th

UVA 4th Year 5th Survey - 2008

12a. What was the alcohol proof/content of the liquor/wine/champagne you consumed?

- ☐ 10 – 12% alcohol (most wines/champagnes)
- ☐ 80 proof
- ☐ 100 proof
- ☐ 150 proof
- ☐ unsure of proof

12b. How many standard drinks did you have?

**a fifth of 80 proof liquor has 17 drinks*

**a fifth of 100 proof liquor has 25 drinks*

**a fifth of 150 proof liquor has 33 drinks*

**a bottle of wine/champagne has 5-6 drinks*

12c. What time did you start drinking?

12d. What time did you stop drinking?

12e. What do you estimate your Blood Alcohol Concentration (BAC) was after completing or attempting the 4th year 5th?

12f. What is your current (approximate) body weight in pounds? (this information will be used to estimate your BAC)

12g. What kinds of things did you do to minimize your risk of problems on the day you attempted the 4th year 5th? (Please select all that apply)

	Yes	No
Alternated with non-alcoholic beverages	<input type="radio"/>	<input type="radio"/>
Diluted alcohol with mixers	<input type="radio"/>	<input type="radio"/>
Did not drink shots	<input type="radio"/>	<input type="radio"/>
Got sleep the night before	<input type="radio"/>	<input type="radio"/>
Ate a large breakfast	<input type="radio"/>	<input type="radio"/>
Ate throughout the day	<input type="radio"/>	<input type="radio"/>
Spaced my drinks evenly throughout the day	<input type="radio"/>	<input type="radio"/>
Had a buddy system (someone who watched me all day)	<input type="radio"/>	<input type="radio"/>
Other (please specify)	<input type="text"/>	

UVA 4th Year 5th Survey - 2008

12h. Please indicate if you experienced any of the following due to your participation in the 4th year 5th this year.

	Yes	No
Had more fun with my friends	<input type="radio"/>	<input type="radio"/>
Enjoyed the game more	<input type="radio"/>	<input type="radio"/>
Had a sense of accomplishment	<input type="radio"/>	<input type="radio"/>
Had a hangover	<input type="radio"/>	<input type="radio"/>
Damaged property	<input type="radio"/>	<input type="radio"/>
Got into a physical fight	<input type="radio"/>	<input type="radio"/>
Was injured or hurt	<input type="radio"/>	<input type="radio"/>
Got nauseated or vomited	<input type="radio"/>	<input type="radio"/>
Went to the ER (UVA or other)	<input type="radio"/>	<input type="radio"/>
Had a memory loss	<input type="radio"/>	<input type="radio"/>
Behaved in ways that I later regretted / Felt guilty	<input type="radio"/>	<input type="radio"/>
Was arrested	<input type="radio"/>	<input type="radio"/>
Engaged in any type of sexual activity which otherwise I would not have	<input type="radio"/>	<input type="radio"/>
Thought I might have a drinking problem	<input type="radio"/>	<input type="radio"/>
None of the above	<input type="radio"/>	<input type="radio"/>

Other (please specify)

ONLY 3 MORE QUESTIONS!

13. Why did you decide not to attempt the 4th year 5th? (please mark all that apply)

- ☐ I don't drink
- ☐ I didn't want to drink that much
- ☐ I thought it was dangerous
- ☐ I wanted to remember the game
- ☐ I was taking care of friends who did attempt the 4th year 5th
- ☐ I had other responsibilities
- ☐ I didn't go to the game
- ☐ Other

(please specify)

