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EVALUATION OF AN ONLINE ALCOHOL EDUCATION PROGRAM FOR
FIRST-TIME-IN-COLLEGE STUDENTS

by

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B.S. University of Central Florida, 2003

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Education
in the Department of Educational Research, Technology, and Leadership
in the College of Education
at the University of Central Florida
Orlando, Florida

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2010

Major Professor: Rosa Cintrón

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ABSTRACT

Alcohol use among college students has maintained its place as a major issue in American higher education since its inception. Although dangerous drinking has always proliferated among college students, institutions have only provided alcohol and other drug (AOD) education and interventions encouraging students to adopt less harmful habits for a much shorter period of time. During this relatively short history of postsecondary alcohol interventions, colleges and universities have shifted away from abstinence-only, education-based methods. Instead, institutions have begun to adopt cognitive behavior-centric, motivational enhancement-based strategies emphasizing harm reduction through the use of protective behaviors. In order to reach a greater number of students, alcohol intervention programs have been developed combining the harm reduction ideology with internet-based dispersion at a population level.

This research study addressed the behavioral changes that occurred among an entire class of first-time-in-college freshmen at a large public university before and after mandatory participation in AlcoholEdu for College, an online, population-level, harm reduction-based alcohol intervention. The study expanded upon previous evaluations of the program, which addressed program efficacy among the population as a whole but did not further explore differences in effect upon students engaging in different levels of drinking. Other

demographic factors, such as gender, ethnicity, family history of alcohol issues, and age of first consumption, were also taken into account.

Pre-test surveys taken by students prior to the intervention at the beginning of the academic year were matched to follow-up surveys taken four to six weeks after program completion, providing the necessary data for conducting a quantitative study. The specific areas of interest within the study included (a) willingness to complete the program in a timely and complete fashion, (b) levels of consumption, (c) use of protective behavioral strategies (PBS), and (d) incurrence of negative alcohol-related consequences. A combination of analytical procedures was utilized, including descriptive statistics, chi-square tests for independence, exploratory factor analysis, repeated measures ANCOVA, and nonparametric inferential tests. Results were described within the framework of social cognitive theory (Bandura, 2004) as well as the CIPP program evaluation framework (Stufflebeam & Shinkfield, 2007).

The analysis uncovered that three major factors determined willingness to complete the mandatory program in a timely and complete fashion: gender, age of first alcohol consumption, and drinker group. Specifically, students who were male, started drinking prior to high school, or were identified as heavy episodic drinkers were less likely than peers to complete all portions of the AlcoholEdu program. Both moderate and heavy episodic drinkers reduced their levels of consumption between pre-test and follow-up. A large percentage of abstaining

students maintained this status later in the semester. Light and moderate drinkers either maintained or slightly reduced their use of PBS, while heavy episodic drinkers showed increases in use of most types of PBS over time. All students indicated low levels of incurrance of negative consequences in both the pre-test and follow-up periods. However, while students experienced an increased number of most of these consequences between the pre-test and follow-up surveys, heavy drinkers cited a decreased rate of drinking and driving-related consequences as of the follow-up. Throughout all of the analyses, important controlling factors included gender, ethnicity, and age of first alcohol consumption. The results of this study can guide future development and refinement of the AlcoholEdu program, as well as provide higher education administrators and AOD education program staff with additional baseline knowledge of the change process first-time-in-college freshmen undergo when engaged in the program.

This dissertation is dedicated to my parents.

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CHAPTER 1 INTRODUCTION

Alcohol use among college students has not only maintained its place in academic research, but also in American news outlets as a prevalent issue in higher education. A brief examination of recent news headlines demonstrated that collegiate drinking is not an issue to take lightly. In 2007, two students died at New Jersey's Rider University in separate incidents after abuse of alcohol (Boccella & Giordano, 2007). The following year, a freshman fraternity pledge at Wabash College in Indiana died as a result of a binge drinking episode (Johnson, 2008). Recently, a sophomore student at the State University of New York at Geneseo drank heavily for three days in an effort to become a member of an off-campus club, ultimately leading to his death (Dobbin, 2009).

These three publicized incidents serve as a mere sample of the many alcohol-related deaths that occurred among college-aged students. In 2001, unintentional deaths from alcohol-related injuries among 18-to-24-year-old students totaled over 1,700. Death, however, was far from the only consequence of drinking. Over 500,000 students in the same population were injured unintentionally due to alcohol. In 2002, over 43% of all college students in this same age group admitted to consuming at least five drinks in one sitting at some time over the past month, which equated to nearly 4 million students. Nearly 3 million students in this population drove under the influence of alcohol in the

past year (Hingson, Heeren, Winter, & Wechsler, 2005). These statistics demonstrate that the prevalence of students abusing alcohol does not lie solely within isolated incidents.

The use of alcohol among college students in the United States can be traced back to colonial days, when students were provided alcohol with dinner. By the start of the 20th century, the place of alcohol on campus had shifted from being an ordinary part of everyday college life to being a nuisance to campus administrators. Physically, alcohol was being slowly pushed off campus to nearby bars and saloons. After conclusion of the ultimate ban on alcohol, the national Prohibition, drinking on campus was considered to be a problem by only a small percentage of institutions (Warner, 1938).

On the other hand, alcohol education in colleges and universities has only earned its presence in more recent years. In the early 1950s, college curriculum largely avoided the subjects of alcohol and drinking (Straus & Bacon, 1953). When the National Institute on Alcohol Abuse and Alcoholism [NIAAA] (1976) visited one postsecondary institution in each state, plus 12 minority and private institutions, only 15% provided activities or services incorporating alcohol abuse or use education. Until the Department of Education Drug and Alcohol Abuse Prevention Rule (1990) threatened to take away federal funding from postsecondary institutions that did not provide students with minimum

information regarding drug and alcohol use did alcohol education become a fully established part of the college landscape.

Many forms of alcohol education have since proliferated at American colleges and universities. These interventions include purely educational approaches, alcohol awareness weeks, social-norms marketing, brief motivational interventions, policy, environmental approaches, protective behavioral strategies, and online programs, to name a subset of the available selection. Regardless of the program, campus administrators have struggled with the question of abstinence versus harm reduction approaches: how can students be told how to be safe, without encouraging drinking? Evidence shows that the abstinence-only approach does not work (Beck, 1998; Marlatt & Witkiewitz, 2002), yet the debate still continues today. What administrators can agree upon, however, is the fact that too many students are still drinking, many of them dangerously, and that the problem will proliferate until the right mix of actions are taken.

Statement of the Problem

Dangerous drinking among college students has persisted as a major issue at colleges and universities nationwide despite federal mandates for all colleges and universities to provide education designed to convince students to curb or reduce this behavior (Department of Education Drug and Alcohol Abuse

Prevention Rule, 1990). Although students have often arrived at colleges having received large amounts of alcohol education, many of these same students have proceeded to engage in heavy binge-drinking behavior (Weitzman, Nelson, & Wechsler, 2003). In understanding that teaching abstinence-only approaches to alcohol often has not been effective (Beck, 1998; Marlatt & Witkiewitz, 2002; Moskowitz, 1989), postsecondary institutions have elected to implement harm-reduction models. With nearly 40% of 12th grade students not seeing the danger in heavy daily drinking (Johnston, O'Malley, Bachman, & Schulenberg, 2009), colleges and universities have had a weighty task in helping to ensure the safety of incoming freshmen who believe that drinking irresponsibly is acceptable behavior.

Colleges have long recognized the fact that some students on their campuses are alcoholics and need treatment (NIAAA, 1976). More recently, the trend has been to provide students who face disciplinary sanctions due to breaking alcohol-related rules with mandatory interventions (Barnett et al., 2004; Hingson et al., 2005; Marlatt et al., 1998). The problem, however, is the fact that some students who are at risk do not learn how to better control their actions until these negative outcomes actually occur. Institutions using population-level approaches to alcohol education have an opportunity to "inoculate" classes of incoming college freshmen with skills and attitudes that will reduce their risk of facing health and academic issues in the future.

Purpose of the Study

Recent developments in alcohol interventional programming have included turning the focus away from an abstinence-only message and toward the use of PBS, which have been proven to help drinkers avoid some of the negative consequences of alcohol use (Araas & Adams, 2008; Martens et al., 2004, 2005; Martens, Pedersen, LaBrie, Ferrier, & Cimini, 2007). A programmatic development used to effectively deliver PBS-based interventions involves the use of a customizable online-based system, such as the AlcoholEdu program (Outside the Classroom, 2008). This program has shown promise in effectively reducing negative consequences. The studies conducted thus far on the program, however, have either focused on its general effects on a population or on certain demographic subgroups. These subgroups may have some relationship to drinking behavior but are not directly drinking-focused, such as gender and residence status (Lovecchio, Wyatt, & DeJong, in press; Wall, 2005, 2007).

To date, no studies have addressed the efficacy of the AlcoholEdu program among FTIC students while accounting for major demographic factors directly related to levels of alcohol use, the use of protective behavioral strategies, or the presence of negative consequences. More specifically, studies regarding this program have not provided a deeper look at the resulting behaviors and attitudes of students in different drinker risk groups – light,

moderate, heavy episodic, and problematic drinkers. In determining whether the AlcoholEdu program can help students in different drinker risk groups increase their willingness to utilize protective behavioral strategies regarding drinking and subsequently reduce negative drinking-related consequences, institutions can better devise alcohol intervention strategies that can work for a population of students with diverse needs.

Significance of the Study

While no single population-level intervention can be expected to solve the issues of irresponsible college student drinking alone, progress in the right direction is certainly welcome. With colleges and universities beginning to understand that it is naïve to take an abstinence-only approach to alcohol education, it is important to seriously consider alternatives that do not encourage drinking nor completely eschew the practice, while equipping students with a toolbox of realistic strategies that they can use to stay safe. With the AlcoholEdu program reaching 36% of the nation's freshmen (Outside the Classroom, 2008), the intervention has grown far beyond a tool used at a handful of schools. In a time of economic difficulty across the nation's postsecondary system, any information that can be gathered about the true effectiveness of a program that comes at a monetary cost to the institution is imperative to ensure that the program is appropriately reaching its target audience. Recommendations can

allow future versions of the AlcoholEdu program to have a greater impact upon the behaviors of less receptive students in the college freshman population.

Aside from the financial and programmatic benefits of conducting a more detailed analysis of the AlcoholEdu program, this study also contributed to the body of knowledge regarding behavioral change in college freshmen. This group of students was identified as “high-risk” in terms of alcohol use (Marlatt et al., 1998), simply because many of these students transitioned into a new environment largely devoid of the same levels of parental supervision or dependency to which they were previously accustomed. To capture the differences in consumption, presence of adverse alcohol-related repercussions, and protective behavioral strategy use both before they begin the semester and in the middle of their critical first semester at college, this research provided a direct look at freshmen behavioral change regarding alcohol. The results informed campus alcohol and other drug (AOD) administrators in charge of related programming with the realities that are critical to improving student well-being – academically, socially, and medically.

Research Questions

This study was guided by the following research questions regarding the efficacy of the AlcoholEdu program in increasing the use of protective behaviors among incoming college freshman of different drinking risk groups:

1. What differences, if any, exist in the demographic composition of the incoming freshmen students between those who completed the AlcoholEdu program as prescribed and those who did not complete the program, as measured by gender, ethnicity, drinker status, drinker risk group, age of first alcohol consumption, and family history of alcoholism?
2. Which drinker risk groups, if any, show the greatest degree of willingness to change alcohol use habits in the areas of (a) consumption, (b) use of protective behavioral strategies, and (c) negative consequences, when gender, ethnicity, age of first alcohol consumption, and family history of alcoholism serve as contributing variables?

Definition of Terms

5/4 Definition: A measure reflecting the fact that males and females require different amounts of alcohol to reach the same level of intoxication due to binge drinking; five drinks over a period of two hours for males and four drinks over a period of two hours for females represent the threshold of binge drinking (Wechsler, Dowdall, Davenport, & Rimm, 1995).

Abstainer: An individual who has not consumed an alcoholic beverage (defined below as a drink) in the past year.

Age of first alcohol consumption: The age at which an individual consumed his or her first drink (defined below), beyond small sips or tastes often associated with certain religious ceremonies.

AlcoholEdu for College (AlcoholEdu): An online, population-level alcohol intervention program developed by Outside the Classroom to provide customized primary-level alcohol prevention education for college students (Outside the Classroom, 2008).

Binge: “A pattern of drinking alcohol that brings blood alcohol concentration to 0.08 gram-percent or above” (NIAAA, 2007, p. 2).

Binge drinker: An individual who engages in a pattern of binge drinking in accordance with the 5/4 definition (defined above).

Drink: A single alcoholic beverage “defined as a 12-ounce beer, an 8.5-ounce malt beverage, a 12-ounce wine cooler, a 5-ounce glass of wine, or 1.5 ounces of liquor, whether in a mixed drink or as a shot” (Lovecchio et al., in press, Surveys section, ¶ 2).

Drinker: An individual who has consumed alcoholic beverages (defined above as drinks) in the past year. This category can still include individuals who choose to periodically abstain.

Drinker group: Also referred to as *drinker risk group*, this categorization provides a more detailed description of an individual’s regular drinking habits beyond drinker or abstainer. This categorization includes abstainers, light drinkers,

moderate drinkers, heavy episodic drinkers, and problematic drinkers (all defined within this list).

Drinker status: A dichotomous categorization of an individual's drinking behavior as a drinker or abstainer.

Family history of alcoholism: Individuals who may or may not be drinkers themselves but have a blood relative (parent, grandparent, aunt or uncle, or cousin) who either had a clinical diagnosis of alcoholism or experienced some form of struggle with alcohol.

Harvard School of Public Health College Alcohol Study (CAS): A large-scale national surveys of college students at 120 four-year colleges in 40 states conducted in 1993, 1997, 1999, and 2001, as well as an additional survey in 2005 at previously identified institutions with high levels of alcohol use (Harvard School of Public Health, 2005).

Heavy episodic drinker: An individual who has met the classification for a binge drinker (defined above) at least once within the past two weeks.

Light drinker: An individual who has consumed at least one drink in the past year, but has not consumed any drinks within the past two weeks.

Moderate drinker: An individual who has consumed at least one drink within the past two weeks, but did not meet the classification for a binge drinker (defined above) during that time.

National Institute on Alcohol Abuse and Alcoholism (NIAAA): A division of the National Institutes of Health routinely recognized as a source for nationally regarded research in the area of reducing alcohol-related problems.

Negative consequence: An undesirable effect associated with consuming alcoholic beverages, including but not limited to headaches, nausea, vomiting, social tension, strained relationships, undesirable sexual situations, injury, or death. Also referred to as *negative outcomes*.

Outside the Classroom: A private company founded in 2000 to address large public health issues, mainly high-risk drinking; created the AlcoholEdu product (Outside the Classroom, 2008).

Positive expectancy: When referring to alcohol use, a side effect perceived by the user as beneficial. Examples include feelings of euphoria, reduced social inhibitions, and release of stress.

Problematic drinker: An individual who meets the classification for heavy episodic drinker (defined above), but meets or exceeds the 5/4 definition for binge drinking by a factor of two (10 drinks in two hours for men, 8 drinks in two hours for women).

Protective behavioral strategies: Also referred to as *protective behaviors*, these activities are “Behaviors that individuals can engage in while drinking alcohol in order to limit negative alcohol-related consequences” (Martens et al., 2004, p. 390).

Conceptual Framework

Social cognitive theory (SCT) served as the conceptual framework that guided the current study. This interpersonal-level theory, originally called social learning theory, was promoted by Bandura (1977, 1986) and focuses on the overall concept of behavioral change. This theory accounts for the valuable contributions of environmental factors in addition to individual factors which help make it appropriate for use when applied to a study regarding a particular group of individuals in a very specific environment such as the university.

Armitage and Conner (2000) have presented SCT as a motivational model for health behavior. Theoretical models in this category have been designed to expose the underlying variables that yield particular health-based decisions. As a model for health behavior promotion, Bandura (2004) presented SCT as a set of four core determinants plus a pre-condition. Knowledge serves as a pre-condition for change. In order to undergo the change process, it is necessary to gain an appropriate knowledge of the dangers and advantages of related health practices. The four determinants – perceived self-efficacy, goal setting, outcome expectations, and perceived facilitators and impediments, both personal and environmentally-based – are interrelated and serve as the backbone of SCT.

All four core determinants serve as important factors of SCT, but the concept of self-efficacy receives the strongest emphasis. Self-efficacy, as applied

to SCT, “refers to beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3). This component affects health behavior both directly and indirectly through the other three determinants. Depending on one’s own beliefs in his or her power to change, the strength of goals created will vary and will ultimately shape outcomes. Belief in the power to change will also affect a person’s view of personal and environmental obstacles and impediments (Bandura, 2004). Not all of these four core items are required to impact change in behavior, as evidenced in Figure 1. Any factor can be skipped in the path from self-efficacy to change. This design gives a degree of flexibility of the model in explaining health behavior as both a direct and indirect result of self-efficacy.

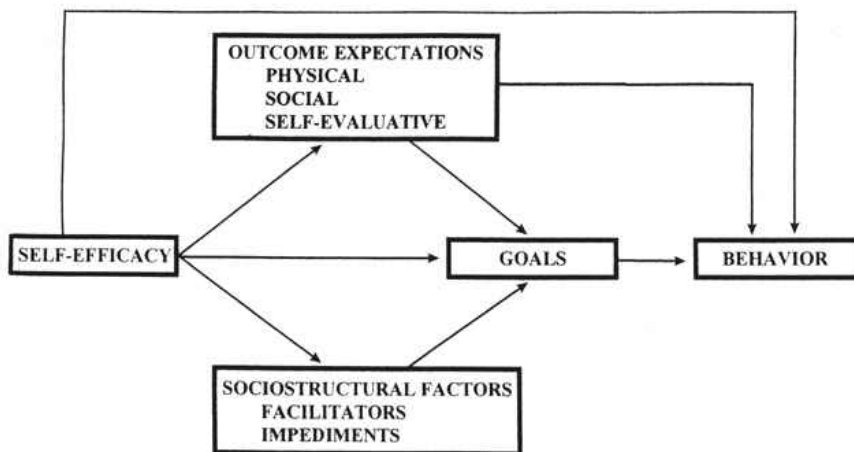


Figure 1. Conceptual structural path mapping of social cognitive theory.

From “Health Promotion by Social Cognitive Means,” by A. Bandura, 2004, *Health Education and Behavior*, 31, p. 146. Copyright 2004 by Sage Publications. Reprinted with permission of the author.

SCT has proven to be a popular framework for use not only with health-related behavioral change, but specifically for issues related to alcohol use among college students. The concept of expectancies serves as a common thread through many of these studies. In determining the link between social anxiety and alcohol consumption among alcohol students, Burke and Stephens (1999) showed that social anxiety did serve as a significant motivator for drinking. The gap between social anxiety and increased levels of consumption and frequency was bridged by the constructs of self-efficacy and expectancies. When students were more socially anxious, they believed that alcohol would serve as a positive force in facilitating social interaction. This positive expectation yielded lower self-efficacy levels for avoiding heavy drinking which ultimately yielded high levels of alcohol consumption. This three-way relationship between social anxiety, expectancy, and self-efficacy was later confirmed by Gilles, Turk, and Fresco (2006). While not involving the factor of social anxiety, Young, Connor, Ricciardelli, and Saunders (2006) also affirmed the link between positive expectancies, self-efficacy, and drinking levels. Additionally, the researchers recommended the inclusion of expectancy theory to inform prevention approaches; this theory serves as one of the guiding methodologies of the AlcoholEdu course (Outside the Classroom, 2008).

Though self-efficacy is a critical core determinant within the SCT framework, environmental facilitators and impediments have also played a

major role in college drinking research. A recent review of the literature showed that interpersonal processes such as peer behavior served as heavy influential factors in college student drinking behavior. Aside from direct influences, concepts such as behavioral modeling and perceived peer norms can also serve as facilitators or impediments to changes in student alcohol use (Borsari & Carey, 2001). Dijkstra, Sweeney, and Gebhardt (2001) also researched beyond the link between positive expectancies and consumption and found that social influence was a significant determinant in drinking behavior. Links were also made to the concept of self-efficacy, as well as negative expectancies, or the motivations to *not* drink. The concept that environmental factors can have an effect on individual behavior was critically important when examining the implementation of AlcoholEdu in the current study, particularly because of the emphasis placed upon the program as a population-level alcohol intervention.

In a prior study (Wall, 2005), the core determinants of SCT were mapped to the theory behind the AlcoholEdu program itself. Units incorporating expectancy theory and motivational interviews addressed outcomes expectations. Students were also asked to set their own goals for a personal plan regarding their alcohol use. Units on media literacy, laws, and social norms addressed environmentally-related facilitators and impediments to change, and an end-of-course application requested students to select what they would do in a variety of social settings, thus attending to self-efficacy. The focus of the current

study was to determine the differences in willingness to change certain alcohol-related behaviors among different subsections of an incoming freshman class after taking the AlcoholEdu program as measured by a series of surveys given as part of the program. The mapping of the social cognitive theory core determinants to specific survey questions utilized in the current study is addressed in Chapter Three.

Limitations and Delimitations of the Study

Limitations

The study acknowledged several limitations:

1. The self-reported nature of the survey data restricted the collected information to reported behaviors.
2. All incoming first-time-in-college (FTIC) freshmen were required to participate in and complete the program; however, not all students necessarily completed all three questionnaires.
3. Due to the structure of the AlcoholEdu program, follow-up responses represented the reported attitudes of the students at four to six weeks following the conclusion of the educational modules. This structure could not measure long-term change in behavior.

4. Although students entering the university in the summer term were eligible for this study, the concept of measuring students' attitudes pre-matriculation referred only to the fall term. The institution provided summer and fall entrants with the same deadline for starting the program (first day of the fall semester). Additionally, the program did not open for summer entrants until after the start of the summer term. Therefore, due to this technicality in the implementation, as well as the anonymous data collection method, it was impossible to differentiate the responses of summer entrants from those who began in the fall term. In other words, while all students experienced the same program, some of the summer students may have had a different level of exposure to the collegiate environment (ranging from some to all of a six-week summer term) prior to beginning the AlcoholEdu program as compared to their peers who began in the fall term.

Delimitations

The following delimitations could be attributed to this study.

1. In order to conduct a program evaluation tailored to institutional goals, the population for this study was limited to all incoming first-time-in-college freshmen at a single public university.

2. The entire scope of the AlcoholEdu program was not investigated in this study. In order to address specific institutional goals regarding the program, only those components related to consumption, protective behavior, and negative outcomes of alcohol were investigated.
3. Only first-time-in-college freshmen students entering the university in the summer 2008 or fall 2008 semesters were considered for the population of this study in the interest of maintaining consistency in program delivery.

Organization of the Study

Chapter 1 introduced background information germane to this study, its overall purpose and significance, and the specific research questions that will be explored. A detailed review of the literature highlighting the prevalence of alcohol use among college students, trends in alcohol education in postsecondary institutions, the specific details of the AlcoholEdu program, and a brief introduction to program evaluation are presented in Chapter 2. Chapter 3 contains the details regarding methodology, data collection, and data analysis for the study. Results from the analyses are presented in Chapter 4. Chapter 5 provides discussion regarding the results and findings of the evaluation, as well as implications for future research pertaining to population-level use of the AlcoholEdu program.

CHAPTER 2 REVIEW OF LITERATURE

Alcohol Use in the United States: A Brief History

Before exploring the current issues related to alcohol use among college students, it is important to explore its place in society in general, particularly from the historical perspective. Its reach in society has ranged from commonplace to controversial. As this section will highlight, the presence of alcohol abuse as a certified clinically-related issue was declared in the mid-20th century, despite the long history of alcohol use.

Explicit research is not necessary to underscore the fact that in the United States general alcohol use has become commonplace in overall culture. Small towns and large cities alike have been home to bars and other liquor-serving establishments. Anyone watching television, reading a magazine, or driving on a highway may encounter an advertisement for some sort of alcoholic beverage without much effort. For example, the Federal Trade Commission (2003) found that almost all of the money spent on advertising by the alcohol industry was in compliance with a rule requiring that at least half of the targeted audience was 21 years of age or older. While this result is positive, it implies that alcohol advertisements can appear in numerous venues with a formidable under-aged population. Little doubt exists as to the pervasiveness of alcohol in this country.

Alcohol as a Disease

The fact that the Federal Trade Commission needed to conduct reviews on the limiting of alcohol advertisements alludes to the overwhelming fact that alcohol use has a large negative characteristic: “in sufficient quantities alcohol is a cell poison which is capable of bringing all life functions to a halt in any organism” (Ewing & Rouse, 1978, p. 10). Why would people continue to engage in an activity that could potentially lead to an untimely death? Ewing and Rouse highlighted the positive effects of drinking, including euphoric feelings, a release of tension, and a general uplifting of spirits. Abuse of and dependence upon alcohol are classified in the revised Fourth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) as psychiatric disorders similar to abuse of or dependence upon other drugs (American Psychiatric Association, 2000). As with other drugs, most users consume alcohol with the goal of obtaining the aforementioned positive side effects with as few of the less desirable side effects as possible (Ewing & Rouse). Therefore, alcohol users engage in a precarious balance between relative safety and danger, as well as control and dependence, in an effort to increase pleasure.

The concept of alcohol abuse among some individuals is not new. However, the concept of alcohol abuse as a bona fide psychiatric disease is relatively recent. In a review of over two centuries of drinking in America,

Howland and Howland (1978) established that attitudes toward alcoholism did not start to change until after the end of the period known as Prohibition. This time in the United States was prompted by the ratification of the 18th Amendment to the U.S. Constitution which banned alcohol from being produced, sold, or transported. Prohibition in the United States lasted from 1920 through 1933 when the 21st Amendment repealed the 18th Amendment.

Howland and Howland observed that prior to Prohibition, most individuals approached alcoholism from the moral standpoint of sin and evil rather from a more scientific perspective. This moralist perspective drove the nation to reach prohibition in the first place, and its demise prompted people to wonder if there was a better explanation for alcohol-related problems other than morality alone.

The establishment of Center for Alcohol Studies at Yale University in 1940 spearheaded the movement to discover more scientific explanations of alcoholism. Through psychological research, the Center recognized that alcoholism was a mental disease and could cause other physical complications. This perspective was slow to gain popularity with the general public until the 1950s. By then, the general public did start to recognize alcoholism as a disease but did not yet fully understand the need for education of causes, symptoms, and related issues. The American Medical Association officially recognized alcoholism as a disease in 1958, and in 1969 the American College of Physicians issued a formal recognition. Acceptance by these two groups prompted a greater

desire by the general public for education, as public health funds could now be utilized for therapy of those affected (Howland & Howland, 1978).