UVA 4th Year 5th Survey - 2008

14. What is the average number of drinks you typically have on a NON-FOOTBALL game Saturday? (if none enter "0")

15. What is the average number of drinks you typically have on the day of a HOME football game? (if none enter "0")

16. Did OTHER STUDENTS' DRINKING on the day of one of the last home games affect you?

	Yes	No
Placed me in a caretaking role (helping someone who was sick, helping someone get home, etc.)	<input type="radio"/>	<input type="radio"/>
Prevented me from enjoying the game	<input type="radio"/>	<input type="radio"/>
Damaged my personal property or the place where I live	<input type="radio"/>	<input type="radio"/>
I was pushed or hit	<input type="radio"/>	<input type="radio"/>
I experienced an unwanted sexual advance	<input type="radio"/>	<input type="radio"/>
Disrupted my sleep	<input type="radio"/>	<input type="radio"/>
Jeopardized a relationship (caused an argument)	<input type="radio"/>	<input type="radio"/>
I was at the game, but I was not affected in any way	<input type="radio"/>	<input type="radio"/>
I was not at the game, and I was not affected in any way	<input type="radio"/>	<input type="radio"/>
I was affected in other ways	<input type="radio"/>	<input type="radio"/>

(please specify)

17. Please provide any comments on this survey or your experiences at the last home football game this year. (Please do not use names or information that might identify yourself or others.)

UVA 4th Year 5th Survey - 2008

THANK YOU FOR COMPLETING THIS SURVEY. Your participation is greatly appreciated!

If you would like to be entered in the drawing for the \$20 bookstore gift card, please send an email to surveydraw@gmail.com with "survey completed" in the subject line. This method of entering will ensure anonymity and no connection to your survey responses.

Please click on the "DONE" button below to submit your responses. If you have any questions, please contact us:

Holly Foster and Lindsey Triplett

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Appendix B: Curriculum Infusion Pre-Test/Post-Test

FINAL Curriculum Infusion Pre-Test**1. Question Set 1**

1. If given an unknown data set, please rate your ability to evaluate data quality and apply basic data-cleansing methods?

- ☐ Excellent ability
- ☐ Good ability
- ☐ Moderate ability
- ☐ Little ability
- ☐ No ability

2. How confident are you about the rating?

- ☐ Very high confidence
- ☐ High confidence
- ☐ Moderate confidence
- ☐ Little confidence
- ☐ No confidence

2. Question Set 2

1. If given a data set, please rate your ability to identify where (and if) one of the many forms of t-tests could be used to analyze those data.

- ☐ Excellent ability
- ☐ Good ability
- ☐ Moderate ability
- ☐ Little ability
- ☐ No ability

2. How confident are you about the rating?

- ☐ Very high confidence
- ☐ High confidence
- ☐ Moderate confidence
- ☐ Little confidence
- ☐ No confidence

3. Question Set 3

FINAL Curriculum Infusion Pre-Test

1. If given a data set, please rate your ability to identify where (and if) one of the many forms of ANOVA could be used to analyze those data.

- ☐ Excellent ability
- ☐ Good ability
- ☐ Moderate ability
- ☐ Little ability
- ☐ No ability

2. How confident are you about the rating?

- ☐ Very high confidence
- ☐ High confidence
- ☐ Moderate confidence
- ☐ Little confidence
- ☐ No confidence

4. Question Set 4

1. If given a data set, please rate your ability to identify where (and if) one of the many forms of tests of proportions could be used to analyze those data.

- ☐ Excellent ability
- ☐ Good ability
- ☐ Moderate ability
- ☐ Little ability
- ☐ No ability

2. How confident are you about the rating?

- ☐ Very high confidence
- ☐ High confidence
- ☐ Moderate confidence
- ☐ Little confidence
- ☐ No confidence

5. Question Set 5

FINAL Curriculum Infusion Pre-Test

1. If given a data set, please rate your ability to identify where (and if) a contingency table/chi-square test statistic could be used to analyze those data.

- ☐ Excellent ability
- ☐ Good ability
- ☐ Moderate ability
- ☐ Little ability
- ☐ No ability

2. How confident are you about the rating?

- ☐ Very high confidence
- ☐ High confidence
- ☐ Moderate confidence
- ☐ Little confidence
- ☐ No confidence

6. Question Set 6

1. If given a data set, please rate your ability to identify where (and if) the Wilcoxon signed-rank test statistic could be used to analyze those data.

- ☐ Excellent ability
- ☐ Good ability
- ☐ Moderate ability
- ☐ Little ability
- ☐ No ability

2. How confident are you about the rating?

- ☐ Very high confidence
- ☐ High confidence
- ☐ Moderate confidence
- ☐ Little confidence
- ☐ No confidence

7. Question Set 7

FINAL Curriculum Infusion Pre-Test

1. If given a data set, please rate your ability to identify where (and if) the Kruskal Wallis test could be used to analyze those data.

- ☐ Excellent ability
- ☐ Good ability
- ☐ Moderate ability
- ☐ Little ability
- ☐ No ability

2. How confident are you about the rating?

- ☐ Very high confidence
- ☐ High confidence
- ☐ Moderate confidence
- ☐ Little confidence
- ☐ No confidence

8. Question Set 8

1. If given a data set, please rate your ability to identify where (and if) the Mann Whitney test could be used to analyze those data.

- ☐ Excellent ability
- ☐ Good ability
- ☐ Moderate ability
- ☐ Little ability
- ☐ No ability

2. How confident are you about the rating?

- ☐ Very high confidence
- ☐ High confidence
- ☐ Moderate confidence
- ☐ Little confidence
- ☐ No confidence

9. Question Set 9

FINAL Curriculum Infusion Pre-Test

1. Please rate your ability to manage time effectively on a team.

- ☐ Excellent ability
- ☐ Good ability
- ☐ Moderate ability
- ☐ Little ability
- ☐ No ability

2. How confident are you about the rating?

- ☐ Very high confidence
- ☐ High confidence
- ☐ Moderate confidence
- ☐ Little confidence
- ☐ No confidence

10. Alcohol Education

For the next set of questions, a drink is defined as:

- One 12-ounce can or bottle of beer
- One 4-ounce glass of wine
- One shot glass of liquor (1oz. of 100 proof or 1.5oz. of 80 proof)
- A mixed drink with one shot of liquor (for mixed drinks with more than one shot, count each shot as a separate drink)

1. Among UVA students who drink, how many alcoholic beverages on average do you think they have on a typical Saturday night? (if none, enter "0")

2. How many drinks do YOU typically consume on a Saturday night? (if none, enter "0")

3. What are the best options for dealing with an intoxicated friend? Check all that apply.

- ☐ Give the person water
- ☐ Sit & watch the person
- ☐ Let the person sleep it off alone
- ☐ Give the person coffee
- ☐ Make the person throw up
- ☐ Give the person food

FINAL Curriculum Infusion Pre-Test

4. Do you know any of the signs of alcohol poisoning?

- ☐ Yes
☐ No
☐ Not sure

5. List the four main signs of alcohol poisoning.

P _____

U _____

B _____

S _____

6. To what extent do you agree with the following statements?

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
If you or your friends are hurt or ill from alcohol, it is important to go to the UVA Emergency Room.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The UVA Emergency Room respects confidentiality for an alcohol related visit and does not contact parents, administration or police.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drinking alcohol mixed with an energy drink poses no additional risks compared to drinking alcohol alone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Demographics

1. What is your gender?

- ☐ Male
☐ Female

2. Are you in a fraternity or sorority?

- ☐ Yes
☐ No

3. What section of SYS3034 are you currently enrolled in?

- ☐ SYS3034-001 (TuTh 12:30-1:45pm)
☐ SYS3034-002 (TuTh 3:30-4:45pm)

4. Enter the first two letters of your mother's maiden name.

FINAL Curriculum Infusion Pre-Test

5. Enter the two-digit day of your birthday day (for example, if your birthday is January 6 then enter '06').

Appendix C: Case Studies

Celebratory Drinking Case

Case Study

in Systems Engineering



School of Engineering and Applied Science
University of Virginia

Celebratory Drinking and Related Decision Making Behaviors

February 16, 2010

Background

Hazardous drinking is generally defined as consumption of alcohol that causes negative consequences to oneself and/or others. Hazardous drinking plays a role in the social activities of some university students and contributes to at least 1,700 college student deaths and 599,000 injuries per year (Hingsen, et al., 2005).