The literature reviewed thus far has addressed the long history of alcohol use among Americans in general. In the next sections, the history and specific issues associated with alcohol use specifically among college students will be discussed. Alcohol prevention and education programs that have been utilized over the years with individuals in this group will also be reviewed.

Alcohol Use Among College Students

Historical records show that collegiate drinking in America dates back to the founding of its first colleges and universities. Warner (1938) observed that when the first colleges were founded, being social through alcohol was a completely regular activity. "Liquor seemed as necessary at social functions, in polite and everyday social intercourse as food, wit, and conversation" (p. 5). Considering the large influence of the English universities on their American counterparts upon their founding (Brubacher & Rudy, 2006), it was natural for the institutions to take on certain English cultural customs. Brubacher and Rudy concurred with Warner regarding the prevalence of alcoholic beverages in colleges through colonial times. While hard liquor was restricted, ale, beer, and wine were not.

Warner (1938) noted the presence of in-house breweries at Oxford and Cambridge, which translated at Harvard and Yale to areas where students could purchase beer, cider, and hard liquor between meals to prevent students from having to travel into town to purchase alcohol. Through the 1800s, the perspective on alcohol began to shift toward an attitude of temperance (Brubacher & Rudy, 2006). For example, in 1837, Harvard provided wine and cider at dinner, but by 1898, no alcoholic beverages were allowed in the student commons area (Warner). Many colleges followed suit with similar bans, yet they had no real effect on college drinking (Brubacher & Rudy). This occurrence was likely one of the first in American colleges and universities to demonstrate that the abstinence-only approach to dealing with alcohol issues does not typically work.

By the beginning of the 20th century, a notable shift had occurred in the area of collegiate alcohol use. The activity was now considered to be a problem of sorts, rather than an assumed way of life. Ordinances pushed student saloons further away from campuses, mostly due to purported disciplinary issues. Between 1910 and 1920, riotous, alcohol-fueled aftermaths were normal behavior after big football games. At the same time, some larger universities began dry campaigns as they recognized large pockets of non-drinking students. This attitude likely echoed that of the general populace who pushed the country toward Prohibition. By the time Prohibition ended, a survey among all college

seniors attending accredited postsecondary institutions showed a two-to-one opposition of Prohibition. At the same time, while there was less drinking occurring among college students than prior to the ban, greater publicity was given to the practice. By 1937, four years after the end of Prohibition, collegiate drinking, but not necessarily drunkenness, was on the rise. In a 1937 survey of over 500 postsecondary institutions, drinking was only considered to be a problem by 24 institutions (Warner, 1938).

Trends in Prevalence of Alcohol Use

Long-term statistics have documented alcohol as a prevalent force in college life (Johnston, O'Malley, Bachman, & Schulenberg, 2008). It is important to note that a large portion of the college-going population has used alcohol well before entering college with participation levels ranging from simply trying alcohol to having a status as a regular drinker. It was found, in the most recent Monitoring the Future study, that 39% of 8th-grade, 58% of 10th-grade, and 72% of 12th-grade students have at least tried alcohol. Having tried alcohol does not necessarily make a student a regular drinker; however, 8% of 8th-grade, 16% of 10th-grade, and 25% of 12th-grade students responded that they had consumed five or more drinks in a row within the past two weeks (Johnston et al., 2009). Trends have indicated that, as a whole, drinking figures among high school students have been declining. A long-term survey of youth behavior showed that

regular drinking prevalence among high school students of any grade had declined from 51% in 1991 to 45% in 2003 (Newes-Adeyi, Chen, Williams, & Faden, 2005). In two other studies of drinking habits of incoming freshmen, one earlier and one later, 51% and 54% of these students respectively were determined to have come to college as drinkers (Sax, 1997; White & Swartzwelder, 2009).

Since the 1980s, the prevalence of alcohol use among college students has declined. From 1980 through 1987, roughly 90% of students claimed they drank at least once in the past year. This rate slowly declined into the upper 80% range from 1988 through 1992 and has since moved to the lower 80% range through the present time. This rate was at 81% as of 2007. Similar declines have occurred among students who reportedly consumed alcohol within the past month. The rate declined from 80% in the early 1980s, remained between 70% and 80% in the late 1980s and early 1990s, and dropped to the upper 60% range up to the present time; the 2007 rate was 67% (Johnston et al., 2008). Clearly, college drinking in general is not as prevalent as it was nearly 30 years ago, but its decline has been a slow, gradual one.

With levels of drinking slowly declining over the past few decades, college and university leaders may wonder why attention and resources should still be directed toward this issue. As the remainder of this section will describe, although overall drinking rates have decreased, rates of dangerous, high-

quantity drinking, as well as perceived acceptability levels of heavy daily drinking, have remained somewhat constant (Johnston et al., 2008, 2009). Additionally, negative consequences for both drinkers and bystanders that will not disappear on their own still exist (Wechsler, Lee, Kuo et al., 2002; Wechsler, Moeykens, Davenport, Castillo, & Hansen, 1995).

Rates of binge drinking, a concern among college officials, has held fairly constant for over 25 years. Between 1980 and 2007, rates of college students reporting they binged in the past two weeks peaked at 45% in 1984, reached a low of 38% in 1996, and settled at 41% as of 2007 (Johnston et al., 2008). Questions have also been raised as to whether binge drinking is a result of the age group or the fact that students are living in the college environment. Of students in the same early 20s age group, approximately 40% of college students and 30% of non-college students engaged in binge drinking (Johnston et al., 2009).

Heavy daily drinking is another area of interest. Among 12th-grade students, slightly more than 60% saw the risk in heavy daily drinking in 2008. This rate has fluctuated over the past 30 years but has only shown a minor overall decline. The rate of 12th-grade students noting the great risk in heavy daily drinking increased from 65% in 1981 to 71% in 1990, but declined to 61% as of 2008 (Johnston et al., 2009). Although it was found in the Monitoring the Future study that only 4-5% of traditional college-aged students drink daily,

regardless of college enrollment status, the fact that a sizeable proportion of high school students presumably enter college thinking that this kind of behavior was not risky was somewhat alarming.

Individuals do not necessarily have to drink daily to meet clinical diagnoses of alcohol abuse and dependence (American Psychiatric Association, 2000), however. Knight et al. (2002) cited U.S. population-wide statistics of 7% and 10% for rates of clinical diagnoses of alcohol abuse and dependence, respectively, when they conducted a comparative study strictly among college students. Of a nationwide sample of college students, 31% met criteria for an alcohol abuse diagnosis, while 6% met the criteria for a diagnosis of alcohol dependence. The staggering difference in abuse diagnoses between the general population and college students has further demonstrated the necessity for stronger support services to be available on college campuses.

These figures represent deeper issues than a set of alarming statistics. College drinking issues can be associated with consequences which represent a larger issue. Although alcohol abuse can affect individuals at any age, it is an issue of particular concern among college students, many of whom go through at least a portion of their experience in higher education before meeting the legal drinking age of 21. Aside from the potential issues of chemical dependence, about 25% of students who drink reported negative academic consequences due to drinking and over 20% reported that they engaged in unintended sexual

activities. Most drinkers experienced more than one negative consequence. In fact, about 20% reported experiencing at least five different alcohol-related consequences (Wechsler, Lee, Kuo et al., 2002).

Students who are alcohol users can also negatively affect others around them. In a study sampling students from nearly 200 institutions across the country, 66% of the respondents reported at least one direct consequence resulting from the drinking of fellow students. Some of these consequences included assault, property damage, unwanted sexual advances, and the need to “babysit” a drunken student (Wechsler, Moeykens, Davenport et al., 1995). In an isolated environment such as the typical four-year institution, these kinds of consequences of alcohol use can harm the educational process for both drinkers and abstainers alike.

Despite the presence of these statistics, there is some evidence that the seriousness of the issue has not permeated upper levels of college and university administration to the same extent. Between 1999 and 2002, in a survey given to presidents of four-year institutions nationwide, the percentage of respondents who believed alcohol to be a problem on their campuses decreased from 24% to 15%. In the same time period, there was no significant change in student behavior with respect to drinking (Wechsler, Seibring, Liu, & Ahl, 2004). This response did not necessarily imply that all of the institutional leaders who did

not feel alcohol use was a problem believed this to be true nationwide. Rather, they may have taken a “not on my campus” position in regard to the issue.

Gender-Related Factors

Alcohol-related behavioral factors, such as consumption levels, use of protective behaviors while drinking, and negative consequences of drinking, can differ between male and female college students. Researchers have shown that male college students have reached higher overall levels of alcohol consumption than have their female peers (American College Health Association, 2009; Wechsler, Dowdall, Davenport, & Castillo, 1995). On the other hand, women indicated a greater likelihood than did men to utilize certain protective behavioral strategies to prevent harm, such as pacing drinks (White & Swartzwelder, 2009) and asking a friend to notify them when they had consumed too much alcohol (Walters, Roudsari, Vader, & Harris, 2007).

Further research was conducted to investigate how alcohol consumption level served as a divisive factor between genders. In a large-scale national study, males (specifically, white males) were found to be more likely to drink to intoxication prior to age 19 than females or males of other races (Hingson, Heeren, Zakocs, Winter, & Wechsler, 2003). In a similarly-scaled study, 50% of men were classified as binge drinkers, compared with 39% of women, using the gender-based 5/4 definition for binge drinking (Wechsler, Dowdall, Davenport,

& Castillo, 1995). In another national survey, estimated binge drinking rates were established at 49% for males and 34% for females (Johnston et al., 2009). When specifically considering the habits of incoming freshmen, White & Swartzwelder (2009) determined that 10.2% of males and 5.3% of the females in the sample were more likely to drink at levels of at least two times beyond the minimum binge drinking threshold.

Aside from certifiable incidents of binge drinking, prior research provided a portrait that in general, men simply drank more alcohol than women, both in quantity and frequency. When college students were asked to provide their alcohol consumption level at the last party they attended, 22% of the men surveyed reported consuming nine or more drinks, while only 6% of the women met this criterion. Identical proportions, 22% of men and women, abstained during their most recent party situation, however (American College Health Association, 2009). These trends have been shown to apply among students who have been disciplined for alcohol use. When compared to female peers, males in this population responded that they had engaged in more days of drinking, more days of heavy drinking, and greater frequency of drinks per week (Barnett, Goldstein, Murphy, Colby, & Monti, 2006). Males have also been shown to engage in daily drinking (5%) more frequently than females (3%), which serves as a potential measure of risk of developing alcoholism (Johnston et al., 2009).

The particular negative behaviors and consequences attributed to alcohol use also differ between men and women. Women were found to attribute more negative drinking-related consequences to a greater number of indicators, ranging from physical to interpersonal to safety-related, when frequency of consumption increased (Barnett et al., 2006; Presley & Pimentel, 2006). Moreover, the types of negative consequences experienced differed between genders. Women were not as likely as men to physically injure themselves, become unaware of surroundings, and coerce someone into unwanted sexual activity (Araas & Adams, 2008). Women were also not as likely as men to chug alcohol, get into a fight resulting from excessive drinking, or drive after drinking. On the other hand, women were more likely to drink on an empty stomach to hasten the feeling of drunkenness (White & Swartzwelder, 2009).

Likelihood of utilizing certain protective behavioral strategies while drinking also has been found to differ between genders. Women have tended to depend upon friends more frequently than men to prevent harmful consequences: they were more likely than men to either make sure they went home with a friend or ask a friend to notify them when they reached a pre-defined limit. Students of both genders frequently endorsed the strategy of knowing where a drink is located at all times and using some sort of designated driver (Walters et al., 2007). Men and women also thought about the effects of alcohol in different ways. Men were more likely to consider the effects of

drinking on total blood alcohol content, while women were more likely to worry about generally consuming too much alcohol and therefore paced drinks (White & Swartzwelder, 2009).

One final important difference in gender-based behavior involves willingness to change. Among students with alcohol-related discipline incidents, women were more likely than men to have the intent to change heavy drinking behavior (Barnett et al., 2006). This finding is crucial, as it can determine the potential effectiveness of AOD interventions based on a constant factor, such as gender.

Ethnicity-Related Factors

Drinking behavior has been shown to differ by a student's ethnicity. Wechsler, Dowdall, Davenport, and Castillo (1995) found that compared to students of other ethnicities, being White raised the risk of binge drinking. More specifically, among students who did not enter college as binge drinkers, White students had a greater likelihood than did Asian or Black students to begin this behavior in college (Weitzman et al., 2003). Evidence of alcohol-related negative consequences for White students was noted by Powell, Williams, and Wechsler (2004) who found that White students were more likely to miss a class due to alcohol use than were Black and Asian peers. They also were more likely to fall behind in school than their Black peers. These findings indicated that although

alcohol use affected students of any ethnic background, White students were often at higher risk for excessive usage and certain harms.

Students of different ethnic backgrounds have also been shown to hold different attitudes towards knowledge and risk of alcohol-related issues. A study of college students of various races showed that Black students believed they were the most knowledgeable and Asian students believed that they were least knowledgeable about AOD issues; similarly, Black students believed they were the least at risk for developing a problem with AOD, and Asian students placed themselves at highest risk. When students were asked if they were interested in receiving AOD information through a program, White students were the least interested (38% approved), and Black students were the most interested (60% approved), indicating a significant difference (McCaughrin, 1995). Though these results represented the findings in a single-school study, the implication was that students of different ethnic backgrounds held different attitudes toward alcohol use and education and, therefore, might respond differently to any given intervention.

So far, the literature has indicated that gender is a factor in describing levels of alcohol consumption, utilization of protective behaviors, and subsequent negative repercussions. Males have been found to have higher levels of overall consumption. Women and men have differed in their protective behavioral strategies and types of negative consequences. It has also been

demonstrated in the literature that White students are at the highest risk for issues of alcohol consumption and lack of receptiveness to interventions. The risk factors concerning a student's past, in the areas of age of first alcohol consumption, family history of alcoholism, and degree of drinking as a student enters higher education will be explored in subsequent sections of the literature review.

Age of First Alcohol Consumption

Researchers have shown (Johnston et al., 2009; Newes-Adeyi et al., 2005) that regular alcohol use is prevalent among students who have not yet reached college. Aside from the fact that these students enter college as drinkers, it is important for higher education officials to understand the additional risk factors faced in college by students in this category. Considering that as of 2003, 37% of the high school students surveyed said they initiated drinking at age 12 or earlier, a minor decline of only 3% since 1991 (Newes-Adeyi et al.), colleges and universities will likely continue to face a sizeable influx of young students who have been drinking for a number of years before walking into the collegiate setting.

A student's drinking activity prior to college can signal a higher potential for danger in the form of binge drinking once the student reaches college.

Wechsler, Dowdall, Davenport, and Castillo (1995) found that pre-college

drinking strongly predicted the presence of binge drinking in college. Likewise, Weitzman et al. (2003) found that students who first got drunk prior to age 16 had a higher likelihood of starting binge drinking activity in college as compared to peers who either abstained or did not drink heavily until college.

Pre-college drinkers face other risks besides binge drinking once they reach college. In a national study by Hingson et al. (2003), it was found that students who were under 19 at the time of their first incident of drunkenness were more likely to drink heavily on a more frequent basis; think they could drink and drive legally; engage in riskier behaviors after drinking; and meet the official criteria for alcohol dependence. Even when controlling for prevalence of heavy episodic drinking meeting alcohol dependence criteria, these students were still more likely to engage in alcohol-related risky behavior.

From a psychosocial perspective, students who enter college with a pre-existing history of drinking have presented challenges for colleges and universities in the way of AOD programming. As adolescents age, they have an increased likelihood of positive expectancies from drinking (Dunn & Goldman, 1996). Therefore, students who are already drinking have an even greater set of positive drinking expectancies. Donovan's (2004) review of longitudinal risk factor studies showed that history of subversive behavior and peer approval were among the largest risk factors for drinking. When these factors are placed atop the challenges that institutions face in reducing harmful alcohol-related

behaviors among students who already drink, the need for AOD programming targeting students exercising different degrees of alcohol use becomes apparent.

Family History of Alcoholism

Many students have a greater likelihood of developing problems related to excessive alcohol consumption due to having a family history of alcoholism. The studies that have been conducted on this topic address the fact that some students are simply genetically or neurologically predisposed to engaging in dangerous drinking habits. While family history has been by no means the only factor in the mix, it is an important one to explore.

An early study employed the measurement of event-related brain potentials (ERP), a type of brain wave measurement, from average drinkers with and without family histories of alcoholism. When subjects were asked to make a decision on task-relevant stimuli, the ERP measurement was found to be greatly reduced among the individuals who indicated an alcohol-positive family history. Additionally, these subjects had longer reaction times in completing the task than did the subjects with a negative family history. These differences were apparent whether or not the subjects consumed any alcohol prior to completing the task (Elmasian, Neville, Woods, Schuckit, & Bloom, 1982).

Some later applicable studies on this topic addressed the amplitude of the P300 brain wave. Hill and Steinhauer (1993) measured P300 brain wave

amplitude in children from families that were considered as being high-risk (several direct relatives met the criteria for alcohol dependence) or low-risk. While the high-risk children did not show any significantly reduced amplitude in the brain wave as a whole, significant differences were present when the results were disaggregated by gender. Male children from high-risk families had significantly reduced amplitude compared to their low-risk male peers, indicating this brain wave as a potential risk marker for alcoholism.

Further research (Hill et al., 2001) was conducted based on the earlier findings of Hill and Steinhauer (1993). It was found that high-risk, young adult males had a smaller right amygdala volume than did equally-aged males in the control group. Among adolescent non-drinkers, subjects who had a family history of alcoholism showed less inhibition in frontal brain regions when performing simple cognitive tasks as compared to peers who did not have such a family history (Schweinsburg et al., 2004). These pieces of evidence were supportive of differences in brain structures and reactions in children who may not drink themselves but are genetically related to someone who does.

Continuing with research relating brain wave structures to risk of future alcohol abuse, another study was conducted to examine the relationship between family history of alcohol disorders and electroencephalographic (EEG) sleep measures. Among youths clinically diagnosed with depression, those in the group with a positive family history of alcohol disorders had greater alpha-level

(higher-level frequency) activity than those who did not (Dahl et al., 2003). This study was important for college students, as it examined children who were not yet alcohol users but were depressed. Considering that 14% of young adults in colleges and universities also battle depression (American College Health Association, 2009), it is critical for those in college health clinics to be aware of these potentially dangerous combinations of risk factors.

Other studies reviewed, showing how family history of alcoholism puts young adults at future risk, involved actual issues of genetic structure. Direct chromosomal markers have been found to link individuals to a risk of alcoholism based on family history. In a study of individuals from 105 families with alcohol dependence issues, it was found that a genome screen identified potential markers for linkage to alcohol dependency (genetic susceptibility loci) on chromosomes 1 and 7 (Reich et al., 1998). A replicate study conducted under the same criteria as the initial study confirmed these findings (Foroud et al., 2000).

The practice of studying genetic linkage to alcohol abuse issues has also extended specifically into the realm of higher education. Herman, Philbeck, Vasilopoulos, and DePetrillo (2003) studied whether variants of the protein promoter region of the serotonin transporter gene (5-HTT) differentiated alcohol consumption levels among college students. Among a subset of White students, the researchers found that students who were homozygous for the short allele had an increased likelihood to more frequently binge drink, consume more

alcohol in a single sitting, and drink with the attempt of getting drunk more frequently, as opposed to students who were either homozygous for the long allele or heterozygous. Studies of this nature have been of great importance as they demonstrate that these genetic linkages do not degrade in importance when children reach adulthood.

In a recent longitudinal study, the potential link between genetics and drinking in college students was explored further to determine whether there was a connection between genetic disposition and environment with respect to alcohol use among college-aged students. The researchers determined that while students who did not ultimately attend college consumed more alcohol and binge-drank more regularly as adolescents than their peers who eventually enrolled in college, the college-attending group overtook the non-college group in levels of alcohol consumption by young adulthood. More strikingly, genetic influence was a greater factor in amount of alcohol consumed per incident with the college-attending group than with their non-college peers. This suggested that the genetic link to alcohol use was intensified when an individual entered an environment with a focus on alcohol use (Timberlake et al., 2007). These findings somewhat contradicted those of Rose, Dick, Viken, and Kaprio (2001), who conducted a longitudinal study of environment versus genetics in Finnish teenage twins. Although this study did not involve college students, it showed that genetics became a more influential factor than environment as the subjects

aged. Conceivably, the college environment is a unique one that was not addressed in the study by Rose et al. which was focused on the difference between urban and rural settings.

Although colleges and universities cannot account for these kinds of neurophysiological, neuroanatomical, or genetic qualities of their students, they can be aware of how some of their incoming students may be facing challenges even before their arrival on campus for the first time. These students often face academic disadvantages due to their family background. Researchers have indicated that students with parents classified as either heavy or problem drinkers (former or current) have a significantly greater likelihood of missing classes and falling behind in coursework compared to their peers who have abstaining parents (Powell et al., 2004). In addition, these students who have a parental history of alcohol abuse and have engaged in at least one binge drinking incident in the past week are less prone to utilize protective behaviors when drinking than peers whose parents have not faced issues of alcohol abuse (Walters et al., 2007). Colleges and universities can tailor support to these students with different backgrounds to help prevent academic and health-related problems.

The literature that has been reviewed thus far has indicated differences in alcohol-related behavior by gender and ethnicity; an increased likelihood of dangerous consequences for students who have been drinkers since an early age;

and a greater risk for alcohol abuse among children of families with alcohol issues. The following section will explore the difference in risks faced by students who fall into the various categories of drinker type.

Risks by Drinker Type

A crucial factor to consider when examining the behaviors and habits of college students with respect to alcohol use is drinker type. Not all students drink alike in quantity and frequency. Some students may not drink at all, drink infrequently and only at parties, while others may make drinking alcohol part of their regular daily routine. Though it may initially seem wise to suggest that students who drink the most should be provided the largest share of resources in alcohol education, this attitude is somewhat of a myth. In this section, the researcher will examine how alcohol affects students in different classifications of drinker type with respect to risky behavior, negative consequences, and desire to change behavior.

The percentage of students who described their own drinking as problematic did not increase in recent years, yet there were significant increases in certain negative consequences. It was found in a 2001 Harvard College Alcohol Study that 4% of respondents felt they had a drinking problem. This statistic had not changed from 1993. However, among all students drinking over the past 30 days who were surveyed, there were significant increases in students

getting in trouble with police (5% in 1993 to 7% in 2001) and getting hurt or injured (9% in 1993 to 13% in 2001) (Wechsler, Lee, Kuo et al., 2002). White and Swartzwelder (2009) provided further indication that injurious negative consequences became more likely among frequent, heavy drinkers. This activity was shown to increase the likelihood of memory blackouts, engaging in a one-night stand, and generally getting injured. Students who took shots, chugged alcohol, or skipped meals to get drunk faster also increased their risk of blacking out. The severity of consequences clearly increased with quantity and frequency of alcohol consumption.

Students who drink heavily frequently increase their likelihood of experiencing negative consequences because of the sheer amount of alcohol they consume. However, lighter drinkers are by no means immune to having alcohol-related issues. In a study of 450,000 freshmen nationwide, it was determined that 60% of the students were light to moderate drinkers, while only 20% were frequent, heavy drinkers. Furthermore, most of the negative consequences were generated by the larger group of light to moderate drinkers and infrequent, heavy drinkers, not their more frequent drinking peers (Busteed, 2008).

Busteed's (2008) findings corroborate those of Presley and Pimentel's (2006) analysis of national Core Alcohol and Drug Study survey results. Among all students, regardless of class standing, about 75% drank, and 41% were classified as heavy drinkers. Of the heavy drinkers, 38% were also classified as

frequent drinkers. In other words, just over 10% of the study population drank heavily and frequently. However, this small part of the population was found to generate over 45% of all negative drinking consequences.

Findings based on Harvard's College Alcohol Study also confirmed that the most harm resulted among non-extreme student drinkers (Weitzman & Nelson, 2004). As with Busteed's (2008) research, these findings indicated that the majority of consequences were indeed generated by more infrequent drinkers; however, the findings also indicated the importance of being attentive to the drinking habits of all types of students. According to Presley and Pimentel (2006), 62% of non-heavy drinkers still experience at least one negative consequence when they drink. This finding means these students are far from unaffected.

An additional study of interest regarding negative consequences was conducted to examine the attitudes of students who visited a campus health center and were screened for indicators of possible risky drinking. These 363 participants became drunk approximately once a week and 76% participated in drinking games, one of the most popular risky behaviors. Most of the students involved were heavy (but not frequent) drinkers, and 61% of the students generated 57% of the harms. The 20% heavy and frequent population generated 31% of the harms, and the remaining 12% of harms were generated by non-heavy, infrequent drinkers. The findings supported the theory that as frequency

of drinking increases, so do harms experienced. On average, the mean numbers of harms experienced per year by the different groups of students were 10, 14, and 23 for the non-heavy, heavy, and frequent heavy groups, respectively (Schaus et al., 2009). Once again, while frequent heavy drinkers generate a substantive number of negative consequences, students who may binge once a week at a party face a substantial numbers of harms, as well.

Severity of students' drinking problems can also affect their motivation to change drinking habits. Barnett et al. (2006) studied willingness to change in a subgroup of college students required to participate in alcohol education due to an alcohol-related disciplinary infraction. Students who experienced more alcohol problems over the past year and consumed more alcohol over the past month displayed a lower intent to modify heavy drinking habits. On the other hand, students who were aversive toward their discipline-yielding incident or believed that they had legitimate responsibility for the occurrence of the incident were more motivated to change behavior due to their discomfort regarding the episode. However, only 30% of the heavy drinking students had any plans to change or reduce their drinking habits. It is clear that for students for whom drinking is a deeply ingrained habit, change is not easy to achieve.

Alcohol Education in Colleges and Universities

To this point, the review of literature has provided a brief history of alcohol use and related issues in the general population of the United States, as well as among the specific subpopulation of college and university students. The research indicated that alcohol has been an omnipresent force in both areas for a long time, yet alcohol abuse was not treated beyond the scope of a personal issue until the mid-20th century. Among college students, certain individuals face greater alcohol-related risks than others due to demographic differences in the areas of gender, ethnicity, age of initiation of drinking behavior, family history of alcoholism, and level of drinking upon reaching college. Literature related to postsecondary alcohol education will be reviewed in subsequent sections. This will be followed by a description of the AlcoholEdu program.

Beginnings

While statistics may suggest that concern regarding alcohol use among college students is a growing issue, this topic has existed in the public eye as far back as the inception of higher education in America. The place of education of college students regarding the dangers of alcohol, however, was largely overlooked until more recent years. "To date, the subjects of alcohol, drinking, and related problems have for the most part been avoided in the college

curriculum” (Straus & Bacon, 1953, p. 211). Compared to the long history of alcohol in college, the history of alcohol education in college is not nearly as lengthy.

One of the first comprehensive studies of alcohol education programs for college students took place in the mid-1970s. In the 1974-75 school year, the NIAAA (1976) conducted a project where one postsecondary institution was visited in each state, plus 12 minority and private institutions. This study, known as the “50 Plus 12 Project,” showed that while many colleges viewed alcohol abuse as a problem, and while 15% of the institutions provided activities or services incorporating alcohol abuse or use education, the majority of the institutions needed guidance. Some of the schools in need of guidance focused their educational efforts strictly on alcoholism, not necessarily alcohol use and abuse. They denied the need to take action unless there was a proliferation of alcoholics. Kraft (1976) provided further insight into this project with a summary of the attitudes displayed by participating institutions. Those schools that did not deny the need for action either felt despair at the magnitude of the alcohol problem, were frustrated that their existing alcohol education programs did not work, or thought that the only way to solve the issue was to turn their campus alcohol-free. Higher education was determined to move in the right direction in educating students about alcohol, but still had numerous issues to overcome.

By 1990, colleges had no choice but to act on the need for alcohol education programs for students due to the passage of the Drug-Free Schools and Communities Act of 1989 Amendments (DFSCA). These amendments altered the 1986 version of the same piece of legislation. This revision to the 1986 reauthorization of the Higher Education Act of 1965 required all institutions receiving federal aid to affirm that they enacted drug and alcohol prevention programs that would benefit students, employees, and administrators, or to lose their federal aid (Upcraft & Welty, 1990). Alcohol-related issues on campus could no longer be considered simply the problem of selected “alcoholic” students or a mere behavioral expectation of undergraduate students.

At the time the DFSCA went into effect, many colleges across the country understood the need to find what did or did not work in terms of AOD programming. In 1990, 1,300 colleges were part of the Network of Colleges and Universities Committed to the Elimination of Drug and Alcohol Use, an organization that developed standards to help guide institutions in dealing with AOD issues. These standards included the development of AOD policies; enforcement of AOD regulations; providing effective AOD programs; ensuring that students, faculty, and staff could receive appropriate intervention and referral for AOD issues; and assessment of attitudes towards AOD on campuses and the effectiveness of the comprehensive AOD programs offered (Upcraft & Welty, 1990). The organization, which was formed in 1987 by the U.S.

Department of Education, continued at the time of the present study with over 1,600 members and had changed its name to The Network Addressing Collegiate Alcohol and Other Drug Issues, or simply, “The Network” (The Network Addressing Collegiate Alcohol and Other Drug Issues [The Network] Web site, 2009). Dowdall (2009) cited The Network as “one of the most important sources shaping professional identity and development among those working in the field” (p. 127).

Legal Ramifications

Considering the historical disconnect between the prevalence of college drinking and the willingness of the institutions to deploy widespread alcohol education programs, it is essential to explore the opinions regarding whether colleges truly have a responsibility to include this kind of programming within the curriculum. Since the beginning of American higher education, institutions have adopted the traditional stance of the English institutions to serve *in loco parentis* or “in place of the parent.” In other words, colleges were expected to hold the same supervisory power over their students as parents would hold (Olivas, 2005, p. 236). Due to the ever-changing social and legal landscape of the higher education system, some have questioned the extent to which *in loco parentis* still applies in colleges.

Bickel and Lake (1999) tracked the rise and fall of *in loco parentis* as related to alcohol use in colleges and universities. The 1960s and 1970s were described as a “bystander” era, where it was fully understood that students were completely responsible for adult choices. Since college leaders felt there was no solution for the inevitable campus drinking culture as it was a “fact of life;” therefore, it was perceived to be the duty of courts to favor universities in alcohol-related injury claims. This period lasted through the mid-1980s and remained relatively intact, but Bickel and Lake expressed the belief that the culture was beginning to transition toward not necessarily holding institutions harmless for alcohol-related injuries. This shift has been attributed to changes in liability laws for providers, an increased awareness of campus alcohol problems, and a general attitude that students are not always fully responsible for these injuries. Campuses, according to Bickel and Lake, have begun to recognize that it is partially their responsibility to crack down on dangerous drinking. “It is not realistic or desirable to enforce prohibition on most campuses. What is at issue is problem, dangerous drinking and the extreme risk of harm it can cause” (p. 209).

Not all researchers believe that *in loco parentis* still fully exists. Bowden (2007) expressed his opinion that *in loco parentis* has turned into *ad meliora vertamur*, which translates to “let us turn to better things” (p. 480). This concept still encompasses *in loco parentis* but also blends the influences of tort law, legal statutes, and academic programs. Feasibly, if a student becomes injured or dies

due to alcohol while on campus, an institution with a strong alcohol education program can show that it sufficiently educated students against the dangers of alcohol in a legal proceeding brought against the school. Just as a parent cares for the child's well-being, the institution can ensure that students have the knowledge to make proper decisions.

The necessity for colleges and universities to provide alcohol and other drug (AOD) prevention programs has moved beyond the desire to maintain *in loco parentis* in some form. With the passing of the DFSCA, colleges and universities risk fiscal disaster if they choose to not implement AOD programming. The specific requirements of the DFSCA as they pertain to institutions of higher education (IHEs) are outlined in the Department of Education Drug and Alcohol Abuse Prevention Rule (1990). This code provides the minimum requirements for a drug and alcohol prevention program that meets requirements to prevent withholding of federal funds. These requirements include the annual written notification of the following to all students and employees: (a) Standards that minimally prohibit illegal possession, distribution, or use of drugs or alcohol on school grounds or as a part of school functions; (b) descriptions of legal ramifications, locally, statewide, or federally associated with illegal possession, distribution, or use of drugs or alcohol; (c) descriptions of health risks resulting from drug and alcohol use; (d) outline of available drug and alcohol treatment options available; (e) clearly stated disciplinary sanctions

that the IHE can take upon any student or employee caught for illegal possession, distribution, or use of drugs and alcohol. In addition, colleges and universities are subject to a biennial review to ensure that their AOD programs are in compliance with the rules outlined above. This review focuses on both the effectiveness of the program, steps the IHE takes to maintain effectiveness, and compliance with disciplinary sanctions.

It is important to analyze the ramifications of these requirements. Favorably, the requirements do provide minimal standards that institutions want to meet to avoid the possibility of losing valuable federal funding. This consequence practically ensures that nearly all colleges and universities have some form of AOD program. However, as Wechsler, Moeykens, and DeJong (1995) stated, "Bringing about a change in a school's drinking environment requires steadfast commitment, plus a recognition that no one policy alone will solve the problem" (p. 9). The Higher Education Center for Alcohol and Other Drug Abuse and Violence Prevention (2006) further recognized the potential for an institution to simply comply but not bring about change. "Complying with the spirit and not just the letter of the law supports IHEs in their AOD prevention efforts and provides significant benefits and opportunities for the entire institution and its students" (p. 1). The minimal standards simply do not represent a sufficiently great effort to combat campus AOD issues.

One of the major issues associated with compliance with these federal regulations involves the type of AOD education they promote. The Department of Education Drug and Alcohol Abuse Prevention Rule (1990) asks institutions to make sure that all students and employees know what uses of AOD are considered illegal, what sanctions can be taken against them if caught, what treatment options are available, and medical reasons why AOD use is dangerous to health. Some well-meaning institutions may see the dispersion of purely education-based AOD programs as both fulfilling legal requirements and helping at-risk students. Numerous researchers have eschewed the education-only approach (Baer, Kivlahan, Fromme, & Marlatt, 1994; Braverman & Campbell, 1989; Lipnickey, 1986; Moskowitz, 1989; Perkins & Berkowitz, 1986; Upcraft & Welty, 1990). This further communicates the premise that merely complying with the law is not enough to prevent alcohol-related issues on campus.

In addition, in the increasingly litigious culture in the United States, liability for student well-being at events and programs, even if essentially student-run, has been attributed to colleges and universities (Gehring, 1993; Upcraft & Welty, 1990). These laws regarding the furnishing of alcohol to minors, whether by licensed vendors (dram shop laws) or by unlicensed individuals (social-host liability), have varied between states but have added to the list of responsibilities of institutions. The best defense of an institution is to ensure that

it has taken full precautions with its students to protect them from reasonably foreseeable alcohol-related dangerous circumstances (Gehring).

Alcohol Education and Campus Culture

It is difficult to argue against the overall place of alcohol use in higher education culture in general. The authors of the report “A Call to Action: Changing the Culture of Drinking at U.S. Colleges” (NIAAA, 2002) commented extensively on the fact that drinking is a greatly embedded subculture within higher education in the United States. This culture can be found all over campuses, from advertisements in campus sports arenas to tailgating alumni to fraternity and sorority life to other environmental and peer-based influences. From a nationwide perspective, it is easy to draw an overarching conclusion that all colleges and universities are similar to one another with respect to alcohol.

While it is simple to understand how this nationwide subculture of alcohol use in higher education exists, it is important to remember that every individual institution has a unique campus culture. This concept of culture was defined by Schein (1992) as “the accumulated shared learning of a given group, covering behavioral, emotional, and cognitive elements of the group members’ total psychological functioning” (p. 10). Schein related the shared learning portion of culture to the phenomena of group norms, espoused values, implicit organizational rules, and behavior patterns. Many studies have been conducted

to analyze how all of these cultural aspects related specifically to higher education. Colleges and universities have been determined to have qualities from several discrete, definable cultures (Bergquist & Pawlak, 2008); different departments in the same institution have been found to experience culture in different ways (Frost & Gillespie, 1998); and change within an institution has been directly related to culture (Kezar & Eckel, 2002).

Since it is evident that a campus culture permeates throughout all institutional aspects – students, faculty, departments, and governance structures – it makes sense to deliver an AOD program that fits the culture of an institution. For any college or university simply carrying out the requirements of the Department of Education Drug and Alcohol Abuse Prevention Rule (1990) in crafting an AOD education program, it is easy to overlook the critical factor of campus culture, as the regulations do not at all explicitly allude to the concept. Schuh and Shore (1997) noted that an institution’s philosophy and mission, closely tied to values, assumptions, and beliefs, were critical in creating an appropriate alcohol policy. Between qualities such as size of the student body, public or private status, distribution of courses taken online or in person, and the general expectation of the institution to adhere to the qualities of *in loco parentis*, each individual institution calls for a unique blend of features designed to keep students safe from AOD-related issues. Dowdall (2009) concurred with this stance and stated that a problem in alcohol education development was the

allure of using off-the-shelf products that did not necessarily fit an individual institution's problems. He suggested that some level of strategic planning should occur to determine what solution would best fit the population.

Though this subculture has existed in almost all institutions to some extent, the degree varies greatly. In one of the first reports published as a part of the Harvard School of Public Health College Alcohol Study, Wechsler, Davenport, Dowdall, Moeykens, and Castillo (1994) found that of the 140 schools participating in the nationwide study, 44 institutions (31%) were classified as "high-level binge schools," where over 51% of the student population were classified as binge drinkers. On the other hand, an approximately equivalent number of schools (43 of 140 institutions) were classified as "low-level binge schools," where fewer than 35% of the students were classified as binge drinkers. It would be difficult to argue that, for example, the one school in this category where less than 5% of the students fell into the binge drinker category would have the same pervasive culture of alcohol use as a school with even 25% to 35% of the students classified as binge drinkers. Again, it is essential to consider the wide array of specific AOD issues at an institution before creating a solution.

Esteban and Schafer (2005) presented a case study outlining the importance of considering campus culture when developing a cohesive, appropriate AOD education strategy. This case study took place at California State University, Chico (CSU, Chico), which had a reputation as an alcohol-

fueled “party school” since the 1940s. It was a largely residential campus with a high percentage of undergraduates in an area filled with young adults. With this combination of factors, it became clear to the researchers that in order for their alcohol education program to be successful, it needed to, among other things, target the entire population, not individual students, as well as involve the community. This approach would not necessarily be as critical for a campus that was not in such a college-centric town with a reputation of a “party school.” One approach to AOD programming does not fit all institutions.

Approaches to Alcohol Education

Researchers have indicated that in the relatively short history of postsecondary alcohol education, legal requirements have played an important role in bringing interventions beyond individual treatment for troubled students. At the same time, institutions that have made strides in improving the alcohol situation at their own campuses have paid close attention to the element of culture. This factor concerns the overall campus culture, as well as the overarching culture of alcohol use present on almost every college campus in America. The literature reviewed addresses some of the more popular approaches institutions have taken to prevent campus alcohol issues from the perspectives of content and delivery methods.

Grade School Interventions

Before addressing the popular approaches to college alcohol education, it is important to review some of the interventions that students have received as children and teenagers. In understanding the initiatives being taken to prevent underage alcohol use among grade school-aged students, it can become easier to understand where gaps exist in these approaches that have become the duty of colleges to fill.

Like many of the early college AOD programs, the grade school equivalents were also based entirely on scare tactics (NIAAA, 2006). As with the collegiate versions, these types of programs were largely ineffective. One of the first programs that attempted to take a slightly different approach with grade school students was Drug Abuse Resistance Education (DARE). The program involved teaching information regarding drugs and alcohol, social pressure resistance, alternatives to drugs, and enhancing self-esteem. It was also taught by law enforcement officers. A meta-analysis of eight rigorous implementations of this program found that DARE had only a slight effect on drug use compared to use at the control schools. None of these differences, with the exception of tobacco use, were statistically significant. The effect sizes were also much lower than those of equivalent interactive programs (Ennett, Tobler, Ringwalt, & Flewelling, 1994). A later study found that in a follow-up among 12th grade

students who received the intervention in 6th grade, no relationship existed between participation in the program and use of alcohol (Dukes, Stein, & Ullman, 1997). Thus, for a generation of students raised on DARE, the alcohol education they received at a young age at their school may not have had a large impact.

As has been the case in the postsecondary environment, AOD strategies with younger students have evolved to be more comprehensive. The NIAAA (2004/2005) identified three types of interventions commonly used among these students: school-based programs, family-based programs, and macro-environmental interventions. The NIAAA underscored the importance of using these programs in conjunction with one another for maximum effectiveness. Effective school programs have to reach beyond simply increasing knowledge of the dangers of drinking. The DARE program has been well intentioned, but effective school programs must contain large elements of interactivity. The NIAAA noted the ineffectiveness of school programs among high-risk students, which is where family programs may be helpful. These programs can both assist an individual student and affect the surrounding environment. Finally, the macro-environmental approach sets the rules in place that can protect minors, such as minimum legal drinking age (MLDA), fake ID penalties, compliance checks, and sanctions on individuals who provide alcohol to minors.

Of particular interest is the set of methods Florida has recommended to combat youth alcohol use. The Florida Department of Education [FLDOE] (2004) recommended finding other programs that have already proven to be effective with children and teenagers, incorporating elements of peer education, learning how to identify risk and protective factors, and media literacy. Nonetheless, the protective factors identified for use with grade school children have not necessarily been the same protective factors that some programs teach to college students. Standards differ between school districts, but a common thread has remained in that schools are not allowed to teach students strategies that actually involve consuming alcohol, even in a more responsible manner (T. Hall, personal communication, November 20, 2009). Additional approaches that the FLDOE recommended included (a) training of school personnel to identify and refer problem drinkers to receive additional services, (b) providing an array of alcohol-free activities for older students, and (c) taking a systemic approach with secondary-level students in providing alcohol education. This set of strategies appeared to align with the tiered approach recommended by the NIAAA (2004/2005), which urged recommending more intensive sources of assistance to any students who needed additional help.

Early College Programs and the Abstinence Perspective

The routes by which colleges and universities have provided alcohol education to students have been standardized. Historically, institutions deployed a combination of alcohol awareness programs for incoming freshman and for the overall student body at various times throughout the academic year, peer education programs, and educational modules on alcohol use incorporated within general education curriculum. The focus of all of this programming has been placed squarely upon the individual student (DeJong et al., 1998).

This focus on treating the individual student for alcohol misuse began in the 1970s. In fact, the general consensus was that alcohol use was simply a fact of life. Jessor and Jessor (1975), in a longitudinal study of adolescent drinking conducted in the early 1970s, concluded that the onset of alcohol use was a perfectly normal stage in a teenager's development. This attitude matched the aforementioned NIAAA "50 Plus 12 Project" findings where, in the mid-1970s, only 15% of the schools interviewed had any sort of alcohol education program (NIAAA, 1976).

As alcohol education programs targeted specifically to college students became popular in the 1980s, some common trends emerged in delivery. The earliest programs were largely information-based. The theory behind these programs was that students drink excessively because of an unawareness of the

potentially dangerous consequences. “Alcoholism, problem drinking, and drug addiction are commonly viewed in the United States as problems that arise out of human weakness” (DeJong et al., 1998, p. 3). Unfortunately, the attitude that students simply bring alcoholism upon themselves led to the creation of these education-based programs solely from the perspective that AOD are dangerous; this approach served as a scare tactic of sorts. These programs may have appeared to be effective, but these traditional interventions filled with legal and medical information regarding alcohol were actually shown to be largely ineffective in changing attitudes toward drinking (Perkins & Berkowitz, 1986).

Also deemed ineffective were programs that only publicized reasons why AOD can put people at risk for an array of problems or otherwise tried to make these substances seem less acceptable for use. These kinds of programs summarized the abstinence-only approach (Upcraft & Welty, 1990). The abstinence concept is representative of many of approaches to alcohol use prevention that were in use for years but were shown to be ineffective (Beck, 1998; Marlatt & Witkiewitz, 2002; Moskowitz, 1989). The debate between abstinence-only approaches and the alternative, harm-reduction approaches, will be discussed in subsequent sections addressing the concepts of prevention and harm reduction.

The Prevention Concept

A theme that runs strongly through all AOD education is that of prevention; specifically, prevention science. Coie et al. (1993) noted that “the goal of prevention science is to prevent or moderate major human dysfunctions. An important corollary of this goal is to eliminate or mitigate the causes of disorder” (p. 1013). Furthermore, this concept, which has been in heavy use in public health since the 1980s, addresses both risk and protective factors through biomedical and social processes. In other words, while some risks may be due to genetic factors, others arise as a function of environmental influences. As Coie et al. further stated, “the primary objective of prevention science is to trace the links between genetic risk factors and specific clinical disorders and to moderate the pervasive effects of risk factors” (p. 1014). Considering the information discussed earlier in this literature review regarding the combination of family history and the college setting as risk factors in developing alcohol issues, the prevention concept is a critical area of research to explore.

Although the concept of prevention in public health as a formally evaluated scientific area has only existed since the 1960s (Beck, 1998; Coie et al., 1993), prevention through school-based drug education has actually existed since the 1880s. As Beck highlighted, these early efforts were largely at the primary and secondary levels. By the late 1980s, primary prevention efforts targeted

specifically to postsecondary students were still considered a recent addition to the prevention landscape (Moskowitz, 1989).

“There is a wide perception that education, if only it is provided with enough funding, can have strong and/or immediate impacts on health problems” (Braverman & Campbell, 1989, pp. 6-7). This quote represents the view of AOD prevention efforts as of the late 1980s, but while researchers of the day may have realized this view was incorrect, practice continued to misalign with research. Today’s practitioners are finally beginning to change this disconnect – over 20 years later – as will be highlighted in sections of this review addressing more recent AOD strategies.

Lipnickey (1986) conducted an evaluation of an information-based college student health course and found that it had no effect on the use of various health behaviors. The author underscored the fact that the concept of providing information within college health education programs would not disappear. “However, this emphasis must occur within the realization that knowledge may be a necessary, but not sufficient, impactor” (p. 491). Moskowitz (1989) confirmed this stance by stating that educational approaches were empirically weak; that prevention cannot be achieved by education alone, and that though education does enhance knowledge, it cannot yield changed attitudes or usage behaviors.

DeJong and Langford (2002) suggested the use of the environmental management approach as an alternative to an education-only approach on college campuses. They believed that on college campuses efforts toward prevention have remained on the individual level with some evidence of expansion to the institutional level. These efforts have focused on change in knowledge, attitude, and behavioral intentions; correction of short-term student infractions; and the identification and treatment of those students abusing AOD. This common approach, however, only addresses the first of three spheres that DeJong and Langford believed to be required for environmental change: the institution, surrounding community, and laws and regulations.

Although colleges have paid little attention to surrounding community factors or state and federal policy issues that affect student alcohol use, colleges and universities can improve some prevention efforts within their own campuses. These college-based approaches include strengthening and better enforcement of AOD policies; clarifying the environment for student AOD expectations and social norms; improving the emphasis on the intellectual life so that social life is slightly de-emphasized; improvement of identification of students struggling with AOD so that they can receive assistance; and restricted marketing and availability of alcohol both on and off campus (DeJong et al., 2007; DeJong & Langford, 2002). It is of interest to note that this whole community-based approach to prevention has also found support in general, non-college

communities in improving disciplinary, AOD, and family-related issues (Crowley, Yu, & Kaftarian, 2000; Hawkins, Catalano, & Arthur, 2002).

A critical programming aspect that can be easily overlooked when planning a prevention program is the concept of cultural relevance (Coie et al., 1993). In outlining the principles of effective general health-related prevention programs, Nation et al. (2003) found that the most successful prevention programs were socioculturally relevant, as they were matched to their target populations. DeJong et al. (2007) extended this concept specifically to AOD in college settings. What works on one campus does not necessarily work as effectively on another.

Prevention efforts also face challenges by individuals or groups who are simply not prepared for change. Researchers have found that AOD prevention efforts often reach early adolescents who can develop abuse or dependence issues in later years (Hawkins et al., 2002). As Braverman and Campbell (1989) noted, a variety of factors contribute to youth alcohol abuse – values formation, self-definition, autonomy, and social modeling, among others. These issues can become more difficult to overcome as students approach their college years; effective prevention programs need to be initiated early enough in the process to make a difference (Nation et al., 2003). Stokols (1996) stated that behavioral change interventions are difficult to achieve when people are simply not ready to change. Moskowitz (1989) concurred. He noted that in an evaluation of college

AOD prevention models, programs that combined knowledge and attitude-based education with values and decision-making skills showed evidence of effectiveness. Moreover, all of the evaluations compared the effectiveness of the programs within a volunteer population to that of a control population. The fact that these students volunteered for the programs indicated that they were more likely to be motivated to change their behavior. This relationship cast some doubt on the notion of effectiveness.

The concept of measuring effectiveness is one of the biggest issues facing the evaluation of prevention education. Nation et al. (2003) listed an outcomes evaluation with clear goals and objectives as one of the principles of an effective prevention program. Moskowitz (1989) listed methodologically weak studies – improper control groups or sample sizes and a lack of clear goals or objectives – as an issue in the late 1980s, yet this problem still existed at the time of the present study. Among grade school-level programs, a recent analysis of programs uncovered that programs listed and marketed as “proven” only required one or two evaluations, many of which were not conducted by an independent evaluator and not longitudinal in design (Gandhi, Murphy-Graham, Petrosino, Crismer, & Weiss, 2007). The longitudinal aspect of an evaluation is critical to prevention science (Coie et al., 1993). These evaluation-related issues have extended to college-specific models for AOD prevention. While it is important to choose programs based on evidence of effectiveness,

companies that market such programs have often used terms similar to “evidence-based effectiveness” without meeting any standard of quality (DeJong et al., 2007). Sometimes, even minimal scientific standards have not been met by some of these programs (DeJong & Langford, 2002).

Harm Reduction Approach

A concept that follows in line with prevention is harm reduction. Unlike the abstinence approach, which urges complete non-consumption of alcoholic beverages, the harm reduction approach allows individuals to still consume alcohol but reduce the frequency of negative consequences that often come with drinking. Beck (1998) provided a historical overview of alcohol education; while the review focused on tactics used among primary and secondary school students, it is of interest to understand the background knowledge of alcohol that future college students received at lower grades. Since the late 19th century, the abstinence approach was used at the grade school level. Schools slowly started to abandon this approach after the end of the Prohibition era in the United States; however, these messages had to come with urgings for students to wait until they were of legal age. These two stances, abstinence and harm reduction, as well as a periodic message of not recommending any approach at all, were all in conflict with one another through the remainder of the 20th century (Beck).

Often ignored when considering the harm reduction approach has been its ability to co-exist with a recommendation of abstinence. “It is important to be clear that the message of harm reduction is not anti-abstinence. In many cases, abstinence may represent the ideal condition with respect to reducing alcohol-related harms” (Neighbors, Larimer, Lostutter, & Woods, 2006, p. 308). Common reactions, however, still keep both approaches mutually exclusive. For instance, Sobell and Sobell (1976) conducted an experiment among male alcoholics to see if a non-abstinence (harm reduction) approach improved the well-being of these individuals. After two years of follow-up, only the patients who were assigned a controlled goal for drinking had significantly more abstinent days than those who were not assigned this goal but still engaged in infrequent, non-problematic drinking. Despite these kinds of results, the debate between abstinence and harm reduction continued in subsequent years (Marlatt & Witkiewitz, 2002).

A challenge faced by AOD educators when utilizing the harm reduction approach involves the question of how much alcohol is still considered responsible use (Moskowitz, 1989). Individuals who criticize the non-abstinence approach feel that promoting the concept that drinking is acceptable as long as negative consequences are reduced to a reasonable level, particularly among underage individuals, can be problematic since these drinkers may not see the benefit in abstaining at all. The goal of the harm reduction approach, however,

has been to reduce harm and not to encourage continued drinking (Marlatt & Witkiewitz, 2002).

The harm reduction approach to prevention of negative alcohol-related consequences has been particularly promising among college students. As Marlatt and Witkiewitz (2002) noted, harm reduction is ideal for individuals such as college students who are in a stage of disinterest in changing their drinking habits but still experience drinking-related problems. They eschewed the fear that taking this approach instead of the abstinence-only alternative will cause students to drink.

There is an inherent misconception that discussing alcohol, without an emphasis on nondrinking, will cause students to drink more. This is analogous to schools not providing education about earthquake-safety because of a fear that discussing earthquakes will cause them to happen. (p. 872)

Harm reduction and reducing negative consequences were the foci of a lifestyle management class studied by Barnett et al. (2004). Focusing on reduction of harms, negative consequences, and heavy drinking, coupled with the inclusion of peer drinking norms, students who participated in the program significantly decreased their likelihood of driving after drinking. The program was also effective in significantly reducing the occurrences of heavy drinking among males enrolled in the program for a drinking infraction. Students

mandated to participate in the program due to an alcohol-related infraction and those who voluntarily enrolled benefitted in a similar fashion. This was a promising outcome demonstrating that these educational concepts can be accepted by many types of students at different levels of change readiness.