At the University of Virginia, the Department of Psychiatry and Neurobehavioral Sciences and the Center for Alcohol and Substance Education (CASE) conduct a yearly Health Behavior Survey (HBS) to investigate usage norms. The results from the HBS and prior research indicate that hazardous drinking by some students poses a health risk to the UVa community as well as the opportunity for related negative consequences such as missed classes and assignments and jeopardized relationships (see for example, McGarvey, 2003). Many students falsely believe that encouraging a severely intoxicated friend to vomit or providing the person with water, food or coffee will help sober the person up or prevent alcohol poisoning. In fact, all of these strategies have the potential for increasing intoxication levels. The only effective strategy is to closely monitor the person for signs of alcohol poisoning and call for help when needed.

One problem that UVa faces is a "tradition" known as the fourth-year fifth (where fourth-year students attempt to drink a fifth of liquor before the start of the last home football game), estimated to have begun in the early 1980's (Wootten, 1999). U.Va. is steeped in tradition, and the fact that the fourth-year fifth has been mislabeled as a tradition may make it appealing to the minority of students who attempt it.

UVa's Center for Alcohol and Substance Education (CASE) would like to address the issue of student drinking and related negative consequences associated with the fourth-year fifth. After a fourth-year student died on the day of the last home football game in 1997, President Casteen began sending letters to all fourth-year students prior to the last home football game (see the Appendix). For the past ten years, CASE and the ADAPT peer educators have coordinated Substance Abuse Awareness Week activities during the week prior to the last home football game. These events include messages on HooVision, tee-shirts to recognize students who pledge not to attempt the fourth-year fifth and informational posters and cups to educate students to recognize the signs of alcohol poisoning and how to respond (see the Appendix).

One intervention to consider is to employ social norms marketing which involves correcting misperceptions about the prevalence and acceptability of hazardous behaviors such as alcohol abuse (Perkins, 1997; Perkins & Berkowitz, 1986). The social norms approach states that most students overestimate the actual prevalence of substance use, thus leading them to consider hazardous drinking to be the norm. Misperceptions can lead to indirect peer pressure to drink heavily. The 2009 University of Virginia Health Behaviors Survey showed that while UVa students self-report on average drinking 2.9

drinks on a typical Saturday night, they estimate that the average is 4.5 drinks. Students who hold permissive views on alcohol use are more likely to drink heavily if they perceive their peers to be tolerant of alcohol abuse (Perkins & Berkowitz, 1986; Perkins & Wechsler, 1996).

A web-based survey was developed in order to begin to understand student drinking norms and related behaviors associated with the fourth-year fifth as well as student perceptions of others' drinking behaviors. After receiving IRB approval, an email with a link to the survey was sent to all fourth-year students in November, 2008. At that time, there were 3,122 fourth-year students. There were 1,335 responses.

The analysis to be conducted

Your role is to analyze the fourth-year fifth survey data and to help CASE identify the value of potential marketing interventions. The staff at CASE would like to know the answer to questions such as:

- At the high level, is the fourth-year fifth an event that CASE should investigate or would resources be better utilized on other events?
- How many students attempt the fourth-year fifth?
- Does when a student hear about the fourth-year fifth impact participation?
- Would social norms marketing work? That is, are there misperceptions associated with the fourth-year fifth?
- What alternative drinking options did students choose in lieu of attempting to drink a fifth of alcohol?
- What are the positive and negative consequences of participating in the fourth-year fifth?
- Are there certain sub-populations for whom the answers to the questions above change? Remember that sub-populations are not only males and females and that CASE is interested in sub-populations that may have different drinking patterns such as those in fraternities and sororities (see <http://www.virginia.edu/fsl/faq.html> and <http://www.virginia.edu/fsl/faq.html>).

In your analyses, describe how you conducted the analysis (what data you used, whether/how you had to "cleanse" it, what statistical hypothesis you tested, how you check for model adequacy, etc.). Then be sure to state what conclusion you can draw from the data, as well as suggestions for additional questions.