White (2006) conducted a review of personal feedback interventions for college students utilizing a harm reduction approach. She found that these interventions reduce alcohol use and negative consequences for both volunteer and mandated students. Based on these results, White recommended that college administrators provide screening and feedback-type interventions of this nature for all incoming students and that further research be conducted on how Web-based harm reduction-based feedback could benefit different types of college students.

Mun, White, and Morgan (2009) also evaluated the efficacy of harm reduction-based personal feedback interventions for students mandated to participate in an alcohol intervention. The researchers found that, among these mandated students, over half reduced heavy episodic drinking frequency and negative consequences although many of these students were considered low-risk drinkers. These results helped address the concern of White (2006) as to what profile of student would be the most likely to receive the greatest benefit. White concluded that both mandated and voluntary drinkers could benefit from a harm reduction-based personalized intervention. Mun et al. concurred with

White about the power of an intervention for incoming students: “. . . certainly, being a first-year student cannot be subject to change by interventions, early preventative interventions with incoming students might help them reduce problematic behaviors that may lead to serious incidents” (p. 98). By incorporating methods that address them as they relate to their surroundings, students can learn to avert dangerous negative consequences of drinking.

Social-Norms Approach

One of the more recent developments in AOD programming that gained popularity in the 1990s involved the concept of improving the way students compare themselves to their peers with regard to substance use. Researchers have shown that college students are often under the assumption that their peers drink with greater quantity and frequency than they actually do (Larimer et al., 2009; Perkins & Berkowitz, 1986; Schworm, 2008). Considering that the “50 Plus 12” project in the 1970s showed that alcohol use was largely accepted as a part of regular campus life by faculty, staff, and students (Kraft, 1976), it is understandable that students have come to believe that everyone drinks. Although perception of campus norms alone has not been shown to predict alcohol use, the combination of students’ personal attitudes and their perceptions of norms have been shown to have a significant effect on behavior (Perkins & Berkowitz). Therefore, some institutions started to take the approach that if

students were made aware of actual peer drinking habits, students would not feel pressured to drink with the same quantity or frequency, or even feel pressured to drink at all.

Since this topic had been of great interest to numerous researchers in the field, Borsari & Carey (2003) conducted a meta-analysis of studies to determine if, as a whole, the alleged discrepancies in perceived alcohol norms truly existed between students and their peers. Of the 102 studies available for analysis, 93 (91%) reported a positive discrepancy between students and others. This finding meant that students believed peers either consumed more alcohol or held a more tolerant view of alcohol than they did themselves. Discrepancies were greater in regard to the perceived approval of peer alcohol use in general than in regard to specific drinking behaviors. However, the discrepancies were smaller when the named comparison group was closer to the individual (for instance, a best friend instead of other students they may not have known well).

Further research supported the findings of Borsari and Carey (2003). A recent study examined the differences in perceptions of alcohol use when students were asked to compare themselves to normative groups by gender, campus residence type, and ethnicity. The researchers found that though first-year undergraduates did identify different norms among different combinations of normative groups, they misperceived drinking norms regardless of the level of specificity of the reference group. Furthermore, perceived norms for higher

levels of specificity reflected the drinking habits of the individual student (Larimer et al., 2009). This study further emphasized the importance of providing students with more relatable reference groups when addressing social norms education.

Given the existence of these discrepancies, researchers have sought to discover whether a social norms-based approach to combat perceptions of alcohol use and quantity of consumption could have a meaningful effect on students. Wechsler et al. (2003) conducted a national study of social norms marketing campaigns through information collected with the Harvard College Alcohol Study. As of the 2001 CAS survey, about half of the participating schools instituted social norms marketing (SNM) campaigns. Although significantly higher rates of students at SNM-implementing schools (51%) were provided with drinking norms information compared to students at schools without SNM campaigns (17%), no significant decreases in consumption levels occurred at any of the SNM schools. In fact, the rates of students drinking any sort of alcohol in the month and students consuming at least 20 drinks in the month prior to the survey increased. The non-SNM schools did not report any significant changes in behavior. Considering that drinking measures did not significantly differ between the SNM and non-SNM schools at the beginning of the study, the evidence suggested that students may have received the message but were not

given the impetus to act upon it. Personal preferences may still prevail in establishing drinking behaviors (Perkins & Berkowitz, 1986).

In further research, it was indicated that the success of social norms campaigns may be largely dependent upon the fidelity of the implementation. A recent study was conducted to examine the effects of social norms campaigns at 18 institutions in the United States. Some schools in the study had social norms campaigns in place. Others that did not served as a control group. Students at the schools with social norms campaigns were at a significantly lower risk of excessive alcohol consumption compared to students at the control group schools. From the beginning to the end of the school year, students at the treatment schools had between a 1% decrease and an 11% increase in alcohol consumption, while students at the control schools reported an 18% to 25% increase in the same period of time. The campaigns were most effective in changing student perception regarding peer consumption of number of drinks per week and alcohol consumption at parties. That schools with more intense social norms campaigns had the greatest differences in alcohol consumption compared to the control group schools suggested the importance of a strong level of implementation (DeJong et al., 2006).

The presence of social norms campaigns has made a difference at institutions with established reputations for drinking and partying. Schworm (2008) reported on the social norms campaign launched at the University of

Massachusetts Amherst to target the pervasive belief that alcohol was a major part of campus culture. Between 2003 and 2008, binge drinking decreased 26% and frequent heavy drinking decreased 38%. However, the institution also enacted more stringent alcohol policies and penalties and increased the accessibility of alcohol education through an online course. Therefore, while the social-norms campaign may certainly have been a positive influence, the major changes in student behavior may have been attributable to the combination of approaches taken.

The discrepancy in the research suggests that the social norms approach may hold promise, but social norms campaigns alone may not be the cure for campus drinking problems. The research initiatives have been lacking in demonstrating how this approach can or cannot de-emphasize the place of drinking in the overall campus culture or decrease the positive expectations students have regarding alcohol (NIAAA, 2007). Students may receive the message that perhaps their fellow classmates do not drink as much as they thought prior to being exposed to a social norms campaign, but the approach may not send messages alerting students to the related negative consequences of abusing alcohol or that drinking excessively is not a requirement.

Brief Motivational Interventions and Feedback

Another popular approach, particularly among students who are already abusing alcohol, has involved the use of brief motivational interventions. This approach to alcohol education recognizes that students who may be at risk or already have drinking issues are often ambivalent toward their stance regarding alcohol. They may require assistance in coming to a realization of the need to change, but on their own terms (Marlatt et al., 1998). These interventions, which can range in scope from one session in an afternoon to multiple short sessions over several weeks, can be performed individually or in a group; in person or online.

In a review of individual-based alcohol treatment methods (Larimer & Cronce, 2002), it was found that nearly all of the most effective methods in reducing drinking among college students utilized feedback tailored specifically to the individual student. Feedback has been a common component of the brief motivational intervention, generally referring to the information provided to students regarding their own drinking, including risk, comparative norms, or consumption rates and frequency. Though feedback has been shown to yield the largest effect among heavy drinkers, abstainers and light drinkers have not been harmed by receiving this type of information (Walters & Neighbors, 2005).

Identifying the drinking habits of all incoming freshmen, a typically high-risk population, through a population-level screening has been an established procedure for targeting students who may need further alcohol intervention (Marlatt et al., 1998). Some questions have been raised as to whether colleges can adequately reach those in need of help and be effective in doing so. Larimer, Cronce, Lee, and Kilmer (2004) highlighted the popularity of campus-wide screenings and assessments of all freshmen students and noted a disadvantage in that the approach “may create distrust in students regarding the intent or purpose of the screening. . . students may be suspicious of an assessment or screening if they fear it signals a ‘crackdown’ or is intended to identify the ‘troublemakers’” (p. 100). Even if students answer the screening accurately and are appropriately identified as high-risk, school officials still face a troubling fact in treating these students: those at highest risk have already reported exposure to a very large amount of alcohol programming (Weitzman et al., 2003). Therefore, it is extremely important for these seemingly resistant students to receive further intervention that takes a different approach other than general facts and information provided to everyone.

The evidence of effectiveness of the brief motivational intervention among high-risk college students has been promising. High-risk college students participating in a freshman year brief intervention significantly reduced drinking rates and negative consequences compared to similar students who were

untreated. These rates also declined more quickly for the intervention students than for the control group students (Marlatt et al., 1998). Hingson et al. (2005) added that brief motivational interventions have “demonstrated effectiveness in a variety of contexts including high-risk freshmen, high school classrooms, fraternity organizations, outpatient counseling centers, and emergency rooms” (pp. 269-270). The feedback component of brief motivational interventions was shown to work for students independent of gender, family history of alcoholism, level of risk aversion, and motivation to change (Walters & Neighbors, 2005). Brief motivational interventions incorporated into programs featuring other strategies such as norms and expectancies education and harm reduction strategies; the combined method yielded significantly greater reductions in alcohol issues among students receiving alcohol-related disciplinary referrals than in traditional education program (Barnett et al., 2004).

With all of the positive results among high-risk students stemming from the use of feedback-based brief motivational interventions, there is still room for valuable research in this area. Walters and Neighbors (2005) noted that there is some degree of uncertainty as to whether feedback affects any specific area of drinking, such as negative consequences, quantity or frequency consumed, or episodes of binge drinking. These results suggest that in determining who may benefit the most from feedback-based intervention in more specific ways,

colleges and universities can better align these programs to the right subgroup of students.

Student Type-Specific Interventions

Professionals responsible for administering AOD education to college students have realized that one, singular, non-customized approach does not necessarily work for all students. With respect to alcohol, women face different social pressures than men; freshmen are in a different stage in their development than seniors. The NIAAA (2007) recently challenged researchers to conduct more studies evaluating the effectiveness of interventions designed for specific demographic sub-groups of the college population such as women, freshmen, or athletes. Research conducted thus far on these kinds of interventions has led to mixed results.

Freshmen have been a particularly volatile group regarding dangerous alcohol use. “It is essential to educate students before they develop problematic drinking habits—specifically, either before or during the first few weeks of freshman year” (Busteed, 2008, p. A34). Using a single-campus design, a study was conducted to evaluate a freshman-specific intervention that directly targeted parents rather than the students. Traditional freshmen have tended to be in their late teenage years rather than their early 20s and have not, therefore, been as distantly removed from a parentally supervised environment as older peers. In

this parent-based intervention (PBI), parents of freshmen received handbooks instructing them how to talk to their child about alcohol. At an 8-month follow-up, students in the PBI program showed a decreased likelihood of transitioning from abstainer to drinker status compared to those not in the program.

Additionally, women in the PBI program demonstrated a slower growth in number of drinks consumed per week compared to female peers in the control group. Nevertheless, the program did not make a difference in students' choices to begin or increase heavy episodic drinking. This result suggests that the program may have been more suited for students who came to college as abstainers (Ichiyama et al., 2009).

Policy-Related Approaches

Dowdall (2009) stated the importance of using a variety of approaches in conjunction with one another to achieve the desired level of effectiveness in reducing alcohol use and abuse among students. Due to the Department of Education Drug and Alcohol Abuse Prevention Rule (1990) and its consequences for not having explicit policies regarding illegal AOD use, practically every institution has some set of policies in place with respect to this topic. Utilization of policy in AOD education is a broad-reaching field, ranging from campus-wide alcohol banning to parental notification to mandatory treatment for violators. In

addition, other state and national-level policies have emerged in various efforts to protect students from alcohol-related harms.

Some institutions have addressed the issue by placing a campus-wide ban on alcohol or limiting alcohol use to certain areas and activities. In a 1999 survey of administrators at four-year institutions nationwide, respondents addressed questions related to programs and policies designed to reduce heavy drinking among students. Approximately 34% of the schools banned alcohol on campus altogether, and 9% banned alcohol use in all residence halls. An additional 38% of schools offered some alcohol-free residence halls or floors (Wechsler et al., 2004).

Banning alcohol outright, however, has not necessarily proven to be effective. In a review of trends in alcohol use from the Harvard College Alcohol Study (CAS), the percentages of students noting that they received alcohol from a friend or relative increased from 17% in 1993 to 23% in 2001. This trend indicates the ease of circumventing policies (Wechsler, Lee, Nelson, & Kuo, 2002). In another CAS study, a combination of banning alcohol on campus and having few off-campus alternatives was shown to reduce the odds of having a student become a heavy drinker; however, the transition that some students made from abstainer to drinker was not impacted. When off-campus alternatives have been increased, effectiveness in decreasing consumption has decreased (Williams, Chaloupka, & Wechsler, 2005).

Another policy-based strategy that has been used by institutions has been parental notification. The 1998 reauthorization of the Higher Education Act provided institutions with the option to notify parents if their underage student (21 years or younger) violated campus rules by illegally using or possessing alcohol (Higher Education Amendments of 1998, §952). Palmer, Lohman, Gehring, Carlson, and Garrett (2001) surveyed 189 colleges and universities regarding the use of parental notification policies. At the time of the survey, 44% of the institutions had official policies in place, 15% had an informal practice of notification, and 25% indicated they had considered policies. The remaining 16% that had no such policy or practice were typically schools with large populations of older students or felt that the practice would make them incorporate an undesirable degree of *in loco parentis*. Considering that all schools that had a policy in effect for at least a semester, alcohol violations were found to have been reduced to some extent, ranging from slightly to greatly, mostly among students with repeated offenses.

Lowery, Palmer, and Gehring (2005) concurred that the parental notification process could be effective; nonetheless, students have not necessarily been pleased with the process. For example, the University of Kansas implemented a parental notification policy utilized when students under 21 years of age endangered their own or someone else's life due to alcohol or drug use. Students interviewed for a news story expressed overall disapproval; one

student conjectured that most students arrived at the institution knowing they had enrolled in a party school (Williams & Bauer, 2009). As described earlier in the literature review, institutional culture can be a powerful influence on decisions to accept or reject a policy.

For campuses that allow legal drinking in some or all locations, recommendations have been made to more stringently enforce the minimum legal drinking age. More specifically, campuses should determine the most popular locations for underage drinking and impose disciplinary sanctions upon those providing these students with alcohol. Also suggested were firmer punishments for students who break laws while intoxicated, ranging from probation to community service to expulsion (Wechsler, Moeykens, & DeJong, 1995). DeJong et al. (2007) concurred with the approach of limiting on and off campus alcohol availability as well as stronger enforcement of alcohol policies both on campus and in the greater community.

The scope of some policy recommendations has extended far beyond the range of a single campus. Powell et al. (2004) found that state-imposed alcohol taxes and dram shop laws (rules punishing those who furnish alcohol to minors) as well as local ordinances against flat-rate alcohol sales helped to reduce alcohol consumption at colleges and universities. In another study, it was suggested that states with more comprehensive alcohol control policies had a decreased likelihood of binge drinking issues among their college students (Nelson, Naimi,

Brewer, & Wechsler, 2005). Though community and state policies alone may not prevent college alcohol use issues, they can move trends in a more positive direction.

The Amethyst Initiative

A major development, initiated in July 2008, involved the Amethyst Initiative. This consortium of college and university chancellors and presidents represented a collective of postsecondary leaders who confirmed that binge and other irresponsible drinking was continuing on campuses despite the presence of copious alcohol education. As the organization stated,

the Amethyst Initiative supports informed and unimpeded debate on the 21 year-old drinking age. Amethyst Initiative presidents and chancellors call upon elected officials to weigh all the consequences of current alcohol policies and to invite new ideas on how best to prepare young adults to make responsible decisions about alcohol use. (Amethyst Initiative, n.d.-a,

¶ 2)

At its core, the initiative questions why students who are old enough to have earned other “adult” rights, such as military service, voting, and jury duty, are not considered old enough to legally drink. The organization’s statement posits that secretive binge drinking and the use of fake identification to procure alcoholic beverages occurs because of the weakness of abstinence-only alcohol

education and advocates for finding alternatives to help young adults think about alcohol in a responsible manner. As of November 2009, 135 campus presidents and chancellors had signed the initiative (Amethyst Initiative, n.d.-b).

Not all individuals are supportive of this policy approach, however. Students have underscored that the drinking age law is moot because of the influx of harm reduction alcohol education. According to Fisher (2008), students have interpreted harm reduction as acknowledgment by colleges that underage students will drink and will circumvent laws to do so. Some administrators, such as the president of Wabash College in Indiana, have chosen to not sign the initiative due to the continuing deaths of fraternity pledges whose unfortunate circumstances demonstrate that many young adults, particularly 18-year-old freshmen, cannot handle alcohol (Johnson, 2008).

NIAAA Four-Tiered Approach

With so many approaches to AOD education in existence, the task of selecting the right mix of programming to make a difference in the health and overall well-being of students can become difficult for college and university leaders. Quick fixes can present themselves as the best answers, even if they are ineffective. Recognizing this unfortunate reality, the NIAAA categorized different types of approaches into tiers ranging from highly effective to ineffective (NIAAA, 2002).

The highest recommended level of approaches, Tier One, included those programs that have been proven to work effectively with individual college students who were either problem, at-risk, or dependent drinkers. When this approach was suggested by the NIAAA, little research had previously been performed regarding the efficacy of these interventions for an entire campus of students. Therefore, this category of interventions has yet to be proven for effectiveness for population use. One strategy involves a combination of cognitive-behavioral skills, norms clarifications, and motivational enhancement interventions. Other strategies in this tier involve student health center-based brief motivational interventions as well as programs that challenge student expectancies of alcohol (NIAAA, 2002).

The next tier of interventions, Tier Two, was comprised of strategies that have been shown to be effective with general populations but not necessarily with individual college students. Some strategies operate to assist the student population as a whole as well as the larger community, i.e., increased enforcement of drinking age laws, better implementation and advertisement of drunk-driving laws, responsible beverage service laws, and coalitions between campuses and communities. Other strategies in this tier, though affecting students, have targeted entire communities including limits placed on density of alcohol retail outlets and increases in price and taxes for alcoholic beverages. (NIAAA, 2002).

Tier Three interventions have been considered promising in nature. These strategies make sense logically and theoretically but need greater evaluation to determine if they can be truly effective in curtailing student drinking. Many of these strategies involve shrewd rule creation and enforcement on campuses regarding alcohol. These approaches include identification of campus-based events that often yield excessive drinking, establishing alcohol-free activities and residence halls, and enhancing enforcement of disciplinary sanctions when students violate alcohol policies. Other strategies in this tier include social marketing campaigns and “safe ride” programs (NIAAA, 2002).

The final tier, Tier Four, includes strategies that are not necessarily ineffective in all cases, but have limited likelihood of effectiveness. These interventions consist of informational, knowledge-based, and values-clarification programs about alcohol. They may be effective in conjunction with other methods, but research cannot explain whether the contribution of these programs alone make a difference with student behavior (NIAAA, 2002). The recommendation is based upon the findings of Larimer and Cronce (2002), who found that the assumption that students abuse alcohol due to lack of awareness or knowledge of the risks is incorrect.

Protective Behavioral Strategies: Reducing Drinker Risk

In the area of content, alcohol education has shifted away from programs based purely on legal and medical information. Interventions have increasingly focused on protective behavioral strategies (PBS) defined as “behaviors that individuals can engage in while drinking alcohol in order to limit negative alcohol-related consequences” (Martens et al., 2004, p. 390). The promise of teaching students about PBS is that if students have otherwise received continuous education and health-based messages about the dangers of alcohol use, or have been urged to completely abstain from alcohol and choose to partake anyway, students have tangible strategies that they can use while drinking to reduce the likelihood of dangerous consequences. Some of these strategies include setting a limit ahead of time on number of drinks consumed, not participating in drinking games, pacing drinks, and utilizing a predetermined designated driver. “Given the continuing enormity of the problem, it is unlikely that students are going to stop drinking altogether at colleges and universities. . . perhaps responsible drinking, rather than abstinence, needs to be the goal of college interventions” (Martens et al., 2005, p. 704).

The presence of negative consequences is a very real risk among college student drinkers. Usdan et al. (2008) conducted a focus group study with students at public and private universities to better understand the contexts of

alcohol use. They found that over half of the alcohol incidents reported by students resulted in multiple negative consequences. Drinking games, holidays, and “pre-gaming,” along with the consumption of shots of hard liquor, were mentioned frequently in conjunction with negative consequences. The researchers emphasized that every single positive consequence mentioned by the students, such as enjoying oneself, was accompanied by at least one negative consequence such as vomiting the entire following day. This information can be extremely valuable to AOD professionals on college campuses, as better understanding of the particular situations in which incidents of intoxication occur can lead to better designed and targeted interventions for students.

Various researchers (Araas & Adams, 2008; Martens et al., 2004, 2005, 2007) have shown that use of PBS correlates significantly with decreased number of adverse alcohol-related consequences. Compared to students who always used PBS, students who never used these strategies were over four times as likely to be involved in a fight; over five times as likely to take an action they would later regret; over six times as likely to injure someone else; and nearly eight times as likely to injure themselves or forget where they were. In general, students who rarely used PBS were between three and five times more likely than students who always utilized PBS to experience negative consequences from the use of alcohol (Araas & Adams). Martens et al. (2005) identified specific PBS factors strongly correlated with negative consequences. These factors

included limiting and stopping drinking; manner of drinking; and serious harm reduction. The findings suggest that although these factors may seem intuitive, it is essential to discover whether these intuitive relationships can yield legitimate ways to combat destructive behavior among students.

In terms of specific protective behavioral strategies, students have been found to use some more than others. The American College Health Association (2009) conducted a nationwide survey across 106 institutions to determine, in part, the behaviors which students always or usually practiced. The majority of students noted that they ate before or during drinking (82%), used a designated driver (80%), and kept track of their drinks (67%). A minority of students decided on a set number of drinks in advance (39%), avoided drinking games (38%), alternated non-alcoholic and alcoholic beverages (32%), or kept drinks to one or fewer an hour (30%). Walters et al. (2007) studied PBS usage among heavy-drinking students and concurred in some respects. They found that the heaviest drinking students used the fewest protective behaviors but suggested that some of the lesser-used strategies need to be re-marketed so that students might see them as more viable alternatives to their current behavior.

Benton, Downey, Glider, & Benton (2008) added the element of normative perception in their examination of PBS. They found that the more students perceived other students to use protective behavioral strategies, the more they used the strategies themselves. However, students underestimated overall peer

use of PBS. Despite these findings, the strongest correlates with negative alcohol-related consequences were with students' actual use of PBS and their usual number of drinks rather than their perceptions of other students' use of PBS.

When students are well-versed in PBS, they are fully equipped to help not only themselves, but others. In one study, students were asked to reflect on their history of actions in helping other students who were suspected of having alcohol poisoning. Of students who faced this situation with another student, the majority (58%) assisted the ill student themselves. The next individuals contacted included other students (39%) and parents (12%). This behavior suggests a need to include friends and parents in interventional strategies. The researchers recommended that PBS be heavily marketed toward heavier-drinking students who may be more likely to be in a situation where their assistance is needed by another student. They, however, may not be equipped with the appropriate reactions if they have been desensitized to the dangers of alcohol poisoning (Oster-Aaland, Lewis, Neighbors, Vangness, & Larimer, 2009).

Online Alcohol Education Delivery

The literature reviewed thus far regarding approaches to alcohol education has primarily addressed issues of content, while tangentially addressing the method by which alcohol education content is delivered. These methods have evolved beyond face-to-face meetings to include online alcohol

education. This section of the review will address online alcohol education, one of the more recent developments in AOD prevention.

In the increasingly online society of the 21st century, it seems only natural to use this tool to more effectively distribute alcohol education programs to a wider audience of college students. In an evaluation of two web-based mandated alcohol intervention programs for college students, Doumas, McKinley, and Book (2009) determined that “because of the low cost, ease of dissemination, and efficacy associated with Web-based personalized feedback, this type of programming is ideal for both large colleges and universities and campuses that do not have many resources for intervention programming” (pp. 72-73). In addition, online methods have been shown to be effective in delivering brief motivational interventions or skill-based programs to students who have been mandated to complete an alcohol education program (NIAAA, 2007). In terms of feedback, web-based methods were shown to be superior to other methods due to the benefits of environmental control, access from anywhere, availability for individualized feedback, ability to keep norms continuously updated, immediate availability, security, increased student comfort for answering honestly, and cost-effectiveness (Walters, Hester, Chiauzzi, & Miller, 2005).

One of the key qualities to making an online alcohol intervention successful is the ease of adaptation and personalization for the student. At any institution, for example, some students arrive as non-drinkers; others are casual,

occasional drinkers; and an additional group will consist of frequent binge drinkers. No static population-level intervention will simultaneously educate the non-drinkers on the dangers they may face and the frequent binge drinkers on the importance of reducing their drinking (Weitzman & Nelson, 2004). For this reason alone, online prevention efforts have been viewed as having vast potential.

It is important to differentiate between a computer-based intervention and an online intervention. In the popular area of brief motivational interventions, Barnett, Murphy, Colby, and Monti (2007) evaluated whether Alcohol 101, a CD-ROM-based intervention, was more efficacious than a counselor-based intervention among students disciplined for an alcohol-related incident. Both interventions showed a significantly greater level of motivation in participants between the intervention delivery and a one-year follow-up. Students in the counselor-based program, however, significantly increased their use of protective behavioral strategies and were more motivated to seek additional counseling. These results should not necessarily be compared to those of online interventions, as the degree of adaptability in the program is not as great in a static, CD-ROM based program. This study corroborates the results of Sharmer (2001), who found that students who completed the Alcohol 101 program indicated similar mean behavior and attitude scores as did students in a control group.

Online interventions, when designed correctly, have begun to yield promising results. Chiauzzi, Green, Lord, Thum, and Goldstein (2005) conducted an evaluation of MyStudentBody.com: Alcohol, an intervention designed to provide customized feedback to motivate students to change high-risk drinking behavior. Persistent heavy drinkers who participated in the program showed significantly more rapid decreases in average and peak consumption compared to those who took a non-customized, traditional alcohol education program also delivered online. Likewise, among drinkers who had a low motivation to change their habits, there was a significant reduction in the number of drinks consumed per day compared to similar control group students. Once again, customization and adaptability of an intervention was determined to be critical.

Walters et al. (2005) conducted an assessment of several computerized interventions, including Drinker's Check-up, e-CHUG, and MyStudentBody.com: Alcohol. All interventions showed positive results in follow-up assessments. Drinker's Check-up, which focused upon personalized feedback and motivation to change, yielded a 50% reduction in quantity and frequency of alcohol consumption among a group of problem drinkers after one year. The e-CHUG program provided quantity and frequency feedback and norms comparisons; the freshmen who completed this program instead of an established, more static educational measure reported a greater reduction in quantity of drinks consumed. The MyStudentBody.com program was tested

among a group of binge drinkers who showed a significantly greater reduction in peak alcohol consumption from baseline to a follow-up time compared to students who completed a text-only online intervention. A composite drinking score (average consumption, binge frequency, and peak consumption) worsened for both groups by this follow-up period. Results of this study indicated that it may be more effective for females, as they reduced total and peak consumption as well as negative consequences. The positive effect on peak consumption aligns with the findings of Chiauzzi et al. (2005).

Walters et al. (2005) focused on the concept of what constitutes effective and ineffective feedback in the realm of online education. The authors differentiated online education from online assessment. Online education involves a limited number of questions with pre-programmed responses and an equally limited number of branching patterns. Online assessment has a greater number of questions, intricate branching patterns, and individualized information. It is critical for an online alcohol intervention to take the assessment approach; otherwise, it will be little more than a traditional education intervention.

Overall, there has been a call for more research regarding the efficacy of the online alcohol intervention. A variety of products have been sold on the market. Though various conclusions have been reached, findings need to be replicated in order to reach any solid conclusions. Elliott, Carey, and Bolles

(2008) conducted a review of 17 computerized interventions for college drinking and noted that the results were mixed when compared to purely educational interventions. However, they saw the promise in the online intervention's potential to raise a student's motivation to change drinking behavior. Furthermore, the authors recommended that since it appears as if the interventions are most effective among risky drinkers, new interventions in development should target that particular group of students. "Providing e-interventions to college-aged abstainers may provide protection against initiation or increased drinking, but this goal requires content tailored for this target group" (p. 1003). In other words, in order to be truly effective, online interventions designed to target an entire population of college students must be customized to the extent that every type of student receives a unique experience that is targeted to his or her specific needs.

AlcoholEdu: Population-Based Alcohol Education

To this point, the literature reviewed has explored the risk factors associated with college student drinking, both overall and for specific subgroups. Additionally, the review has provided a broad picture of the various approaches colleges have taken to help students reduce their levels of drinking and prevent dangerous negative alcohol-related consequences from occurring. Researchers have indicated that though one approach cannot cater to the culture of every

college or university, education-only, abstinence-based approaches have not shown evidence of effectiveness. Showing greater promise have been methods that incorporate a combination of motivational enhancement, individualized feedback, interactive qualities, properly enforced policies, and take a harm reduction stance. The literature review concludes with a discussion of alcohol-related issues and further description and research regarding the AlcoholEdu program which will be the focus of the program evaluation to be completed in the present research.

About the AlcoholEdu Program

AlcoholEdu for College (AlcoholEdu) is a customized, online alcohol intervention program that has been used by many institutions across the country. As of 2009, approximately 36% of the nation's first-time-in-college (FTIC) students participated in this intervention on over 500 campuses. This program can technically be classified as a form of education-based intervention, as the course is filled with science-based content regarding the mental and physical effects of alcohol. Beyond this superficial description, however, it incorporates some other prevention strategies (Outside the Classroom, 2008).

The program utilizes NIAAA's (2002) Tier One strategy of combining cognitive-behavioral skills, which attempt to "change an individual's dysfunctional beliefs and thinking about the use of alcohol through activities

such as altering expectancies about alcohol's effects, documenting daily alcohol consumption, and learning to manage stress" (p. 16). AlcoholEdu achieves this approach through strategies for reducing alcohol use to a safer level of consumption and through challenging students' positive expectancies of alcohol. Norms clarification regarding student use and media influences, as well as personalized feedback, are also utilized in the program. Other features include educative modules regarding negative consequences, the benefits of abstinence or alcohol reduction, and current alcohol and drunk-driving laws (Lovecchio et al., in press). Students are also asked to set goals and make a personal plan regarding their drinking.

AlcoholEdu features differing pathways of content, based upon gender and drinker status (abstainer or drinker). The program is designed so that a female drinker and a male non-drinker can both benefit from the experience, as it will (a) encourage and support non-drinkers in their efforts not to succumb to the pressure to change, and (b) provide motivation to change for high-risk drinkers. These students in the high-risk category are also provided with a brief motivational intervention. This customization makes the program a suitable candidate for deployment among the target population.

Effectiveness of AlcoholEdu

Considering that AlcoholEdu began in 2000 with a small number of schools (Wall, 2005), the literature regarding the efficacy of this program was not found to be as expansive as the body of work on more established programs. Moreover, researchers have conducted several studies on this program over the past few years. In a post-test-only analysis of nationwide AlcoholEdu results from the 2003-04 academic year, the students who participated in the intervention experienced fewer adverse repercussions, reduced their frequency of heavy drinking, and lessened their likelihood of engaging in intentionally risky behavior in a follow-up compared to students with no program involvement (Wall, 2007).

There has been some evidence that AlcoholEdu shows promise as a program but should continue to be tested for true efficacy. A study conducted at an elite private university in the northeastern United States during the 2006-07 academic year showed that the intervention significantly increased student knowledge about alcohol but did not mitigate risky alcohol behaviors as compared to a control group (Croom et al., 2009). In the following academic year, Lovecchio et al. (in press) also conducted a study at a mid-sized northeastern private university to evaluate the program for effectiveness among incoming freshmen. Compared to the control group, students in the AlcoholEdu program

significantly reduced alcohol use, negative consequences, and positive expectancies of alcohol. These conflicting results are indicative of the need for further study to truly gauge the effectiveness of the program. Dowdall (2009) referred to Wall's 2007 study of the program by noting that while AlcoholEdu shows potential to serve as a valuable component of a college or university's comprehensive AOD plan, more extensive studies are needed to convince experts in the field that the program is effective.

In reviewing conflicting results, it is important to research possible causes for the differences. Since the program's inception, Outside the Classroom has revised the product every year. This action means that while the underlying course theory has remained fairly consistent, revisions may have had some influence regarding the program's effectiveness. Realizing the importance of consistent material for the purpose of longitudinal research, Outside the Classroom has since committed itself to maintaining greater consistency in its AlcoholEdu program from year to year (T. Wyatt, personal communication, June 23, 2009).

Aside from issues of longitudinal inconsistencies in evaluating the program are issues of inconsistent implementation of the program itself. Dowdall (2009) referred directly to the AlcoholEdu program in noting that population-level programs of its kind are beneficial because of their scope and relatively low cost. He noted, however, that programs such as AlcoholEdu by

themselves only make a minor impact on students. AlcoholEdu has the promise to encourage a large group of students to improve their alcohol-related behavior but should not be expected to work directly out of the package without other “ingredients” such as appropriate campus AOD policies and other health support services.

A point of interest comes from NIAAA’s (2007) update to their 2002 recommendations, in which effectiveness tiers were considered. Although AlcoholEdu utilizes a Tier One strategy, the recommendations at the time were unproven for entire college population-level interventions. In the update, the NIAAA regarded findings that web-based interventions may be effective in reducing risky drinking behavior on a population level. “Given these findings, it appears that increased alcohol screening and brief interventions are feasible and appropriate for identifying and addressing harmful drinking among college students” (NIAAA, 2007, p. 4). These recent findings provide a stronger reason for continuing to test the effectiveness of programs such as AlcoholEdu at the population level.

Program Evaluation

Although social cognitive theory will be utilized as a theoretical framework for the proposed study, the research that will be conducted will also serve as a program evaluation for the AlcoholEdu implementation at the

University of Central Florida. Therefore, it is important to provide a description of the evaluation concept.

Evaluation has a variety of definitions. Fitzpatrick, Sanders, and Worthen (2004) defined it as “the identification, clarification, and application of defensible criteria to determine an evaluation object’s value (worth or merit) in relation to those criteria” (p. 5). Specifically, program evaluation was defined by Rossi, Lipsey, and Freeman (2004) as “the use of social research methods to systematically investigate the effectiveness of social intervention programs in ways that are adapted to their political and organizational environments and are designed to inform social action to improve social conditions” (p. 16).

Since social intervention programs exist to improve social conditions, it is necessary to evaluate any or all of the following areas to determine if the program is truly effective: need, design, implementation, outcomes, or efficiency. Typically, a plan for evaluation is created by a sponsor or stakeholder with a vested interest in the program. Due to this need for balance between sound research methods and meeting the needs of the stakeholders, evaluators typically have to strike a balance between highly scientific social research and serving the agenda of program heads. Both views can indeed exist; however, an evaluator must be fully attuned to resource constraints (Rossi et al., 2004).

Evaluation is a term that is often used in situations where it is not truly fitting. Posavac and Carey (2007) defined activities that are often mistaken for

program evaluation. These activities include basic research, individual assessment, and program audits. While basic research asks questions with theoretical backing, it does not attend to organizational needs for information. Although program evaluation can consider theory, program effectiveness and improvement is a central goal. Program evaluation may also gather information about the health status of individuals; however, its main purpose is to determine the ability of a program to help a group of people improve on a particular set of metrics. Additionally, unlike a program audit, which concerns adequate documentation of a program reaching an intended audience, program evaluations involve uncovering the ways in which the program has affected its recipients.

Fitzpatrick et al. (2004) further described the difference between evaluation and research. In terms of purpose, research is focused upon conclusions, while evaluation seeks judgments. Methodologies are designed differently in the two activities; research is focused on generalization of results, while evaluation must attend to a specific context. Unlike research, which is judged upon criteria of causality and generalization, evaluations tend to be judged upon accuracy, utility, feasibility, and propriety. Clearly, evaluation is more specifically purposed than basic research.

When conducting a program evaluation, it is also important to distinguish between formative and summative evaluations. Formative evaluations primarily

provide information in order to improve a program. They are typically of the most interest to those delivering the program, conducted with a small sample size, and answer questions as to what works and what needs to be improved. On the other hand, summative evaluations provide information to make decisions or help make judgments about a continuation, adoption, or expansion of a program. Their audience typically consists of administrators and other policy-makers. Summative evaluations are conducted with a large sample size and answer questions as to what are the results and with which group of individuals (Fitzpatrick et al., 2004). Once again, it is entirely possible for an evaluation to embody both formative and summative qualities, but they are typically largely characterized as one type or the other.

Aside from the determination of formative or summative evaluation type, it is also necessary to decide upon an evaluation model. Examples of models include the objectives-based evaluation, a popular model type that focuses upon clear program goals and objectives; the qualitative model, in which the evaluator becomes the actual instrument for gathering data through conversations; the black box evaluation, where outputs are examined without regard for the internal workings of the program; and the improvement-focused approach, where discrepancies between planned and observed qualities are made with the focus of improvement (Posavac & Carey, 2007). Fitzpatrick et al. (2004) chose to classify evaluation approaches on a continuum from utilitarian to pluralist:

objectives-oriented, management-oriented, consumer-oriented, expertise-oriented, and participant-oriented. Each approach is appropriate for a different situation based upon the questions asked and the involvement of stakeholders.

CIPP Evaluation Method

Stufflebeam's CIPP evaluation model is a management-oriented evaluation approach intended to best serve policy makers, administrators, and managers sort outcomes data in a logical fashion (Fitzpatrick et al., 2004). The CIPP model is best described as an evaluation framework that acts as a four-in-one decisional model. Stufflebeam (1985) created the acronym CIPP from the four types of evaluations covered by the model: context, input, process, and product. The summaries of each type follow.

Context evaluations exist to identify populations and opportunities, as well as to diagnose the problems and the ability for proposed objectives to address needs. These evaluations are best served by surveys, hearings, and interviews as a method of data collection. The emphasis within the context evaluation is placed squarely on the concept of planning.

Once contexts are defined, input evaluations can be utilized. This includes an assessment of the capabilities of the infrastructure and address alternatives as well as budgets and schedules. Input evaluations are typically conducted via literature searches, pilot studies, and visits to programs that work. Input

evaluations focus on resources for information, both human and material. Whereas the context evaluation focuses upon judging outcomes, the input evaluation focuses upon judging implementation, as it is necessary to select strategies and designs.

The process evaluation serves the purpose of refinement, as it identifies defects in the implementation of a program's design. Additionally, it judges procedural activities through descriptions of the process and continuous interactions with the activities of staff members running a program. Aside from its role in aiding the refinement process, the data collected from a process evaluation assists in interpreting outcomes later.

The last evaluation type is the product evaluation. This model works with outcomes, in relating outcome descriptions to the context, input, and process information to obtain worthy interpretations. This evaluation functions through collection of outcome judgments from stakeholders where the collected data can be qualitative or quantitative in nature. Product evaluations are largely focused on the decision; in the end, the evaluator is expected to be able to come to a conclusion to continue, end, or change an activity, as well as present an unbiased report regarding the effects of the program.

CHAPTER 3 METHODOLOGY

Design of the Study

The incurrence of negative consequences due to alcohol abuse by college students is an issue of great importance (Wechsler, Lee, Kuo et al., 2002; Wechsler, Moeykens, Davenport et al., 1995). Researchers have indicated that although heavier drinkers endure more frequent injurious repercussions while drinking (Schaus et al., 2009; White & Swartzwelder, 2009), a greater number of total negative consequences are endured by their less heavily-drinking peers (Busteed, 2008; Presley & Pimentel, 2006; Weitzman & Nelson, 2004). At the same time, there is growing evidence that protective behavioral strategy use can mitigate the likelihood of these undesirable effects (Araas & Adams, 2008; Benton et al., 2008; Martens et al., 2004, 2005, 2007; Oster-Aaland et al., 2009).

The proposed research expanded upon the work of Wall (2005, 2007) in analyzing the effectiveness of the AlcoholEdu program to educate whole populations of college students to increase PBS use and subsequently reduce these negative consequences. A quantitative research methodology was utilized in conjunction with a program evaluation in analyzing the efficacy of the AlcoholEdu program at UCF (University of Central Florida). The program was evaluated as it applied to defined drinker subgroups among FTIC students in an effort to improve overall student well-being. This evaluation was summative in

nature, as it provided recommendations on the overall merits of the AlcoholEdu program as they related to UCF's specific goals for implementation of the program (Fitzpatrick et al., 2004).

This summative evaluation utilized the product evaluation portion of the CIPP Evaluation Model, a management-oriented evaluation approach proposed by Stufflebeam and Shinkfield (2007). "Product evaluations identify and assess outcomes. . . to help a staff keep an enterprise focused on achieving important outcomes and ultimately to help the broader group of users gauge the effort's success in meeting targeted needs" (p. 326). When used in the context of summative assessment, a product evaluation compares the outcomes of the program to the targeted needs of the recipients. In this situation, the targeted goals for alcohol education of FTIC students at UCF were provided by the Alcohol and Other Drug Prevention Programming office at UCF (UCF AOD), the campus unit responsible for the university's implementation of AlcoholEdu.

UCF AOD, an office within UCF's Division of Student Development and Enrollment Services, provides "leadership and overall management in developing and implementing the university's alcohol and other drug policies and procedures" (UCF AOD, 2005). As with all units at the university, UCF AOD is required to complete an annual assessment plan in which the department sets outcomes and measures to determine whether the mission and goals are being carried out appropriately. In the context of evaluating the efficacy of the

AlcoholEdu program at UCF within the CIPP framework, direct references to the program within the stated goals in the assessment plan guided the research questions which in turn guided the detailed analysis.

One of the desired outcomes in the 2008-09 AOD departmental assessment plan was for all FTIC students taking the AlcoholEdu program to endorse a variety of protective behavioral strategies through their learning about selected alcohol risk factors. These behaviors included having the knowledge to identify and assist students displaying evidence of an alcohol overdose; intent to alternate alcoholic and non-alcoholic drinks while drinking; and intent to set a personal limit on number of drinks consumed on a given drinking occasion. The measure relating to identification of students who had overdosed on alcohol applied to all participants, while the personal drinking behavior applied only to students who admitted to current alcohol use. While the specific measurable goals in the departmental assessment plan could be addressed by a percentage of survey respondents answering in a certain way, they were important to consider in the development of the program evaluation. These measurable goals provided a strong argument for UCF's specific expectations of the AlcoholEdu program delivered to all FTIC students. This focus served as one of the driving forces for the analytical goals of this study.

While theory and evaluation do not always mix (Fitzpatrick et al., 2004), the combination is by no means prohibited. The research questions and focus for

the study were shaped by the needs of the institution regarding its use of the AlcoholEdu program as a part of its comprehensive AOD plan. This study was, however, conducted within the realm of social cognitive theory (Bandura, 2004). Though Bandura names four major constructs that individuals utilize on their way to health change, many paths exist to explain this change using some or all of the major constructs. The AlcoholEdu program itself addresses the use of all four of these constructs (Wall, 2005), but this study was focused on the evaluation of only three: (a) self-efficacy, (b) outcome expectations, and (c) goals. Since this study incorporated both theory and evaluation, a balance had to be reached. Because the researcher utilized social cognitive theory as a lens for framing the results, distinguishing among the available paths was not a necessary objective.

Population

This retrospective analysis was conducted with a sample of incoming FTIC students at UCF who entered in the summer 2008 or fall 2008 terms and self-identified as 18 years of age or older as of the start of the program. Starting in the 2008-2009 academic year, all FTICs entering in these terms were required to participate in the AlcoholEdu program. Considering UCF's status as a large comprehensive public research institution, this sample of enrolling students represented a diverse range of demographic qualities. No formal sampling

methods were utilized to obtain the final group of students, since the use of AlcoholEdu records from all incoming UCF FTICs ensured sufficiently large subgroup sizes for various subset analyses.

The process implemented to obtain participation rates as close to 100% as possible provided students with a series of reminders. If students did not complete the pre-test by the first day of classes, they received approximately one e-mail message per week from a member of the UCF AOD staff. After one month passed, if students still did not respond to the notifications, holds were placed on their academic records, preventing registration for the following semester's courses among other activities. A staff member contacted these 188 students via telephone to provide them with opportunities to rectify the situation and have the holds removed. Other students who did not complete subsequent portions of the intervention were regularly notified via e-mail.

This sample of incoming UCF FTICs from summer and fall 2009 represented a cross-sectional and temporal sample from a larger population of all FTIC students who enrolled at either UCF or any of its peer institutions in any particular academic year who could have participated in the AlcoholEdu intervention program. It was important to define the sample as belonging to this population in both geographical and time-based membership terms since the inferences that could be drawn from any analysis on the particular UCF sample should be applicable to any demographically similar group of students

participating in this intervention at any point in time. UCF was chosen as the school from which to form the sample due to the researcher's academic connections to the institution and its overall diversity in student body.

Instrumentation

Considering that the purpose of this research was to evaluate the effectiveness of a particular program, it was deemed advisable to utilize the program's built-in, required surveys that were designed to measure the constructs of interest. As a part of the AlcoholEdu program, students were required to complete three comprehensive questionnaires designed to collect data regarding the attitudes and behaviors of the respondents on a variety of alcohol-related constructs. These areas included usage patterns, positive and negative expectancies, use of protective and care-taking behaviors, intended behaviors, and the occurrence of negative consequences. Students were also asked to rate the course itself and provide a variety of demographics, such as gender, ethnicity, campus activity involvement, and family history of alcohol use. The survey items consisted of a mix of free-response, Likert-scaled, and multiple-choice questions. For many of the Likert-scaled questions, one question may have been comprised of multiple items with a common stem; for example, the question asking "When you drink, to what degree do you do the following" was followed by 26 separate behaviors on the first survey (Appendix A).

Participants were required to take the 36-item first questionnaire prior to beginning any of the AlcoholEdu education modules to establish a set of baseline attitudes and collect demographics (Appendix A). Upon completion of the educational content modules, students took a shorter, 18-item second questionnaire, mostly containing questions regarding positive and negative expectancies, intended behaviors, and feelings of preparedness after completing the AlcoholEdu course. After four to six weeks elapsed since the completion of the second questionnaire, students were asked to complete one more 17-item questionnaire containing an almost identical set of items as the first questionnaire (Appendix B). Although this follow-up questionnaire was almost identical to the pre-test questionnaire, the length was much shorter due to the absence of demographic questions. Exceptions included questions regarding the use of certain behaviors directly linked to a student's experience after using the AlcoholEdu program, i.e., the likelihood of reviewing goals and a personal plan students created for themselves, or putting into practice what students learned from AlcoholEdu.

Although students completed pre-test, post-test, and follow-up surveys as part of this program, the research utilized only the results of the pre-test and follow-up surveys. Though the post-test survey was similar in length to the follow-up survey, it did not focus on the three areas of interest that were addressed in the present study: consumption, use of protective behavioral

strategies, and negative consequences. Since the research was focused on specific outcomes, only certain portions of the pre-test and follow-up surveys were utilized. The specific questions, response types, and purposes have been discussed in the sections addressing each applicable research question.

The surveys were analyzed for ease of readability. The pre-test survey (Appendix A) rated at 44.4 on the Flesch Reading Ease test and received a grade of 9.5 on the Flesch-Kincaid Grade Level test. The follow-up survey (Appendix B) rated at 66.2 on the Flesch Reading Ease test and received a grade level of 7.9 on the Flesch-Kincaid Grade Level test. These scores were likely discrepant because of a large number of questions on the pre-test that were absent on the post-test.

Reliability and Validity

Reliability and validity of the survey instrument were considered prior to analysis. Reliability “concerns the extent to which an experiment, test, or any measuring procedure yields the same results on repeated trials” (Carmines & Zeller, 1979, p. 11). Keeping in mind that it is often desirable to measure reliability based upon a single administration of a test, internal consistency estimates exist to measure homogeneity of a group of items measuring the same construct (Henson, 2001). One of the more popular measures of measuring reliability is the alpha coefficient, as developed by Cronbach (1951). This measure of correlation between random samples of items is appropriate for use with both

dichotomously-scored items as well as multiple-choice items, including those utilizing a Likert scale (Henson).

Nunnally (1978) noted that for the purposes of basic research, an alpha coefficient of 0.8 or higher will generally suggest that a construct score can be considered reliable; however, lower scores are acceptable for measures that are in testing or development. For the various constructs germane to the present study, previous analyses involving the AlcoholEdu surveys (Lovecchio et al., in press; Wall, 2005, 2007) yielded factors with coefficient values ranging from $\alpha = 0.61$ to $\alpha = 0.91$; most were above $\alpha = 0.70$. It is important to be mindful that the factors created were not identical across studies. However, with Outside the Classroom making continuous improvements and upgrades to the surveys (for instance, changing the Likert scales from 5-point to 7-point in more recent administrations), these coefficients can be considered reasonably strong and consistent.

Whereas reliability involves the consistency of results, validity addresses “the extent to which any measuring instrument measures what it is intended to measure” (Carmines & Zeller, 1979, p. 17). Validity comes in different forms: evidence based on test content, response processes, internal structure, relations to other variables, and consequences of testing (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999). This survey, which has been developed and

revised by Outside the Classroom since 2000, has been constantly reviewed by experts in the field working with the company to ensure that they appropriately measure the full scope of content (T. Wyatt, personal communication, November 16, 2009). This process of expert review fits into the category of evidence based on test content. Internal structure validity has also been tested in numerous studies (Lovecchio et al., in press; Wall, 2005, 2007) through the use of exploratory factor analysis, which yielded similar types of factors. Outside the Classroom is also currently in the process of conducting item-response theory analysis to add an additional source of internal structure validity (T. Wyatt, personal communication, November 16, 2009). For the current study, exploratory factor analysis was also conducted to provide not only the most accurate grouping of underlying constructs as they apply to the UCF population, but also a general identification of factors for the 2008-09 administration of the survey.

Statistical Procedures

Variables

A number of dependent, independent, and control variables were used to test the research questions of the present study. The following sections will address the sources, formation, and other details of these variables.

Dependent Variables

Three sets of dependent variables, all focusing on desired outcomes after students complete the AlcoholEdu program, were utilized in this study. These variables were in the areas of (a) consumption, (b) protective behavioral strategy use (intended and actual), and (c) negative consequences. The exact number of variables was determined as a part of the analytical process, as exploratory factor analyses took place in order to determine relationships between the independent variables and the apparent sub-constructs within the larger main construct. These variables were largely analyzed within a pre-test, post-test framework to determine change between student attitudes and behaviors with respect to alcohol at the beginning of the student's first semester and after the AlcoholEdu follow-up period passed later in the fall semester.

Consumption levels are a major concern regarding students – particularly among incoming college freshmen, who are largely younger than the legal drinking age. The rate of college students who drink is in the upper 60% range (Johnston et al., 2008); the binge drinking rate is in the lower 40% range (Hingson et al., 2005; Johnston et al., 2008). The fact alone that these individuals of this age group are in college has an effect on consumption – by comparison, only about 30% of similarly-aged young adults who do not attend college binge drink (Johnston et al., 2009) – gives more cause for concern among this population.

These reasons prompted the NIAAA (2002) to name reduction in consumption as one of its major goals for successful alcohol education programs. The measure of consumption addressed involved the average number of drinks consumed per week over the previous two weeks, which was addressed by a student's initial drinker category (moderate, heavy episodic, or problematic) to determine if students within these groups changed these behaviors. Though the student's drinker category also addressed consumption, this categorical variable served as an independent variable and was involved in most of the analyses.

Use of protective behavioral strategies (PBS) was also a major area of interest, both of the UCF AOD office as well as with scholars researching ways to reduce alcohol-related harms among college students. Numerous studies have correlated increased PBS use with decreased negative consequences (Araas & Adams, 2008; Benton et al., 2008; Martens et al., 2004, 2005, 2007; Oster-Aaland et al., 2009). Other scholars have also found that some PBS were used more frequently than others (American College Health Association, 2009; Walters et al., 2007). Factor analysis was employed to create variables representing subscales of PBS use, both intended and actual. Differences in actual use of these identified types of PBS between the pre-test and follow-up were analyzed by drinker group, as well as differences between intended use in the pre-test and actual use in the follow-up period.

Negative outcomes are a major issue among college student drinkers. A quarter of drinkers report negative academic consequences; 20% report negative sexual consequences (Wechsler, Lee, Kuo et al., 2002). Many students report experiencing multiple negative consequences each time they drink (Usdan et al., 2008; Wechsler, Lee, Kuo et al.). Student drinking also causes second-hand negative consequences to other students (Wechsler, Moeykens, Davenport et al., 1995). Since the risk of negative consequences increases with consumption (Weitzman & Nelson, 2004), many intervention programs have been developed with the goal of reducing consumption, which will typically reduce negative outcomes (Barnett et al., 2004; Marlatt et al., 1998; Mun et al., 2009; White, 2006). As with PBS, factor analysis was employed to uncover different types of negative consequences. The factors created were analyzed for change between the pre-test and follow-up periods among students in different drinker groups.