What to Turn in:

1. Powerpoint Document: Prepare a 10 minute presentation to deliver to your client. Your client is Susan Bruce, director of the Center for Alcohol and Substance Awareness (<http://www.virginia.edu/case/>). She is aware of statistical approaches, but is not a statistician.
2. Statistics Appendix: Document all statistical tests you conducted, including what data you used, whether/how you had to "cleanse" it, what statistical hypothesis you tested, the results from the test (e.g., for ANOVA, show the ANOVA table from the stats program that you are using, for a t-test show the output from the stats program you are using), how you check for model adequacy, and any conclusions you draw from each test. This document will be long, but is largely just a log of all your tests (Something that you should be keeping anyway so that you keep track of what you did). You should group your statistical tests in a logical manner, e.g., grouped by the objective you are evaluating with the tests.

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Appendix: Example Letter from President Casteen

Dear Fourth-Year Students:

We have a home football game this weekend, and then our final home game against Virginia Tech on the Saturday following Thanksgiving. These are occasions to celebrate, but also occasions to consider safety – your own, and that of your classmates.

Sad to say, some persons in the past have used these festivities as an excuse to drink to excess, and have even claimed that what they have called the “fourth-year fifth” is a University tradition. This is emphatically not a tradition here. It is a foolish, dangerous, frequently destructive activity, and (folklore notwithstanding) only a handful of students engage in it. Those who do jeopardize their own safety and health, and often bring harm to themselves and to other persons around them.

One student died on the day of the last home football game several years ago. I attended her memorial service. I saw and experienced her family’s and her friends’ agony and bewilderment. I know no words to console a family whose child and hope for the future has died in this way. You do not want me to be in the position of trying to console your family in a similar situation.

A fifth of 80-proof liquor (17 drinks) can kill you. Seventeen drinks spaced evenly over six hours can result in a blood alcohol concentration (BAC) of 0.32 for a 160-pound man and 0.42 for a 130-pound woman. Most people lose consciousness at a BAC of more than 0.30, and a BAC of 0.40 or more is generally lethal.

Our common commitment to student self-governance, which is an *authentic* tradition here, demands that you take responsibility for yourself and for members of your student community. When a friend’s behavior puts her or him (or others) at risk, speak up. Show your concern. Encourage those around you to make healthy choices. When necessary, and before a good time turns to disaster, seek help and support from other students, from the deans, from the police.

Enjoy the good times with family and friends during Thanksgiving break. Go to the football games against Boston College and Virginia Tech. Have a great time, and celebrate the University’s true traditions.

Sincerely,

John T. Casteen III, President

Safety tips:

1. Don’t leave a drunken friend alone regardless of whether or not she or he is conscious. Stay with and monitor a friend who has passed out. BAC may continue to rise despite unconsciousness.
2. If you do not know what to do in a dangerous situation, or if your own judgment is impaired, call a sober friend to help you, or call 911 for help.
3. Whenever you choose to drink, take precautions to minimize risks to yourselves and others. Eat a meal beforehand, and alternate alcoholic drinks with water.

Appendix: HooVision Messages

Message 1:

Hoos want to remember the last home game
9 out of 10 fourth-years don't do the 4TH year 5TH
Don't let the pregame erase the last home game

Message 2:

Hoos take care of friends.

If you see ANY of the following signs of an alcohol-related emergency, call 911

P = pulse slowed

U = unresponsive

B = breathing slowed

S = skin cold and clammy

U.Va. students will not face judicial proceedings for requesting or receiving medical assistance.

Appendix: Poster about what to do in alcohol emergency

HOW TO HELP IN AN ALCOHOL EMERGENCY



If you suspect alcohol poisoning or have concerns about an alcohol related injury, **seek immediate medical care**. Delaying medical evaluation and treatment can be life-threatening.

IF THE PERSON HAS PASSED OUT:

- Roll him/her onto left side & prop head up.
- Stay with the person until your RA or sober help arrives.
- Monitor breathing – *Blood Alcohol Concentration could still be rising.*
- Call 911 if he/she shows **any** signs of alcohol poisoning (see below).

SYMPTOMS OF ALCOHOL POISONING:

If you see ANY of these symptoms, call 911 immediately!

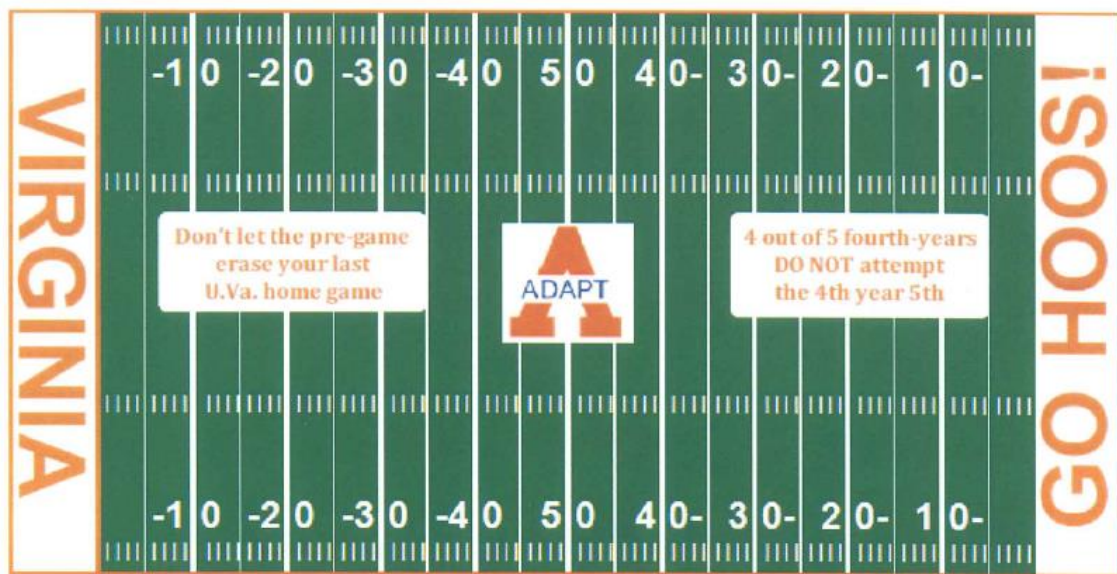
Remember “**PUBS**”

- **Pulse:** Should be between 50 and 140 beats per minute, not irregular.
- **Unresponsive:** Doesn't respond to a firm pinch.
- **Breathing:** Should be at least 9 breaths / minute, not slow and shallow.
- **Skin:** Shouldn't be cold, clammy or blue.

EMERGENCY ROOM PROCEDURES:

- Clinicians at the U.Va. Emergency Department and at Student Health **DO NOT** notify police or university officials in the event a U.Va. student is seen for an alcohol-related incident.
- Parents or guardians are **NOT** notified by clinicians without student permission unless a situation is deemed life threatening or the student is under the age of 18 and requires parental consent for treatment.
- Any 911 call from Grounds **WILL** result in automatic University Police response. The officer's primary emphasis is care of the student. Follow up investigation will take place only in exceptional circumstances.
- There is **NO** charge for ambulance services in Charlottesville.

Appendix: Social Norms Marketing Interventions – stadium cup design



Funding provided by the Parents Committee and Virginia ABC



Distracted Driving Case Case Study

in Systems Engineering



School of Engineering and Applied Science
University of Virginia

**~~Feeding a Baby Watching~~
~~Emailing Calling Distracted Driving Eating Dialing~~
~~Arguing Tuning Singing Texting~~**

February 16, 2010

Driver distraction, where attention to driving is diverted toward a competing activity and driver inattention, where attention to driving is diminished but without a competing activity, are coming under increased scrutiny¹. One reason for this increased scrutiny is the increased use of cell phones while driving and the search for evidence as to the impact of such use on vehicle safety. Events such as the recent U.S. Department of Transportation Distracted Driving Summit (<http://www.tvworldwide.com/events/rita/090830/>) have provided forums for the advancement of the knowledge about driver distraction and inattention.

You are part of a team preparing a comprehensive report on the current state of distracted driving and its impacts for the Highway Loss Data Institute (HLDI).