Independent and Control Variables

An array of demographic variables was utilized within this investigation as independent or control variables. Several of these variables, including gender, ethnicity, age of first alcohol consumption, and family history, served as independent variables for one portion of the analysis and control variables for the other portion. Other variables, including AlcoholEdu program completion

status and drinker status, were used in the analysis only as independent variables.

Gender, ethnicity, age of first consumption, and family history are all demographic factors that cannot be changed post-hoc but have been previously shown through extensive literature review to explain different alcohol-related behaviors among students. Males have a higher tendency to drink to intoxication at earlier ages and binge drink (Hingson et al., 2003; Johnston et al., 2009; Wechsler, Dowdall, Davenport, & Castillo, 1995; White & Swartzwelder, 2009). Gender differences also account for the presence of different negative consequences (Barnett et al., 2006; Presley & Pimentel, 2006; White & Swartzwelder, 2009) and differences in use of PBS (Walters et al., 2007; White & Swartzwelder, 2009). Ethnicity has also been shown to make a difference, as being White raises the likelihood of binge drinking (Weitzman et al., 2003; Wechsler, Dowdall, Davenport, & Castillo, 1995) and experiencing negative consequences (Powell et al., 2004). Pre-college drinking also increases the likelihood of college binge drinking (Weitzman et al., 2003; Wechsler, Dowdall, Davenport, & Castillo, 1995) as well as the likelihood to engage in risky behavior (Hingson et al., 2003). A family history of drinking has shown to genetically link college students to increased likelihood of dangerous drinking (Herman et al., 2003), which is an intensified effect when a student enters the college environment (Timberlake et al., 2007). The presence of these variables as either

control or independent variables will be further explained with the respective research questions.

AlcoholEdu completion served as an independent variable for a portion of the analysis. The ability of incoming freshmen students to receive a population-level alcohol screening not only helps to identify students who may need further assistance (Marlatt et al., 1998) but will immediately provide harm reduction techniques for a group of students with a high likelihood of drinking (White & Swartzwelder, 2009) who have been exposed to a very high level of previous alcohol education programming (Weitzman et al., 2003). Many of these students still do not largely see the risk in heavy daily drinking (Johnston et al., 2009). Therefore, an independent variable was created to denote whether a student completed the AlcoholEdu program as mandated by UCF (all parts completed, with the first survey taken prior to the first day of classes for fall entrants). This variable was compared to other demographics as will be described within the details of Research Question 1.

Drinker group was reflected within two different independent variables. Students with alcohol problems and higher consumption levels have been shown to be less willing to change their consumption habits (Barnett et al., 2006). Additionally, as students increase levels of alcohol consumption, they increase the likelihood of injurious negative consequences (Wechsler, Lee, Kuo et al., 2002; Weitzman & Nelson, 2004; Schaus et al., 2009; White & Swartzwelder,

2009). At the same time, the majority of all negative consequences due to drinking are still incurred by light to moderate drinkers (Busteed, 2008; Presley & Pimentel, 2006). Therefore, this factor is a major variable of interest in determining whether a widely delivered program such as AlcoholEdu can show a decrease in these harmful consequences with a wide array of drinkers. One variable was created to denote a student as an abstainer (no drinks over the past year) or a drinker to help demonstrate shifts in behavior as the semester progresses. A second variable, which served as the main independent variable throughout the analysis, was used to group students into categories of abstainer and four other drinking categories. Light drinkers were those who consumed alcohol within the past year but not in the past two weeks. Moderate drinkers reportedly consumed alcohol within the past two weeks but did not engage in binge drinking. Heavy episodic drinkers indicated that they consumed alcohol within the past two weeks and met the NIAAA-accepted definition of binge drinking at least once (5 or more drinks over a two-hour period for males, 4 or more for females). Finally, problematic drinkers were heavy episodic drinkers who met a threshold of double the minimum for binge drinking (10 or more drinks over a two-hour period for males, 8 or more for females) at least once. Students were analyzed for their movement between these categories as well as their differences in behavior within these different categories.

Research Questions

Research Question 1

What differences, if any, exist in the demographic composition of the incoming freshmen students between those who completed the AlcoholEdu program as prescribed and those who did not complete the program, as measured by gender, ethnicity, drinker status, drinker risk group, age of first alcohol consumption, and family history of alcoholism?

The first research question was addressed through student survey responses on the pre-test AlcoholEdu surveys as well as background system data from Outside the Classroom addressing when students took the survey. The first day of the fall semester for 2008-09 was August 25, 2008, so students were classified as not properly completing the program if they either completed the pre-test survey after that date or did not complete all sections of the program, including the follow-up survey. These data were used to create a binary variable representing proper or improper completion. From a conceptual standpoint, this variable helped represent the self-efficacy portion of social cognitive theory (Bandura, 2004). As part of the foundation of motivation and action, personal efficacy was represented here by the desire to engage in the full program.

Most of the independent variables with which completion status was compared came directly from single questions on the pre-test survey. The variable for gender (male or female) was asked by Question 21. Ethnicity was addressed by Question 22. The survey allowed students to choose one from the

list of African-American, White, Hispanic/Latino, Asian/Pacific Islander, and Native American Indian/Alaskan, but for purposes of this analysis the Asian and Native American/Alaskan categories were combined into an “Other” category. Family history was represented by Question 36 of the pre-test, which asked students to enter the number of parents, siblings, grandparents, aunts or uncles, and cousins who are blood relatives and have ever had a problem with alcohol. Students who entered a value for any of those relatives were given a status of having a family history in a binary variable; students who did not enter a value were coded as not having a family history of alcohol issues. Drinker status, abstainer or drinker, was asked in Question 5 of the pre-test. This remained a binary variable. For the variable of age of first consumption, Question 19 of the pre-test allowed students to respond to a multiple-choice question with single-year choices for ages 10 through 20, inclusive, as well as choices for 9 years or younger or over 21 years. Students who never consumed alcohol could respond with an option labeled as such. Abstainers were not considered within this portion of the analysis since they were addressed in a separate portion, so the remaining choices were grouped into 11 years or younger (elementary school), 12-14 years (middle school), 15-17 years (high school), or 18 years and older (college).

Drinker group categorization was addressed through several questions.

The abstainer category was described above. Question 8 asked whether a student

consumed alcohol within the past two weeks. Students who were not abstainers but answered no to this question were categorized as light drinkers. Question 12 asked students how many times they had five or more drinks in a row within a two-hour period within the past two weeks; Question 13 was identical, but asked about four drinks in a row, rather than five. Male students who selected the once, twice, or three times or more response to Question 12 were categorized as heavy episodic drinkers; female students were categorized likewise if they answered any of the same responses to Question 13. For the final category, Questions 9 and 10 were used to determine if students drank more than 10 drinks in a two-hour period (8 drinks for females) on any given day in the past two weeks. Question 9 provided students with a calendar in which they were asked to enter the number of drinks they consumed on each day for the previous two weeks. Question 10 asked students to then identify the time period, in hours and minutes, during which they were drinking on the day when they reported having the highest number of drinks. The mathematical calculation was made to determine if a student exceeded the 10/8 definition. If a student met this threshold, he or she was moved from the heavy episodic to the problematic category.

Research Question 2

Which drinker risk groups, if any, show the greatest degree of willingness to change alcohol use habits in the areas of (a) consumption, (b) use of protective behavioral strategies, and (c) negative consequences, when gender, ethnicity, age of first alcohol consumption, and family history of alcoholism serve as contributing variables?

The second research question was addressed through data collected on the pre-test and follow-up AlcoholEdu surveys for all students identified in Research Question 1 as having completed the program as prescribed. With exceptions that are noted later in this section, the analyses for this question involved control variables of gender, ethnicity, age of first consumption, and family history, created by the same process used in Research Question 1. The independent variable of drinker group also created for Research Question 1 was utilized as well. Most analyses only involved drinkers; some analyses only addressed moderate, heavy episodic, and problematic drinkers. Two analyses addressed abstainers. Once again, all exceptions to these category uses are noted later in this section.

Drinker status – abstainer, light, moderate, heavy episodic, and problematic – was addressed in Research Question 1, but only for the pre-test. Since Research Question 2 addressed these same categories in the follow-up as well, the same calculations for each of the categories were made for each student. On the follow-up survey, some of the question numbers changed slightly but the

content was identical. The abstainer screening question was Question 4; the light drinker screening question was Question 7; the daily drinking question was Question 8; and the corresponding time period question corresponding to the daily drinking calendar was Question 9. The two screening questions for heavy episodic drinking were Questions 12 and 13, respectively. Data were then analyzed to track changes in categories between the pre-test and follow-up, including movement to and from the abstainer category.

To address the differences in consumption between the pre-test and follow-up, a variable representing average weekly consumption was created. Question 9 (Question 8 on the follow-up survey), which asked students to enter their daily alcohol consumption in number of drinks, was utilized to establish variables for total drinks consumed in each of the two weeks. The variables were then averaged to create a final dependent variable for analysis. Due to skip patterns built into the survey, only students who consumed alcohol within the prior two weeks answered Question 9 (Question 8 on the follow-up), which asked students to enter their daily alcohol consumption in number of drinks. Although this system meant that students who were categorized as light drinkers did not answer the question, their value was coded as zero drinks for the given survey so that movement to the light drinker category in the follow-up from higher-level categories could be captured and changes could be calculated.

Analysis of habits involving protective behavioral strategies was covered for all drinkers through variables addressing both intended and actual use of these behaviors. One PBS analysis addressed the change in actual use between the pre-test and follow-up surveys. On both surveys, 24 items that comprised the question asking students, “When you drink, to what degree do you do the following?” were addressed in Question 14. All questions asked students to respond on a scale of 1 to 7, with *never* as the low value and *always* as the high value. All items were positively worded in terms of PBS, but three items (chug alcohol, do shots, and start drinking before going out) were reverse-coded (*never* = 7, *always* = 1) so that these items could fit with the intent and direction of the other PBS questions. To determine the conceptual groupings within these 24 items, exploratory factor analysis was performed utilizing the maximum likelihood extraction method with the Promax rotation method. All questions conceptually grouped within each identified factor were combined to form dependent variables.

A similar process occurred to compare intended PBS with actual PBS use. Intended behaviors were addressed within Question 15 on both the pre-test and follow-up surveys by asking students, “During the next 30 days to what degree do you plan to.” This variable had 17 items on the pre-test survey and 27 on the follow-up survey; only the 16 items that matched intended behaviors for the pre-test and actual protective behavioral strategies for the follow-up were used to

form variables to address this portion of the research question. Also, it is very important to note that an exploratory factor analysis was run again for the intended behaviors analysis because of the reduction in number of PBS addressed as compared to the actual use-only analysis. It was not conceptually appropriate to simply remove the eight discrepant questions from the previously created actual use scales, as it would have harmed the internal structure of these dependent variables. A conceptual link to social cognitive theory occurred with the creation of these variables regarding self-efficacy and goal setting (Bandura, 2004). Desire to change intended PBS behaviors in the pre-test represented a degree of self-efficacy; when linked to the follow-up responses to these variables in reporting actual behavior, attainment or non-attainment of these goals became apparent. Goal-setting was also represented by some of the items on Question 15 of the follow-up survey. These items did not appear on the pre-test and therefore could not be formed into scales; however, many of these items demonstrated a desire to set goals as a result of the AlcoholEdu program. These items included putting into practice lessons learned from AlcoholEdu, as well as reviewing goals and personal plans students created for themselves as a part of the program.

The fact that abstainers practice the strongest protective behavioral strategy of all by not drinking should not be ignored; however, since abstainers do not drink, they did not receive questions in the AlcoholEdu surveys about

different strategies used. They were asked to respond to Question 16 (both surveys), which asked “When you choose to not drink alcohol, how important are the following reasons?” The 24 items that followed had possible response values ranging from a low of 1 = *not at all important* to a high of 7 = *very important*. For the abstainer group only, this question contributed individual variables for ranking to determine the top reasons why abstainers chose to do so. The only controlling variable that was not necessary to use for the accompanying analysis was age of first use, as this variable was not of importance to freshmen who did not drink within the prior year. This set of descriptive variables helped to address the outcome expectations element of social cognitive theory (Bandura, 2004), as these items addressed both physically and socially aversive reasons as to why students may not have wanted to drink.

The final set of dependent variables that were created for use in Research Question 2 involved negative consequences. As with most of the other variables that were created, this analysis did not address abstainers, since they were not asked about negative consequences. Question 11 (both surveys) asked students, “During the past two weeks, to what degree did the following happen to you when drinking or as a result of your drinking?” The question then featured 24 items for both the pre-test and follow-up surveys, with Likert-type responses ranging from 1 = *never* to 7 = *always*. For the 17 questions that matched between both surveys, an exploratory factor analysis featuring the maximum likelihood

extraction method with Promax rotation was conducted to determine underlying constructs within the realm of negative consequences, and dependent variables were formed based upon the identified factors. These dependent variables addressed the outcome expectations construct of social cognitive theory (Bandura, 2004) by showing the degree to which students experienced both physically and socially aversive effects of alcohol use.

Statistical Analysis

The analytical methods for this study included a combination of chi-square tests for independence, repeated-measures analysis of covariance (ANCOVA) tests, and descriptive statistics. The rest of this section will describe in greater detail how these methods were utilized with the respective research questions.

Research Question 1, which addressed differences in composition of various demographic qualities between students who did and did not complete the program as requested, was analyzed through several chi-square tests for independence. This statistical analysis is recommended for use when measuring the existence or strength of a relationship between two binary or categorical variables. All of the variables used to answer this research question were binary (completion status, gender, drinker status, family history) or categorical (ethnicity, drinker group, age of first consumption). Six separate analyses were

used to address these relationships, as completion status was compared separately to each of the other independent variables. Significance of the relationship was tested at the $\alpha = .05$ level, effect sizes (Φ coefficient for 2x2 tables; Cramer's v for larger tables) were calculated to further test the relationship, and standardized residuals were provided to determine which combinations of categories provided the largest influence.

The analytical process necessary to address Research Question 2 was more extensive. For each of the dependent variables identified and subsequently created through the factor analysis process, a two-way repeated-measures ANCOVA with one within-subjects factor was utilized. The repeated measure, or within-subjects factor, was the factor of time represented by the pre-test at the start of the semester or the follow-up survey mid-semester. The independent variable was drinker group, which was represented by drinking behavior as of the pre-test. For all of the ANCOVA analyses, four variables served as covariates, or controlling factors. These variables consisted of gender, ethnicity, age of first consumption, and family history. For the examination of intended PBS use with actual PBS use, the continuous variable representing actual PBS use in the pre-test also served as a covariate.

Since ANCOVA requires covariates to be either continuous or binary in nature, the non-binary covariates (ethnicity and age of first consumption) were recoded into dummy variables using a reference group coding scheme. All

assumptions were checked prior to running the test; any covariate that was not deemed appropriate to remain in the model was addressed.

Descriptive statistics also incorporated the presence of abstainers for the consumption and PBS-related questions. Frequency tables were built to demonstrate the movement of students between the different drinker groups, including those who abstained, for the overall student population and with separation by gender. This provided an overall, large-scale view of the habits of students by this critical consumption-related control variable. Additionally, for abstainers only, a descriptive-style ranking of the reasons why these students choose not to drink was provided, with comparisons between the pre-test and follow-up survey.

Authorization to Conduct the Study

Prior to conducting any research involving human subjects, authorization must be approved from the Institutional Review Board. The actual implementation of the AlcoholEdu program was previously approved by the IRB as exempt research. Since the current study only involved the use of the dataset for UCF's AlcoholEdu survey results provided with no personally identifiable information by Outside the Classroom, the IRB concluded that this study did not qualify as human subjects research. The letter specifying this classification is located in Appendix C.

Originality Score

The College of Graduate Studies at UCF requires the submission of each thesis or dissertation to a software program used to detect plagiarism. The institution utilizes the Turnitin software tool for this purpose. The graduate advisor for this investigation defined an acceptable originality score as between zero and 10%. The initial submission of the proposal yielded a score of 28%. The removal of bibliographic and quoted material reduced the score to 14%. A further itemized review by hand enabled the score to be reduced to approximately less than 1% after the removal of general phrases, bibliographic material, and other sources to which the researcher had no access. The researcher's graduate advisor approved the document as original work.

Data Collection Plan

Since the goal of this study was to assess student attitudes regarding alcohol before and after the administration of an online alcohol education program among an entire freshman class, and since data collection on this topic occurred extensively as a required part of the program, the data previously collected through AlcoholEdu incoming freshmen during the summer 2008 and fall 2008 academic terms by Outside the Classroom were utilized for this study. All required elements were present in this portion of the data collection process,

including self-reported student demographics. Confidentiality of the student information was maintained. Outside the Classroom assigned non-identifiable, arbitrary identification numbers to all student participants so that each of the three surveys could be linked without any knowledge by the researcher as to the actual identity of any student. The dataset, originating from a secure server at Outside the Classroom, was sent to the researcher upon request and was stored on a secure university server despite the anonymous nature of the data.

CHAPTER 4 DATA ANALYSIS AND FINDINGS

Alcohol intervention programming for use with college students has moved away from education-only and abstinence-only models. Interactive, online-based, protective behavioral strategy-centric, population-level interventions such as the AlcoholEdu program (Outside the Classroom, 2008) have grown in popularity. While researchers have reported promising results among the overall college student population in reducing negative alcohol-related consequences (Lovecchio et al., in press; Wall, 2005, 2007), the efficacy of the program among specific types of drinkers (light, moderate, and heavy episodic) as well as abstainers has not been addressed. The analysis for the current study focused on differences in attitudinal changes among first-time-in-college (FTIC) students in these groups in the areas of levels of consumption, use of protective behavioral strategies, and the incurrence of negative consequences.

This chapter provides the results of the statistical analyses conducted on the two related research questions of interest. Regarding the statistical analysis in this chapter, all data were analyzed using SPSS Version 16.0 for Windows. Inferential tests were conducted at the $\alpha = .05$ level of significance. Though a summative program evaluation also served as an important piece of this analysis, the outcomes of this results-based evaluation will be addressed in Chapter 5.

Research Question 1

What differences, if any, exist in the demographic composition of the incoming freshmen students between those who completed the AlcoholEdu program as prescribed and those who did not complete the program, as measured by gender, ethnicity, drinker status, drinker risk group, age of first alcohol consumption, and family history of alcoholism?

Individual chi-square tests of independence analyses were conducted to examine the relationships between each demographic characteristic and the variable representing completion status. As described in Chapter 3, completion status was represented by a dichotomous variable with possible values of improper or proper. Students who did not complete the pre-test survey prior to the first day of the fall 2008 semester (August 25, 2008) as requested, or did not complete all sections of the AlcoholEdu program including the follow-up survey, were deemed to have completed the program improperly. All other students were categorized as proper completers. The results of each analysis, including counts and frequencies, are presented in Tables 1-6 with accompanying interpretations.

Table 1 presents the analysis regarding the relationship between gender and completion status. All 5,573 students in the population who were eligible for participation in this study provided a valid answer to Question 21 of the pre-test and were, therefore, included within the chi-square analysis. A total of 1,475 students, or 26.5% of the study population, were categorized as improper

completers. The analysis, $\chi^2(1, N = 5,573) = 32.97, p < .01$, indicated that there was a statistically significant relationship between gender and completion status. The indication of effect size of the relationship, $\Phi = .07$, demonstrated that despite the statistical significance represented by the chi-square test, the relationship between gender and completion status was small in nature.

Table 1

Chi-Square Analysis for Gender and Completion Status (N = 5,573)

Completion	Female	Male
Improper		
Count	676	799
% of Row	45.8	54.2
Std. Residual	-3.4	3.6
Proper		
Count	2,235	1,863
% of Row	54.5	45.5
Std. Residual	2.0	2.1

Note. $\chi^2 = 32.97, df = 1, p < .01, \Phi = .07$.

The standardized residuals are also provided in Table 1 to provide a clearer indication of which cells contribute the most to the result of statistical

significance. A standardized residual much less than zero, such as female improper completers (-3.4), indicates that the actual value was much smaller than the expected value for this cell. In this situation, there were notably fewer female students who completed the program improperly than expected. On the other hand, a standardized residual much greater than zero would indicate that the observed cell value was greater in magnitude than the expected cell value. For this analysis, the standardized residual of 3.6 for male improper completers indicated that there were more students who fell into this category than expected. Furthermore, in regard to the concept of cell values as related to the whole population, the converse conclusions can also be reached regarding proper completers. More females than males completed the AlcoholEdu program within the expected timeframe and to the requested extent.

The results for the chi-square analysis explaining the relationship between ethnicity and completion status are presented in Table 2. A total of 5,519 of the 5,573 participants (99%) provided a valid response to Question 22 of the pre-test and were included for statistical testing. The analysis, $\chi^2(3, N = 5,519) = 5.31, p > .05$, indicated that there was no statistically significant relationship between ethnicity and completion status. Cramer's v was utilized to measure effect size; the value of $v = .03$ indicated a minor relationship between these two variables. Since the relationship between these two variables was not statistically significant, the values of the standardized residuals were also close to zero. This

result suggests that each student categorization relative to one another yielded observed counts that were similar to the associated expected counts for each cell and that there was no special relationship between variables.

Table 2

Chi-Square Analysis for Ethnicity and Completion Status (N = 5,519)

Completion	White	Hispanic	Black	Other
Improper				
Count	1,042	208	131	75
% of Row	71.6	14.3	9.0	5.2
Std. Residual	0.5	0.0	0.1	-1.9
Proper				
Count	2,843	578	363	279
% of Row	70.0	14.2	8.9	6.9
Std. Residual	-0.3	0.0	0.0	1.1

Note. $\chi^2 = 5.31$, $df = 3$, $p > .05$, $v = .03$.

Students provided a self-reported family history of alcoholism in Question 36 of the pre-test questionnaire. A dichotomous variable was created as a result of these responses. Respondents who listed at least one blood relative as having ever been a problem drinker or alcoholic, including parents, siblings,

grandparents, aunts, uncles, and first cousins, were categorized as having a family history. Respondents who did not cite having any blood relative in these classifications as a problem drinker or alcoholic were categorized as having no family history. Of the 5,573 respondents to the pre-test questionnaire, 1,897 (34%) reported having a family history of alcohol issues.

The results from the chi-square analysis measuring the relationship between this variable and completion status are provided in Table 3. The analysis, $\chi^2(1, N = 5,519) = 2.35, p > .05$, indicated that there was no statistically significant relationship between family history of alcohol issues and completion status. Additionally, the effect size of $\Phi = .02$ indicated an inconsequentially-sized relationship between these two variables. Although the group of students who did not complete the program as described had a higher family history rate (35.7%) than the group of students who completed the program properly (33.5% with a family history), the difference was not statistically significant in size.

Question 18 of the pre-test questionnaire asked students to identify the age at which they first started drinking. A categorical variable was then created from this question to reflect age of first consumption. Over 99% (5,543 of 5,573) of the respondents provided a valid response to this question. The students who identified through this question as never having consumed alcohol (33.6%) were grouped together. Ages 11 and below represented the elementary group, with 1% of the student population. A total of 8.9% of the students were categorized in

the middle school group, corresponding to ages 12-14. A relatively large proportion of students (44.7%) who first drank between ages 15-17 were categorized as the high school group. The remaining 11.8% of the students who first drank at age 18 or older represented the college group. Because of the relatively small number of students who began drinking in elementary school, this category was combined with the middle school category to ensure reasonably sized subgroups.

Table 3

Chi-Square Analysis for Family History and Completion Status (N = 5,573)

	Completion	No History	History
Improper			
Count		949	526
% of Row		64.3	35.7
Std. Residual		-0.8	1.1
Proper			
Count		2,727	1,371
% of Row		66.5	33.5
Std. Residual		0.5	-0.6

Note. $\chi^2 = 2.35$, $df = 1$, $p > .05$, $\Phi = .02$.

Table 4 provides the results of the chi-square analysis testing for the relationship between age of first consumption and AlcoholEdu completion status. The analysis, $\chi^2(3, N = 5,543) = 33.41, p < .01$, provided evidence of a statistically significant relationship between these two variables. The effect size of $v = .08$ indicated that this relationship was small in magnitude. In examining the standardized residuals, the most extreme residual was attributed to a smaller-than-expected number of students who claimed to have never drunk and improperly completed the AlcoholEdu program relative to the rest of the distribution (standardized residual = -3.7). Likewise, there was a larger-than-expected number of students who first started drinking in elementary or middle school and improperly completed the AlcoholEdu program (standardized residual = 2.8). These two groups appeared to provide the greatest contributions to the statistically significant relationship between the age of first consumption and completion variables.

The final two analyses address drinker status and drinker group. The details regarding the construction of these variables were addressed in Chapter 3. In an effort to maintain data integrity, responses to the pertinent questions were compared to one another in several ways to flag responses that may suggest a student provided untruthful answers in either the pre-test or follow-up questionnaires. The first flag concerned the movement between drinker and abstainer statuses. Question 5 in the pre-test and Question 4 in the follow-up

asked students if they had consumed alcohol in the past year. Likewise, pre-test Question 8 and follow-up Question 7 asked students if they had consumed alcohol in the past two weeks. It was impossible for students to claim in the pre-test that they consumed alcohol in the past two weeks yet claim in the follow-up survey conducted within the same semester that they did not consume alcohol within the past year. These students were flagged as providing untruthful responses regarding drinking behavior and were removed from any analysis regarding drinking status or risk group.

Table 4

Chi-Square Analysis for Age of First Consumption and Completion Status (N = 5,543)

Completion	Never	Elem-Mid	High	College
Improper				
Count	408	179	694	179
% of Row	27.9	12.3	47.5	12.3
Std. Residual	-3.7	2.8	1.6	0.5
Proper				
Count	1,454	373	1,781	475
% of Row	35.6	9.1	43.6	11.6
Std. Residual	2.2	-1.7	-1.0	-0.3

Note. $\chi^2 = 33.41$, $df = 3$, $p < .01$, $v = .08$.

The second type of screening mechanism implemented involved students who claimed to have never participated in binge drinking behavior but who did not provide a daily drinking history that matched this response. Men who claimed to have never had five or more drinks in a two-hour period in response to Question 12, yet met this classification through the daily drinking questionnaire (Questions 9 and 10 in the pre-test; Questions 8 and 9 in the follow-up), were flagged. Likewise, women who claimed to have never had four or more drinks in a two-hour period in Question 13 yet met the classification through the daily drinking questionnaire were also flagged. The third screening mechanism applied to students who had the reverse issue, claiming to binge drink in Question 12 or 13, yet who did not have any day indicated through the daily drinking questionnaire on which he or she consumed the minimum number of drinks required for binge behavior (five for men, four for women). All flags applied to inconsistencies on both the pre-test and follow-up instruments. After the flagged students were removed from eligibility for further analysis in the dataset, analyses regarding drinker status and group were conducted.

The analysis addressing the relationship between pre-test drinker status, represented by a dichotomous variable of abstainer or drinker, and completion status was conducted through a chi-square test of independence. A total of 5,300 of the original population of 5,573 (95.1%) remained after students flagged for

inconsistencies were removed. Of these students, 3,274 (61.8%) were classified as drinkers, with the remaining 2,026 (38.2%) classified as abstainers.

Table 5 indicates the results of the chi-square test. The analysis, $\chi^2(1, N = 5,300) = 27.88, p < .01$, demonstrated a statistically significant relationship between drinker status and completion status. The value for effect size, $\Phi = .07$, suggests a relationship between these variables of a relatively small magnitude. Fewer abstainers completed the program improperly than expected (standardized residual = -3.5) and more drinkers completed the program improperly than expected (standardized residual = 2.8). The percentages support this discrepancy as well. Of improper completers, 67.6% were drinkers and 59.6% of the proper completers were drinkers.

The final chi-square analysis expanded pre-test drinker category into groups of light, moderate, and heavy episodic, as well as existing abstainer groups. The previous analysis regarding drinker status revealed that 61.8% of the students were classified as drinkers at the time of the pre-test. Of these 3,273 students, 1,592 (48.6%) were classified as light drinkers, with claims to drinking within the past year but not within the past two weeks. A total of 1,036 (31.7%) were classified as moderate drinkers, with claims to drinking within the past two weeks but without claims to engage in binge-drinking behavior. The remaining 645 (19.7%) engaged in binge-drinking behavior at least once in the past two weeks. The category for problematic drinkers, those students who exceeded the

5/4 definition for binge drinking with at least twice as many drinks in the same two-hour period of time, was contained within the heavy episodic drinker category due to a small category size of 68 students. One student could not be further classified into a specific drinker category.

Table 5

Chi-Square Analysis for Drinker Status and Completion Status (N = 5,300)

	Completion	Abstainer	Drinker
Improper			
Count		463	965
% of Row		32.4	67.6
Std. Residual		-3.5	2.8
Proper			
Count		1,563	2,309
% of Row		40.4	59.6
Std. Residual		2.2	-1.7

Note. $\chi^2 = 27.88$, $df = 1$, $p < .01$, $\Phi = .07$.

Located in Table 6, the chi-square analysis regarding the relationship between drinker group and completion status, $\chi^2(3, N = 5,299) = 65.66, p < .01$, suggests the existence of a statistically significant relationship between these two variables. The effect size for this relationship, $v = .11$, is small yet notable in magnitude. Of particular interest is the magnitude of the standardized residuals associated with the heavy episodic drinkers. A much larger number of heavy episodic drinkers than expected (standardized residual = 5.3) were classified as improper completers, while a much smaller number of drinkers in this category were classified as proper completers (standardized residual = -3.2). These residual values moved toward zero as drinking category decreased in severity. Regarding the residuals for the abstainer group, these values were consistent with those found in the drinker status analysis, as indicated in Table 5.

Table 6

Chi-Square Analysis for Drinker Group and Completion Status (N = 5,299)

Completion	Abstainer	Light	Moderate	Heavy Episodic
Improper				
Count	463	401	320	243
% of Row	32.4	28.1	22.4	17.0
Std. Residual	-3.5	-1.3	2.5	5.3
Proper				
Count	1,563	1,191	716	402
% of Row	40.4	30.8	18.5	10.4
Std. Residual	2.1	0.8	-1.5	-3.2

Note. $\chi^2 = 65.66$, $df = 3$, $p < .01$, $v = .11$.

Research Question 2

Which drinker risk groups, if any, show the greatest degree of willingness to change alcohol use habits in the areas of (a) consumption, (b) use of protective behavioral strategies, and (c) negative consequences, when gender, ethnicity, age of first alcohol consumption, and family history of alcoholism serve as contributing variables?

In order to address this research question, a combination of descriptive statistics, factor analysis, repeated measures ANCOVA analyses, and nonparametric analytical methods were utilized. Any necessary steps that were taken in the areas of data preparation or variable transformation are discussed in the sections that pertain to the specific analysis.

Consumption

Change in levels of alcohol consumption among the student population between the pre-test and follow-up surveys served as an area of interest for this study. This change was measured using two methods. The first method involved examining the movement of students between different drinker groups, abstainer, light drinker, moderate drinker, and heavy episodic drinker, through descriptive statistics. The second method utilized repeated-measures ANCOVA to determine the change in total weekly drinking averaged over two weeks, between students in different drinker groups, while controlling for the demographic factors of gender, ethnicity, family history, and age of first

consumption. Combined, these two analyses provided a comprehensive view of student drinking habits in the population.

Table 7 provides the distribution of drinker group for all students who completed both pre-test and follow-up surveys and did not provide inconsistent responses with respect to drinker group. These stipulations for consistency were described in detail in the discussion of drinker status and drinker group in Research Question 1. The rows identify the student's drinker group as of the pre-test, while the columns identify the student's drinker group as of the follow-up survey. The row values add to 100% in order to more easily identify the percentage of students from each pre-test category who either stayed in the same category as of the follow-up or moved to a different category.

As presented in Table 7, 80% of the abstainers remained in that category as of the follow-up. Among light and moderate drinkers, nearly half (49% and 48%, respectively) remained in those categories as of later in the semester. Among moderate drinkers, similar percentages of the remaining students either reduced consumption and moved into the light drinker category (29%) or increased consumption and moved into the heavy episodic category (24%). A majority of heavy episodic drinkers (64%) continued to engage in binge-drinking activities as of the follow-up.

Table 7

Change in Drinker Group from Pre-Test to Follow-Up, All Students (N = 3,854)

Pre-Test Group	Group Percentage in Follow-Up			
	1	2	3	4
1. Abstainer ^a	79.6	12.6	5.6	2.2
2. Light ^b	11.7	48.8	27.2	12.3
3. Moderate ^c	—	28.5	47.9	23.6
4. Heavy Episodic ^d	—	14.7	21.4	63.8

^a*n* = 1,560. ^b*n* = 1,185. ^c*n* = 708. ^d*n* = 401.

Considering the importance of gender with respect to alcohol consumption, the movement between drinker groups was also tracked separately for both female and male students. Table 8 and Table 9 display the results for female and male students, respectively. A slightly higher percentage of male abstainers remained in that category (81%) compared to female abstainers (78%). Regardless of pre-test drinker group, consistently larger percentages of male students qualified for the heavy episodic drinker group as of the follow-up. Additionally, a noticeably greater percentage of males who were heavy episodic drinkers in the pre-test remained in the category as of the follow-up (75%), as compared to female students in the same category (55%).

Table 8

Change in Drinker Group from Pre-Test to Follow-Up, Women Only (N = 2,140)

Pre-Test Group	Group Percentage in Follow-Up			
	1	2	3	4
1. Abstainer ^a	78.1	14.1	6.2	1.5
2. Light ^b	10.1	50.1	29.0	10.8
3. Moderate ^c	—	29.8	48.3	21.9
4. Heavy Episodic ^d	—	17.4	27.2	55.4

^a*n* = 851. ^b*n* = 686. ^c*n* = 379. ^d*n* = 224.

Table 9

Change in Drinker Group from Pre-Test to Follow-Up, Men Only (N = 1,714)

Pre-Test Group	Group Percentage in Follow-Up			
	1	2	3	4
1. Abstainer ^a	81.4	10.9	4.8	3.0
2. Light ^b	14.0	46.9	24.6	14.4
3. Moderate ^c	—	27.1	47.4	25.5
4. Heavy Episodic ^d	—	11.3	14.1	74.6

^a*n* = 709. ^b*n* = 499. ^c*n* = 329. ^d*n* = 177.

The second piece of the consumption analysis involved the difference in total weekly drinking averaged over a two-week period between the pre-test and follow-up surveys. Question 9 in the pre-test and Question 8 in the follow-up questionnaires asked all moderate and heavy episodic drinkers to enter the number of alcoholic beverages they consumed on each day over a two-week period prior to the survey date. The total number of drinks was calculated separately for the first and second weeks and then averaged to create a single continuous variable to measure the weekly consumption of these students. Since only the students identified as moderate and heavy episodic drinkers were presented with this question, only students who were categorized into these two groups in the pre-test were included in the population for this particular analysis. Students who were subsequently classified as light drinkers as of the follow-up analysis (did not consume alcohol within the past two weeks) received a value of zero drinks for the follow-up consumption variable.

Prior to conducting the planned ANCOVA analysis, the dependent variable, average number of drinks per week, was checked for normality, a critical statistical assumption, through examination of skewness and kurtosis values. Both values should be within the range of -2 to 2. The distribution was skewed to the right for both the pre-test and follow-up subsets, as a large portion of the respondents expressed low consumption values. Skewness and kurtosis values were 1.79 and 3.40, respectively, for the pre-test. The follow-up

distribution yielded a skewness value of 1.54 and a kurtosis value of 2.44. After the removal of 29 outliers with a pre-test or follow-up value beyond three standard deviations above their respective means, a square root transformation was applied to all of the observations, which brought skewness and kurtosis values into the -2 to 2 range: skewness values of 0.82 and 0.21 and kurtosis values of 0.24 and -0.76 for the pre-test and follow-up, respectively.

After the distribution issue was addressed, the analysis was conducted through a repeated-measures ANCOVA, with one two-level repeated measure (time), one two-level fixed factor (drinker group), and four control variables represented by seven dichotomous indicators: ethnicity was represented by dummy variables for Black, Hispanic, and Other; gender and family history were represented by single indicators; and age of first consumption was represented by dummy variables for elementary-middle school and high school age ranges.

An additional underlying assumption for the ANCOVA analysis is a lack of interaction between the covariate and the fixed factor. Results of the ANCOVA analysis yielded evidence of a significant interaction between the factor of drinker group and the gender covariate: $F(1, 1,027) = 11.23, p < .01$. Because gender is an important covariate, as evidenced by differences in behavior in movement between drinker groups in Tables 8-9, the researcher conducted separate ANCOVA analyses for male and female students in lieu of covariate removal. The other characteristics of the planned analysis remained.

The analysis regarding trends among women was conducted first. Between-subjects results, which reflect the significance of the independent factor and covariates regarding consumption levels while holding time constant, are located in Table 10. Holding the factor of time constant, there was a statistically significant relationship between weekly consumption levels and drinker group: $F(1, 573) = 167.47, p < .01$. The η^2 value of .23 indicated that 23% of the variability in consumption levels was explained by drinker group alone. All of the other control variables were statistically significant at the $p < .01$ level (ethnicities of Black and Hispanic; both age of first consumption variables) or the $p < .05$ level (family history), with the exception of the Other ethnicity. These results indicate the value of including these particular covariates in the model.

The tests for within-subjects effects, where time was taken into consideration, are addressed in Table 11. Controlling for drinker group and other covariates, there was a significant difference in mean consumption from the pre-test to follow-up: $F(1, 573) = 12.60, p < .01$. A more critical result was addressed by the test analyzing the relationship between time and drinker group. The analysis, $F(1, 573) = 10.90, p < .01$, suggests that there was a significant interaction effect between these two variables. Only 2% of the variability in consumption level, however, was addressed by this relationship, as measured by the η^2 value. Table 11 further displays that there were no statistically significant relationships between time and the covariates of interest.

Table 10

Between-Subjects Effects for Consumption by Drinker Group (Women)

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Drinker Group	1	167.47**	.23	.01
Ethnicity: Black	1	14.83**	.03	.01
Ethnicity: Hispanic	1	9.06**	.02	.01
Ethnicity: Other	1	0.15	—	.70
Family History	1	6.24*	.01	.01
Age: Elem-Middle	1	41.37**	.07	.01
Age: High	1	31.94**	.05	.01
S within-group error	573	(1.32)		

Note. Value enclosed in parentheses represents mean square error. S = subjects.

p* < .05. *p* < .01.

Estimated marginal means and standard error values, which account for the average values of the covariates, are located in Table 12. When adjusting for all of the covariates, weekly consumption levels decreased between pre-test and follow-up surveys for both the moderate and heavy episodic drinker groups. As the consumption values were treated with a square root transformation prior to analysis, the values in this table can be squared for an improved practical interpretation. Among moderate drinkers, weekly consumption declined from

2.86 drinks per week to 2.05 drinks per week. Likewise, among heavy episodic drinkers, consumption declined from 7.78 to 4.71 drinks per week, a steeper decline than experienced among moderate drinkers.

Table 11

Within-Subjects Effects for Consumption by Drinker Group (Women)

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Time (T)	1	12.60**	.02	.01
T x Drinker Group	1	10.90**	.02	.01
T x Ethnicity: Black	1	2.48	.01	.12
T x Ethnicity: Hispanic	1	0.75	.01	.39
T x Ethnicity: Other	1	0.37	.01	.54
T x Family History	1	1.93	.01	.17
T x Age: Elem-Middle	1	2.12	.01	.15
T x Age: High	1	3.15	.01	.08
T x S within-group error	573	(0.80)		

Note. Value enclosed in parentheses represents mean square error. S = subjects.

p* < .05. *p* < .01.

Table 12

Estimated Marginal Means for Consumption by Drinker Group, Women (N = 581)

Drinker Group	<i>n</i>	Pre-Test		Follow-Up	
		<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Moderate	365	1.69	.04	1.43	.07
Heavy Episodic	216	2.79	.05	2.17	.09

Note. Means evaluated at Black = .05, Hispanic = .16, Other = .03, Family History = .38, Elementary/Middle = .20, and High = .70.

An identical ANCOVA consumption analysis was conducted on the male student subpopulation. The results are presented in Table 13. As with the female subpopulation analysis, there was a statistically significant relationship between weekly consumption levels and drinker group: $F(1, 454) = 210.08, p < .01$. A total of 32% of the variation in weekly consumption levels was explained by the drinker group variable as indicated by the η^2 value. Most of the control variables were statistically significant at the $p < .01$ level as well, including the dummy variables for Black and Other ethnicities along with both dummy variables representing age of first consumption.

Table 13

Between-Subjects Effects for Consumption by Drinker Group (Men)

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Drinker Group	1	210.08**	.32	.01
Ethnicity: Black	1	7.96**	.02	.01
Ethnicity: Hispanic	1	3.73	.01	.05
Ethnicity: Other	1	6.96**	.02	.01
Family History	1	0.07	—	.80
Age: Elem-Middle	1	10.79**	.02	.01
Age: High	1	11.93**	.03	.01
<i>S</i> within-group error	454	(1.54)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

p* < .05. *p* < .01.

Within-subject effects for the male subpopulation, located in Table 14, showed some different trends than the comparable analysis for female students. The analysis, $F(1, 573) = 0.91, p > .05$, indicated that, controlling for drinker group and the other covariates, there was no statistically significant difference in weekly consumption by males between the pre-test and follow-up surveys. However, when controlling for the covariates, there was a statistically significant interaction between time and drinker group regarding the consumption variable:

$F(1, 573) = 7.49, p < .01$. Approximately 2% of the variability in consumption can be explained by this interaction between the two factors. There were also statistically significant interactions between time and the dummy variables for Black and Hispanic students, respectively. These results suggest that behavior with respect to this variable changed over time for these specific groups.

Table 14

Within-Subjects Effects for Consumption by Drinker Group (Men)

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Time (T)	1	0.91	.01	.34
T x Drinker Group	1	7.49**	.02	.01
T x Ethnicity: Black	1	4.20*	.01	.04
T x Ethnicity: Hispanic	1	13.86**	.03	.01
T x Ethnicity: Other	1	0.69	.01	.41
T x Family History	1	1.06	.01	.31
T x Age: Elem-Middle	1	0.89	.01	.35
T x Age: High	1	0.69	.01	.41
T x <i>S</i> within-group error	573	(1.00)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

* $p < .05$. ** $p < .01$.

Similarly to the consumption analysis among female students, the estimated marginal means can be interpreted in the same fashion for the male student analysis. Table 15 presents the values for the marginal means and standard errors for the square root-transformed variables. Squaring the values for more meaningful interpretation, mean weekly consumption of males among moderate drinkers decreased slightly, from 3.31 drinks to 3.17 drinks per week. On the other hand, mean consumption among heavy episodic drinkers decreased from 10.89 drinks to 8.24 drinks per week. As of the follow-up survey, heavy episodic drinking men consumed nearly three times as many drinks per week compared to their moderately drinking peers.

Table 15

Estimated Marginal Means for Consumption by Drinker Group, Men (N = 462)

Drinker Group	<i>n</i>	Pre-Test		Follow-Up	
		<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Moderate	310	1.82	.05	1.78	.08
Heavy Episodic	152	3.30	.07	2.87	.11

Note. Means evaluated at Black = .04, Hispanic = .16, Other = .06, Family History = .33, Elementary/Middle = .15, and High = .71.

For comparison purposes, the square root-transformed mean values of weekly consumption for female and male drinkers are displayed side-by-side in Figure 2. Both male and female heavy episodic drinkers demonstrated declines in weekly consumption at a greater rate than their like-gendered, moderate drinker peers. Comparing the trends of each drinker group by gender, the consumption of the female students consistently declined at a greater rate between pre-test and follow-up than that of their male peers in the same drinker groups.

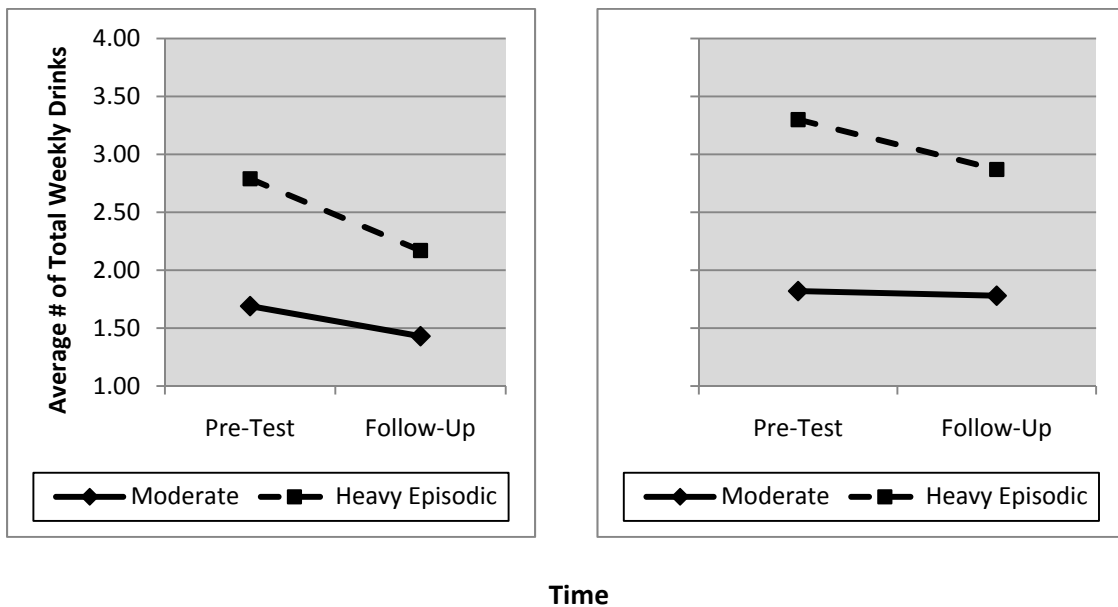


Figure 2. Estimated marginal means for consumption by drinker group.

Results for women are located in the left panel; results for men are located in the right panel.

Protective Behavioral Strategies (PBS)

The analysis for the use of protective behavioral strategies (PBS) was conducted in three phases. The first and second phases utilized exploratory factor analyses to ultimately create scale variables reflecting actual and intended PBS use, respectively. These variables were then analyzed for difference by drinker group through the use of repeated measures ANCOVA. The third phase involved a descriptive statistic-based summarization of the reasons why abstainers, who exercise the highest level of PBS, chose not to drink.

Use of Actual Protective Behavioral Strategies (PBS)

The first phase of the PBS analysis involved a comparison of the protective strategies students claimed to use when they drank alcohol between the pre-test and follow-up surveys. Question 14 in both questionnaires asked respondents, "When you drink, to what degree do you do the following?" A total of 24 behaviors followed, for which respondents were asked to rate their personal usage on a Likert-type scale of 1 (*never*) to 7 (*always*). All of the listed behaviors were desirable in nature, with the exception of "Chug alcohol," "Start drinking before going out (i.e., pre-gaming)," and "Do shots." Since the planned analysis involved the formation of additive factors representing like groupings of behaviors, these three behaviors were reverse-coded such that a value of 1 now

represented *always*, the least desirable response, and a value of 7 now represented *never*, the most desirable response, to maintain consistency with the scale directions of the other 21 behaviors.

Once these steps for data preparation were taken, the items were ready for conducting exploratory factor analysis based upon the pre-test values. Factors were extracted using the maximum likelihood method and rotated using the Promax rotation with Kaiser normalization. Since oblique rotations such as Promax are most appropriate for use when the resulting factors are correlated (Rencher, 2002), it is necessary to check correlation of the factors before proceeding with factor interpretation. Nearly all of the correlations between factors were sufficiently large (above a value of .25) so the use of the Promax rotation was deemed acceptable. Additionally, the values for communalities, or the degree to which the extracted factors addressed the total variance of each variable, were examined to ensure that no value exceeded 1, which represents 100%. No issues arose regarding communalities, so the interpretation of the factor analysis results continued as planned.

The factor loading for the actual PBS use items are located in Table 16. The use of Kaiser normalization implies that each extracted factor must explain the equivalent of at least one variable's variance, which translates to an eigenvalue of at least one. With this rule in effect, a total of four factors were extracted.

Although many items clearly loaded most strongly among one particular factor,

other items had similar factor loadings among multiple factors. This correlation between factors was accounted for as best as possible by choosing a rotation method such as Promax.

In further examination of the groupings of items in Table 16, each factor consisted of a number of items regarding a specific need for PBS use. The first factor addressed issues of image in social situations or “excuses” that a student could use to divert attention from others about drinking when feeling pressured to increase consumption. These items were grouped as influence avoidance techniques. The items grouped with the second factor, preventative planning, addressed the actions that students could take ahead of time to prevent harms, whether related to drinking and driving or to injurious consequences in general. Alcohol monitoring and reduction behaviors, the third factor, included the general preventative behaviors that did not necessarily address issues of influence from others, but rather were focused upon simply reducing the quantity of alcohol a student consumes. The final factor, binge-related behaviors, consists of actions associated with consuming large quantities of alcohol in a short period of time.

Table 16

Factor Loading for Actual Protective Behavioral Strategies (PBS) Use

Item	Factor			
	1	2	3	4
Choose a drink containing less alcohol	.80	.40	.61	.44
Stop drinking at a predetermined time	.70	.44	.64	.30
Monitor your BAC to reduce drinking-related problems	.69	.29	.50	.34
Put extra ice in your drink	.69	.33	.51	.24
Avoid drinking games	.65	.31	.53	.54
Avoid trying to "keep up" or "out drink" others	.57	.45	.55	.34
Limit the amount of money you bring to spend on alcohol	.52	.51	.50	.11
Hold a drink so people stop bothering you about drinking	.46	.25	.31	.16
Prevent a friend from driving under the influence of alcohol	.37	.82	.43	—
Use a designated driver	.37	.81	.40	—
Make plans to avoid driving after drinking	.36	.76	.46	—
Know where your drink has been at all times	.46	.69	.56	.17

Item	Factor			
	1	2	3	4
Have a friend let you know when you've had enough to drink	.59	.59	.55	.20
Don't drink so you can serve as a designated driver	.54	.59	.43	.23
Set a limit on how many drinks you'll have	.68	.42	.79	.41
Keep track of how many drinks you've had	.56	.48	.76	.32
Pace your drinks to 1 or fewer per hour	.69	.36	.69	.48
Alternate non-alcoholic beverages with alcoholic drinks	.61	.34	.67	.33
Make your own drinks to control the amount of alcohol you have	.42	.38	.55	.10
Not accept drinks from a shared source (e.g., punch bowl)	.46	.46	.51	.27
Eat food before or while drinking	.25	.41	.40	—
Chug alcohol	.33	.15	.29	.73
Start drinking before going out (i.e., pre-gaming)	.24	—	.24	.67
Do shots	.27	—	.16	.66

Table 17 provides the names for each of these four scales and the distribution of the 24 associated items. The first scale, influence avoidance, contained eight items and had a Cronbach alpha value of .84. The second scale, preventative planning, contained six items and had a Cronbach alpha value of .85. The third scale, alcohol monitoring and reduction behaviors, contained seven items and had a Cronbach alpha value of .84. The final scale, binge-related behaviors, contained three items and had a Cronbach alpha value of .73.

It is important to note that one of the items, "Eat food before or while drinking," was numerically placed with the preventative planning factor by the factor analysis. However, since the factor loading scores were nearly identical for this item (.41 for preventative planning and .40 for alcohol monitoring and reduction behaviors), the researcher placed it within the alcohol monitoring and reduction behaviors scale for a better conceptual grouping. Although an individual can plan to eat food before or while drinking ahead of time, the behavior was presented more as a way to simply reduce the concentration of alcohol entering the drinker's body. All of the other items were assigned to factors as prescribed by the analysis.

Table 17

Scale Creation for Actual Protective Behavioral Strategies (PBS) Use

Scale Name	Item
Influence Avoidance ^a	<p>Choose a drink containing less alcohol</p> <p>Stop drinking at a predetermined time</p> <p>Monitor your BAC to reduce drinking-related problems</p> <p>Put extra ice in your drink</p> <p>Avoid drinking games</p> <p>Avoid trying to "keep up" or "out drink" others</p> <p>Limit the amount of money you bring to spend on alcohol</p> <p>Hold a drink so people stop bothering you about drinking</p>
Preventative Planning ^b	<p>Prevent a friend from driving under the influence of alcohol</p> <p>Use a designated driver</p> <p>Make plans to avoid driving after drinking</p> <p>Know where your drink has been at all times</p> <p>Have a friend let you know when you've had enough to drink</p> <p>Don't drink so you can serve as designated driver</p>

Scale Name	Item
Alcohol Monitoring and Reduction Behaviors ^c	Set a limit on how many drinks you'll have
	Keep track of how many drinks you've had
	Pace your drinks to 1 or fewer per hour
	Alternate non-alcoholic beverages with alcoholic drinks
	Make your own drinks to control the amount of alcohol you have
	Not accept drinks from a shared source (e.g., punch bowl)
	Eat food before or while drinking
Binge-Related Behaviors ^d	Chug alcohol
	Start drinking before going out (i.e., pre-gaming)
	Do shots

^a8 items, Cronbach $\alpha = .84$. ^b6 items, Cronbach $\alpha = .85$. ^c7 items, Cronbach $\alpha = .84$. ^d3 items, Cronbach $\alpha = .73$.