The Highway Loss Data Institute (HLDI), an affiliate of the Insurance Institute for Highway Safety (IIHS), is a nonprofit research organization that publishes insurance loss statistics on most car, SUV, pickup truck, and motorcycle models on US roads. Sponsored by the automobile insurance industry, HLDI regularly publishes detailed analyses of insurance losses and analyzes the effects of various safety features, such as antilock braking systems. Innovative safety features shown to be effective in HLDI analysis, such as Electronic Stability Control, have later become federally mandated on all cars (http://www.iihs.org/about_hldi.html, 2010). It is clear that HLDI reports shape policy.

Your role on the HLDI comprehensive report team is to see what can be learned about distracted driving from the 2008 General Estimates Systems (GES).

Providing data about all types of crashes involving all types of vehicles, the GES is used to identify highway safety problem areas, provide a basis for regulatory and consumer information initiatives, and form the basis for cost and benefit analyses of highway safety initiatives. The GES obtains its data from a nationally representative probability sample selected from the estimated 5.8 million police-reported crashes which occur annually.

(National Automotive Sampling System
(NASS) General Estimates System (GES)
Analytical User's Manual 1988-2008)

¹ For more background information on distracted and inattentive driving, see http://www.tvworldwide.com/events/rita/090830/globe_show/default_go_archive.cfm?gsid=1241&type=flv&test=0&live=0 (minutes 5:52 to 16:25 for an introduction to distracted driving)

THE ANALYSIS TO BE CONDUCTED.

Your role is to analyze the GES data provided to help the HLDI determine the importance of distracted driving. You really should be looking for any interesting findings as they relate to distracted driving as they relate to the “overall questions,” but your manager has also given you a specific set of questions to analyze:

Overall Questions

Based on the GES data, is distracted driving deserving of investment by auto insurance companies -- or would resources be better utilized to lobby for other policies? If resources are applied to reduce the negative effects of distracted driving, where should resources be targeted?

- What types of distracted driving are the most prevalent?
- Are crashes involving distracted driving more severe? Do they lead to more rollovers? Do different types of distraction lead to different crash severities?... to different rollover frequencies?
- Are injuries from crashes involving distracted driving more severe? Does the number of people who are injured vary between distracted and non-distracted driving?
 - Do different types of distraction lead to different injury severities? Does the number of people who are injured vary among different types of distracted driving??
- Do crashes involving distracted driving occur at different speeds than non-distracted driving? Do different types of distraction occur at different speeds?
- Do crashes involving distracted driving have more occupants in the car than non-distracted driving? Do the number of occupants differ for different types of distraction?
- Are there any sub-populations for whom the answers to the questions above change? This may include more than just demographics. For instance, are people who wear seatbelts more likely to be distracted by certain distraction types? This question is important in that it may help target distracted driving awareness/marketing campaigns.
- Underreporting of distracted driving (both subconscious and conscious) is undoubtedly a major problem when dealing with crash data from police reports. How does potential underreporting affect the meaning of your results? How big of a problem would underreporting need to be to affect your findings?

In your analyses, describe how you conducted the analysis (what data you used, whether/how you had to “cleanse” it, what statistical hypothesis you tested, how you check for model adequacy, etc.). Then be sure to state what conclusion you can draw from the data.

Data collected for the analysis group is in the Excel file. For this case, do not collect additional data on distracted driving. We want you to spend time working with the given data... that said, you likely will need to do some general research on distracted driving. The given data is compiled from multiple GES files (both the Vehicle and Person data sets). The data for each case (i.e., each row) from the “Person” Data Set is for the driver of the car. In addition, it only shows one third of the cases for 2008 simply to keep the processing time in Minitab to a reasonable amount. It still has over 30,000 rows...

What to Turn in:

1. Powerpoint Document: Prepare a 10 minute presentation to deliver to your manager. Your client is aware of/familiar with statistical approaches, but is not a statistician.
2. Statistics Appendix: Document all statistical tests you conducted, including what data you used, whether/how you had to "cleanse" it, what statistical hypothesis you tested, the results from the test (e.g., for ANOVA, show the ANOVA table from the stats program that you are using, for a t-test show the output from the stats program you are using), how you check for model adequacy, and any conclusions you draw from each test. This document will be long, but is largely just a log of all your tests (Something that you should be keeping anyway so that you keep track of what your did). You should group your statistical tests in a logical manner, e.g., grouped by the question you are evaluating with the tests.

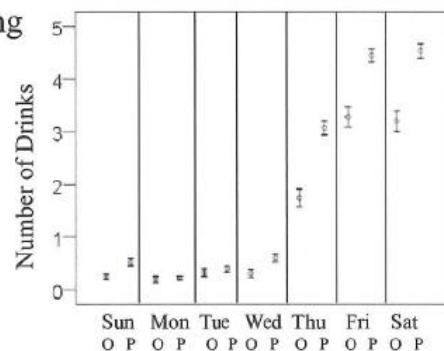
SYS 3034

Alcohol Education Program

Self-report of Own Drinking Lower than Perceptions of Others' Drinking

O = Self-report of own number of drinks

P = Perception of other's number of drinks



Wilcoxon Signed Ranks Test of Self-report of Own Drinking Compared to Perceptions of Others' Drinking

	Sun. N=1216	Mon. N=1216	Tues. N=1216	Wed. N=1216	Thurs. N=1219	Fri. N=1220	Sat. N=1442
Z	-8.761	-2.858	-3.302	-8.682	-15.800	-12.723	-17.813
Sig. (2-tailed)	< .001	.004	.001	< .001	< .001	< .001	< .001

SIGNS OF ALCOHOL POISONING

Remember P-U-B-S

- P**ulse: irregular heartbeat
- U**nresponsive: no reaction to firm pinch
- B**reathing: slow and shallow
- S**kin: cold and clammy

**If you notice any of these symptoms,
call 9-1-1 or go to a First Aid Tent.**

What **TO DO** when helping an
intoxicated friend

- ▶ Check for signs of alcohol poisoning
- ▶ Stay and monitor every 10-15 minutes
- ▶ Call for sober assistance and/or 911 if indicated

What **NOT TO DO** when helping an intoxicated friend

- ▶ DO NOT try to make the person throw up.
- ▶ DO NOT administer anything orally (food, coffee, liquids).
- ▶ DO NOT give the person a cold shower.
- ▶ DO NOT try to exercise the person.
- ▶ DO NOT try to restrain the person without (sober) assistance.

Emergency Room Procedure

- ▶ Clinicians at the U.Va. ER and at Student Health **DO NOT** notify police or university officials if a U.Va. student is seen for an alcohol-related incident.
- ▶ Parents or guardians are **NOT** notified by clinicians without student permission unless a situation is deemed life threatening or the student is under the age of 18 and requires consent for treatment.
- ▶ There is **NO CHARGE** for ambulance services in Charlottesville/Albemarle County.

Case Process Analysis

OBJECTIVE

For students to reflect on the process that they use in approaching an open-ended case. Students should be able to explain their process and evaluate its effectiveness.

PROCEDURE

Each team is to prepare a graphical representation outlining their team's process. The requirements for the representation are that they shall 1) individual tasks, 2) the time to complete tasks, and 3) the order in which the tasks were completed are shown. It would be nice to see a breakdown of who on the team did each task, but this is not a hard requirement.

In addition to the content-requirements, communication-requirements include that the representation must be graphical, it should be presented neatly, and it should be easy to understand.

Your graphical representation should be on one side of a single sheet of paper (use a larger sheet of paper if necessary). On the back of that single sheet, include the name of your individuals in your group and two evaluative comments. The first comment should highlight what y'all think is the greatest strength of your process. The second comment should highlight what y'all think is the biggest area for improvement in your process. Each comment should be short – 1-2 sentences each is fine.

Two samples of graphical representations are attached. Another option would be to make a Gantt chart. Do not limit yourself to these graphical forms – we really want to encourage you to be creative in applying a graphical form that makes the most sense for your process.

LOGISTICS

The representations can be created on a computer or by hand. In either case, it needs to meet the communication-requirements stated in the prior section.

Each team should hand in one hard copy of their process representation on the day that the case is due.

This is not intended to be a time consuming task – aim for 20-30 minutes to prepare the graphical representation and 5-10 minutes to prepare the evaluative comments.

SAMPLE PROCESS ANALYSIS II