After the additive scales addressing the different factors of actual PBS use were created, the data were prepared to conduct a repeated measures ANCOVA analysis for each of the four scales where each additive factor served as the dependent variable. In order to focus upon the results, all of the steps for checking assumptions and performing any necessary transformations to

variables will be discussed jointly for the four factors. Each of the four ANCOVA analyses will be addressed separately.

All of the dependent variables were checked for normality via skewness and kurtosis values prior to conducting any analyses. The influence avoidance, alcohol monitoring and reduction behaviors, and binge-related behaviors variables all presented desirable skewness and kurtosis values well between -2 and 2 and, therefore, did not require any further transformations. The preventative planning variable, however, demonstrated a left-handed skew, as many students indicated heavy use of these behaviors. To resolve this issue, a square transformation was applied to the dependent variable. Squaring the values in such a distribution reduces the severity of the skew and helps to normalize the distribution without affecting the underlying meanings of the variables. The original skewness and kurtosis values of -1.48 and 2.38 for the pre-test became -.80 and -.10 after transformation, while the less severe skewness and kurtosis values of -1.06 and .56 for the follow-up became -.50 and -.79 after transformation.

The repeated measures ANCOVA analyses were conducted for all four dependent variables in the same fashion. Each analysis featured a two-level repeated measure (time), a three-level fixed factor (drinker group: light, moderate, and heavy episodic), and four control variables represented by seven dichotomous indicators. Ethnicity was represented by dummy variables for

Black, Hispanic, and Other; gender and family history were represented by single indicators; and age of first consumption was represented by dummy variables for elementary-middle school and high school age ranges. Interaction between each covariate and the fixed factor of drinker group was tested within each model to check for the presence of multicollinearity. No significant interactions were found, so the ANCOVA analyses were conducted as planned.

The first analysis involved the use of influence avoidance strategies. Between-subject results are displayed in Table 18. Holding the factor of time constant, there was a statistically significant relationship between the level of influence avoidance strategies used and drinker group with an analysis of $F(2, 1,877) = 109.31, p < .01$. Approximately 10% of the variability in influence avoidance score could be described by drinker group alone as indicated by the η^2 value of .10. With the exception of the covariates for Black ethnicity and family history, all of the covariates were statistically significant at the $p < .05$ level (Hispanic ethnicity) or the $p < .01$ level (all others). Gender served as a particularly valuable covariate for the model, with η^2 value indicating that the covariate explained 8% of the variability in the influence avoidance variable.

Table 18

Between-Subjects Effects for Actual Influence Avoidance Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Drinker Group	2	109.31**	.10	.01
Gender	1	155.27**	.08	.01
Ethnicity: Black	1	0.01	—	.99
Ethnicity: Hispanic	1	6.19*	.01	.01
Ethnicity: Other	1	11.86**	.01	.01
Family History	1	1.52	.01	.22
Age: Elem-Middle	1	51.31**	.03	.01
Age: High	1	34.43**	.02	.01
<i>S</i> within-group error	1,877	(149.97)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

p* < .05. *p* < .01.

The tests for within-subjects effects, where time was taken into consideration, are addressed in Table 19. Controlling for drinker group and the other covariates, there was no significant difference in use of influence avoidance strategies between the pre-test and follow-up: $F(1, 1,877) = 0.01, p > .05$. A more critical result was addressed by the test analyzing the relationship between time and drinker group regarding the use of influence avoidance strategies. The

analysis, $F(2, 1,877) = 3.70, p < .05$, suggested that there was a significant interaction effect between these two variables. Only 1% of the variability in the influence avoidance variable, however, was addressed by this relationship, as measured by the η^2 value. Table 19 further displays that there were no statistically significant relationships between time and the covariates of interest.

Table 19

Within-Subjects Effects for Actual Influence Avoidance Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Time (T)	1	0.01	—	.94
T x Drinker Group	2	3.70*	.01	.03
T x Gender	1	1.32	.01	.25
T x Ethnicity: Black	1	0.12	—	.73
T x Ethnicity: Hispanic	1	1.35	.01	.24
T x Ethnicity: Other	1	0.04	—	.83
T x Family History	1	0.03	—	.86
T x Age: Elem-Middle	1	0.23	—	.63
T x Age: High	1	2.10	.01	.14
T x <i>S</i> within-group error	1,877	(58.45)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

* $p < .05$. ** $p < .01$.

Estimated marginal means and standard error values, which accounted for the average values of the covariates, are shown in Table 20. When adjusting for all of the covariates, the level of usage of influence avoidance strategies decreased slightly among light drinkers, increased slightly among moderate drinkers, and increased at the greatest rate among heavy episodic drinkers. Since the variable consists of an additive factor formed by eight items with a minimum value of 1 and a maximum value of 7, the possible values for this variable ranged from a minimum of 8 to a maximum of 56. Therefore, each mean value can be divided by 8 to obtain an average endorsement score for the items contained within the factor. Among light drinkers, both the pre-test and follow-up average endorsements equated to approximately 4.2, while the endorsements among moderate drinkers averaged to 3.8 for both pre-test and follow-up. Although heavy episodic drinkers showed the lowest number of average endorsements of influence avoidance behaviors, their score increased from 3.0 in the pre-test to 3.3 in the follow-up. A graphical comparison of these means is located in Appendix D.

The second repeated measures ANCOVA analysis addressed the differences in mean score for the use of preventative planning protective behaviors. Table 21 contains the results of between-subjects analyses, which control for the element of time. Most notably, there was a statistically significant difference in levels of preventative planning used by different drinker groups,

$F(2, 1,979) = 113.27, p < .05$. Approximately 10% of the variability in preventative planning score could be explained by the drinker group variable, as indicated by the value of η^2 . Ethnicity was not a particularly strong contributor to explaining differences, as neither Black nor Other ethnicity indicators were found to be significant covariates. All other covariates were significant at either the $p < .01$ (gender, Hispanic ethnicity, and age of first consumption) or the $p < .05$ level (family history). Gender was the most powerful covariate in terms of explaining variability in the preventative planning variable, due to its η^2 value of .09.

Table 20

Estimated Marginal Means for Actual Influence Avoidance Protective Behavior Use by Drinker Group (N = 1,887)

Drinker Group	n	Pre-Test		Follow-Up	
		M	SE	M	SE
Light	897	33.53	.31	33.27	.38
Moderate	631	30.24	.37	30.70	.44
Heavy Episodic	359	24.39	.49	26.01	.60

Note. Means evaluated at Gender = .43, Black = .06, Hispanic = .15, Other = .05, Family History = .34, Elementary/Middle = .14, and High = .69.

Table 21

Between-Subjects Effects for Actual Preventative Planning Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Drinker Group	2	113.27*	.10	.01
Gender	1	193.74**	.09	.01
Ethnicity: Black	1	0.55	.01	.46
Ethnicity: Hispanic	1	11.08**	.01	.01
Ethnicity: Other	1	2.20	.01	.14
Family History	1	4.28*	.01	.04
Age: Elem-Middle	1	51.88**	.03	.01
Age: High	1	34.62**	.02	.01
<i>S</i> within-group error	1,979	(237,499)		

Note. Value enclosed in parentheses represents mean square error. *S* = subjects.

p* < .05. *p* < .01.

Table 22 contains the results of within-subjects analysis which accounts for the critical interaction between the drinker group fixed factor and the repeated measure of time. Controlling for drinker group, there was a significant difference between levels of preventative planning used between the pre-test and follow-up periods: $F(1, 1,979) = 15.29, p < .01$. More notably, there was a significant interaction effect between time and drinker group with respect to

preventative planning use: $F(2, 1,979) = 6.41, p < .01$. The η^2 value of .01 implied that only 1% of the variability in preventative planning could be explained by this relationship. Most of the covariates did not have a significant interaction with time; however, two of three ethnicity indicator variables, Black and Hispanic, were statistically significant at the respective $p < .01$ and $p < .05$ levels.

Table 22

Within-Subjects Effects for Actual Preventative Planning Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>P</i>
Time (T)	1	15.29**	.01	.01
T x Drinker Group	2	6.41**	.01	.01
T x Gender	1	3.84	.01	.05
T x Ethnicity: Black	1	7.54**	.01	.01
T x Ethnicity: Hispanic	1	4.62*	.01	.03
T x Ethnicity: Other	1	0.01	—	.96
T x Family History	1	0.23	—	.63
T x Age: Elem-Middle	1	0.38	—	.54
T x Age: High	1	0.30	—	.58
T x <i>S</i> within-group error	1,979	(80,576)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

* $p < .05$. ** $p < .01$.

The estimated marginal means and standard errors for use of preventative planning while controlling for the covariates are presented in Table 23. It is extremely important to remember that the variable had a square transformation applied prior to analysis and, therefore, the summary statistics can be best interpreted by taking the square root. With six items comprising the preventative planning scale, the minimum value of the variable was 6 and the maximum value was 42. All drinker groups demonstrated a reduction in preventative planning use between the pre-test and follow-up, but the extent of the reductions differed. Interpreting the square-rooted means, the mean score from light drinkers reduced from 36.66 to 34.63; in moderate drinkers, from 34.41 to 32.98; and in heavy episodic drinkers, from 31.32 to 30.33. As the drinker group increased, the severity of the reduction in score decreased, which yielded the statistically significant interaction between drinker group and time. Regardless, the follow-up average item endorsement score for all groups was between 5 and 6 on the 7-point scale, which is close to the maximum. A graphical comparison of these means is located in Appendix D.

Table 23

Estimated Marginal Means for Actual Preventative Planning Protective Behavior Use by Drinker Group (N = 1,989)

Drinker Group	<i>n</i>	Pre-Test		Follow-Up	
		<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Light	942	1,344	12.12	1,199	14.15
Moderate	668	1,184	14.23	1,088	16.61
Heavy Episodic	379	980.70	19.18	920.05	22.38

Note. Means evaluated at Gender = .43, Black = .06, Hispanic = .15, Other = .05, Family History = .35, Elementary/Middle = .13, and High = .70.

Actual PBS use related to alcohol monitoring and reduction was the dependent variable of interest for the third repeated measures ANCOVA analysis. Table 24 contains the between-subjects effects for this analysis which controlled for the effect of time. The analysis, $F(2, 1,932) = 95.65, p < .01, \eta^2 = .09$, indicated that there was a significant difference in overall use of alcohol monitoring and reduction of PBS between students of different drinker groups; 9% of the variability in usage levels was explained by this factor. Regarding the covariates, the indicator for the Black ethnicity and the family history factors did not yield any significant differences. All other covariates displayed significant

relationships with the dependent variable, either at the $p < .01$ (gender, Hispanic ethnicity, and age of first consumption) or the $p < .05$ level (Other ethnicity).

Table 24

Between-Subjects Effects for Actual Alcohol Monitoring and Reduction Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Drinker Group	2	95.65**	.09	.01
Gender	1	78.23**	.04	.01
Ethnicity: Black	1	0.70	—	.40
Ethnicity: Hispanic	1	8.17**	.01	.01
Ethnicity: Other	1	5.30*	.01	.02
Family History	1	0.14	—	.70
Age: Elem-Middle	1	27.66**	.01	.01
Age: High	1	27.78**	.01	.01
<i>S</i> within-group error	1,932	(119.51)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

* $p < .05$. ** $p < .01$.

Within-subjects results, which controlled for time on the effect of alcohol monitoring and reduction PBS use, are contained in Table 25. The results indicated that the factor of time was statistically linked to the level of these strategies used: $F(1, 1,932) = 3.87, p < .05$. Only 1% of the variability in this dependent variable could be explained by time, as indicated by the η^2 value. On the other hand, there was no statistically significant difference in alcohol monitoring and reduction use, $F(2, 1,932) = 2.39, p > .05$, when there was an interaction between time and drinker group. With the exception of the interaction between time and gender, $F(1, 1,932) = 3.91, p < .05$, there were no other significant interaction effects between time and individual covariates.

Table 26 presents estimated marginal means and standard errors for alcohol monitoring and reduction behaviors by drinker group for the pre-test and follow-up surveys, controlled for the values of the covariates. This scale, which consisted of 7 questions, had a minimum score of 7 and a maximum score of 49. Both light and moderate drinkers displayed slight reductions in use levels from the pre-test to the follow-up, while heavy episodic drinkers displayed a slight increase. Converting the scale scores into an average level of endorsement for each item within the factor, endorsements decreased from 4.73 to 4.62 for light drinkers; decreased from 4.37 to 4.26 for moderate drinkers; and increased from 3.68 to 3.74 for heavy episodic drinkers. All values fell within the low-moderate range of the scale. As indicated in Table 25 there was no significant

interaction effect between time and drinker group; thus, it is important to remember that while there was an overall reduction in alcohol monitoring and reduction PBS use from pre-test to follow-up and that use decreased as drinking increased, there was no significant difference in change by drinker group. A graphical comparison of these means is located in Appendix D.

Table 25

Within-Subjects Effects for Actual Alcohol Monitoring and Reduction Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Time (T)	1	3.87*	.01	.05
T x Drinker Group	2	2.39	.01	.09
T x Gender	1	3.91*	.01	.05
T x Ethnicity: Black	1	2.86	.01	.09
T x Ethnicity: Hispanic	1	1.30	.01	.25
T x Ethnicity: Other	1	2.35	.01	.13
T x Family History	1	2.53	.01	.11
T x Age: Elem-Middle	1	0.56	—	.45
T x Age: High	1	2.42	.01	.12
T x S within-group error	1,932	(42.81)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

p* < .05. *p* < .01.

Table 26

Estimated Marginal Means for Actual Alcohol Monitoring and Reduction Protective Behavior Use by Drinker Group (N = 1,942)

Drinker Group	<i>n</i>	Pre-Test		Follow-Up	
		<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Light	930	33.11	.28	32.35	.32
Moderate	646	30.60	.33	29.85	.38
Heavy Episodic	366	25.75	.44	26.20	.51

Note. Means evaluated at Gender = .43, Black = .06, Hispanic = .15, Other = .05, Family History = .35, Elementary/Middle = .13, and High = .70.

The final scale variable created for repeated measures ANCOVA analysis regarding actual PBS use addressed binge-related behaviors. The results of the between-subjects effects analysis, which controlled for time, are presented in Table 27. The analysis, $F(2, 1,976) = 110.49, p < .01$, suggested that there was a statistically significant difference in the mean level of use of binge-related protective behaviors between drinker groups. As indicated by the η^2 value, 10% of the variability in this dependent variable was explained by drinker group. Addressing the covariates, most did not indicate statistical significance regarding the dependent variable other than both age of first consumption indicators (both significant at $p < .01$) and the indicator for Black students (significant at $p < .05$).

Table 27

Between-Subjects Effects for Actual Binge-Related Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Drinker Group	2	110.49**	.10	.01
Gender	1	0.39	—	.53
Ethnicity: Black	1	6.65*	.01	.01
Ethnicity: Hispanic	1	1.24	.01	.27
Ethnicity: Other	1	2.09	.01	.15
Family History	1	0.96	—	.33
Age: Elem-Middle	1	68.34**	.03	.01
Age: High	1	77.95**	.03	.01
<i>S</i> within-group error	1,976	(21.47)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

* $p < .05$. ** $p < .01$.

Continuing with the explanation of the ANCOVA results, the effects of time when controlling for drinker group, as well as the interaction between time and drinker group, were tested for mean differences regarding the dependent variable of binge-related protective behaviors. Results of this analysis are located in Table 28. Time was shown to be a statistically significant factor regarding mean binge-related PBS use, $F(1, 1,976) = 5.60, p < .05$. Additionally, there was a

significant interaction effect between time and drinker group, $F(2, 1,976) = 8.64, p < .01$. For each of these relationships, only 1% of the variability in the dependent variable was addressed, as noted by the η^2 values of .01. The only covariates displaying significant interaction effects with time were the two indicator variables addressing age of first consumption, both significant at the $p < .01$ level.

Table 28

Within-Subjects Effects for Actual Binge-Related Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Time (T)	1	5.60*	.01	.02
T x Drinker Group	2	8.64**	.01	.01
T x Gender	1	0.05	—	.82
T x Ethnicity: Black	1	0.15	—	.70
T x Ethnicity: Hispanic	1	2.45	.01	.12
T x Ethnicity: Other	1	1.13	.01	.29
T x Family History	1	1.10	.01	.29
T x Age: Elem-Middle	1	11.71**	.01	.01
T x Age: High	1	6.82**	.01	.01
T x S within-group error	1,976	(9.03)		

Note. Value enclosed in parentheses represents mean square errors. S = subjects.

* $p < .05$. ** $p < .01$.

Table 29 contains the estimated marginal means and standard errors for the binge-related PBS use variable by drinker group for the pre-test and follow-up surveys. This factor consisted of 3 items, yielding a possible score ranging from 3 at a minimum to 21 at a maximum. From pre-test to follow-up, this score indicated a reduction in overall use of these behaviors among light and moderate drinkers, but an increase in overall use among heavy episodic drinkers. Dividing these scores by three to obtain a mean item endorsement score, light drinkers decreased their score from 5.07 to 4.94; moderate drinkers reduced scores slightly from 4.84 to 4.76; and heavy episodic drinkers displayed an increase from 3.88 to 4.11. While the light and moderate drinkers showed minor decreases, the increase in mean score made by the heavy episodic drinkers brought all groups' mean endorsement scores into a range between 4 and 5, slightly above the midpoint of the 7-point scale. A graphical comparison of these means is located in Appendix D.

Table 29

Estimated Marginal Means for Actual Binge-Related Protective Behavior Use by Drinker Group (N = 1,986)

Drinker Group	<i>n</i>	Pre-Test		Follow-Up	
		<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Light	933	15.22	.12	14.82	.14
Moderate	676	14.53	.14	14.27	.16
Heavy Episodic	377	11.64	.19	12.32	.22

Note. Means evaluated at Gender = .43, Black = .06, Hispanic = .15, Other = .05, Family History = .34, Elementary/Middle = .14, and High = .70.

Use of Intended Protective Behavioral Strategies (PBS)

Although the change in actual PBS use by drinker group was a critical measure to study, equally important was the potential difference in intended versus actual PBS use between students in different drinker groups. This second phase of the PBS analysis compared the protective behaviors students claimed to *intend* to use while drinking to prevent further harm with the actual use of the behavior later in the semester at the follow-up period. The majority of the items addressed in both questionnaires through Question 14 (“When you drink, to what degree do you do the following?”) were also addressed in Question 15

("During the next 30 days to what degree do you plan to?"). The same seven-point Likert scale was utilized for this question. Therefore, the responses to Question 15 served as intended behaviors, while the responses to Question 14 remained representative of actual behaviors. A total of 15 items were matched between the actual and intended behavior lists. The same three items that were worded in an unfavorable fashion, "Chug alcohol," "Start drinking before going out (i.e., pre-gaming)," and "Do shots" that were subsequently reverse-coded for the actual PBS use analysis were reverse-coded here in the same fashion.

With the items selected and prepared, exploratory factor analysis began using the pre-test intended behaviors. Although these items overlapped with the selected items for use in the actual PBS use analysis, it was necessary to conduct a new exploratory factor analysis since the underlying structure of the factors was liable to change after removal of the non-overlapping items. For the factor analysis, the maximum likelihood extraction method was utilized using the Promax rotation with Kaiser normalization. Before proceeding, correlations between factors were checked to ensure appropriate use of the Promax rotation. All of the correlations were sufficiently large (above a value of .25) and therefore this rotation method was deemed acceptable for use. Communalities were examined to ensure that no value exceeded 1; this assumption was also met. Factor analysis interpretation was allowed to continue.

The factor loading for the intended PBS use items is displayed in Table 30. The use of Kaiser normalization implies that each extracted factor must explain the equivalent of at least one variable's variance. With this rule in effect, three factors were extracted. Each factor consisted of a number of items regarding a specific need for PBS use. The three factors share qualities with those extracted for the actual PBS use. The first factor, alcohol monitoring and reduction, grouped items that outright addressed behaviors a student could take while drinking to consume less alcohol in a given situation. The second factor, preventative planning, grouped the behaviors that required some advanced planning to directly prevent negative consequences, such as drinking and driving. The last factor, binge-related behaviors, grouped the same three items as in the actual PBS analysis known for being associated with binge drinking.

Table 30

Factor Loading for Intended Protective Behavioral Strategies (PBS) Use

Item	Factor		
	1	2	3
Pace your drinks to 1 or fewer per hour	.88	.53	.35
Set a limit on how many drinks you'll have	.87	.59	.31
Choose a drink containing less alcohol	.85	.50	.33
Alternate non-alcoholic beverages with alcoholic drinks	.80	.52	.26
Monitor your BAC	.79	.43	.25
Avoid drinking games	.77	.40	.39
Keep track of how many drinks you've had	.73	.70	.23
Make plans to avoid driving after drinking	.46	.88	—
Prevent a friend from driving under the influence of alcohol	.43	.80	—
Have a friend let you know when you've had enough to drink	.70	.72	.16
Eat food before or while drinking	.55	.69	—
Not drink so you can serve as designated driver	.59	.58	.20
Chug alcohol	.31	.12	.80
Do shots	.29	—	.80
Start drinking before going out	.28	—	.74

Table 31 provides the names for each of these three scales and the distribution of the 15 associated items among the scales. The first scale, alcohol monitoring and reduction, contained seven items and had a Cronbach alpha value of .93. The second scale, preventative planning, contained five items and had a Cronbach alpha value of .85. The final scale, binge-related behaviors, contained three items and had a Cronbach alpha value of .82.

It is important to note that one of the items, "Not drink so you can serve as a designated driver," was numerically placed with the alcohol monitoring and reduction factor through the analysis. However, since the factor loading scores were nearly identical for this item (.59 for alcohol monitoring and reduction behaviors and .58 for preventative planning), the researcher chose to place this item with the preventative planning scale for conceptual grouping reasons. Although not drinking is certainly a strategy associated with reduction in alcohol consumption, the item fit better as a specific strategy that requires some advanced planning before drinking to prevent negative harms from occurring to both the student and peers. All of the other items were assigned to factors as prescribed by the analysis.

Table 31

Scale Creation for Intended Protective Behavioral Strategies (PBS) Use

Scale Name	Item
Alcohol Monitoring and Reduction ^a	Pace your drinks to 1 or fewer per hour
	Set a limit on how many drinks you'll have
	Choose a drink containing less alcohol
	Alternate non-alcoholic beverages with alcoholic drinks
	Monitor your BAC
	Avoid drinking games
	Keep track of how many drinks you've had
Preventative Planning ^b	Make plans to avoid driving after drinking
	Prevent a friend from driving under the influence of alcohol
	Have a friend let you know when you've had enough to drink
	Eat food before or while drinking
	Not drink so you can serve as designated driver
Binge-Related Behaviors ^c	Chug alcohol
	Do shots
	Start drinking before going out

^a7 items, Cronbach α = .93. ^b5 items, Cronbach α = .85. ^c3 items, Cronbach α = .82.

After the additive scales addressing the different factors of intended PBS use were created, the data were prepared to conduct a repeated measures ANCOVA analysis for each of the three scales. In order to focus on the results, all of the steps for checking assumptions and performing any necessary transformations to variables will be discussed jointly for the three factors. Each of the three ANCOVA analyses will be addressed individually.

All of the dependent variables were checked for normality via skewness and kurtosis values prior to conducting any analyses. Each of the three dependent variables presented desirable skewness and kurtosis values well between -2 and 2. Therefore, no further transformations were necessary and the ANCOVA analysis could continue as planned.

The repeated measures ANCOVA analyses were conducted for all three dependent variables in the same fashion. Each analysis featured a two-level repeated measure (time), a three-level fixed factor (drinker group: light, moderate, and heavy episodic), and five control variables represented by seven dichotomous indicators and one continuous variable. For the dichotomous indicators, ethnicity was represented by dummy variables for Black, Hispanic, and Other; gender and family history were represented by single indicators; and age of first consumption was represented by dummy variables for elementary-middle school and high school age ranges. The continuous control variable was the corresponding actual PBS use from the pre-test to match the current

dependent variable. This variable strengthened the design of the analysis so that in detecting any differences in the dependent variable between the intended PBS use and subsequent actual PBS use the model could control for baseline use.

Interaction between each covariate and the fixed factor of drinker group was tested within each model to check for the presence of multicollinearity. The alcohol monitoring and reduction and preventative planning analyses did not face any issues regarding multicollinearity. When testing for this interaction within the binge-related behaviors analysis, however, the prior behavior covariate displayed significant interaction with the fixed factor of drinker group. Normally, this covariate would be considered for removal; however, the researcher deemed its role as a baseline variable too important for removal. Therefore, this covariate remained in the model, but its results were interpreted conservatively. If the tests of interest still yielded statistically significant results, even with additional variability being accounted for by this particular covariate, it would present an even stronger case for the relationship between the dependent variable and drinker group.

The first analysis involved the alcohol monitoring and reduction variable. Between-subjects analysis results, which addressed the effects of the fixed factor and covariates on the dependent variable when holding time constant, are shown in Table 32. With the factor of time set as a constant, there was a statistically significant relationship between the level of alcohol monitoring and reduction

strategies used and drinker group, $F(2, 1,824) = 15.38, p < .01$. Approximately 2% of the variability in this dependent variable could be described by drinker group as evidenced by the η^2 value. Prior behavior was the strongest covariate, not only through the test of significance, $F(1, 1,824) = 1,555.60, p < .01$ but through the η^2 value of .46. This value implies that nearly half of the variability in intended and actual PBS use for alcohol monitoring and reduction could be explained by prior behavior. Other statistically significant covariates included gender and the indicators for Black and Hispanic ethnicities, all significant at $p < .01$, as well as family history, significant at $p < .05$.

Table 33 addresses the analyses for within-subjects effects, where the repeated measure of time was taken into consideration. Controlling for drinker group and other covariates, such as prior behavior, there was no significant difference in the dependent variable of alcohol monitoring and reduction use over time, $F(1, 1,824) = 0.22, p > .05$. Additionally, there was no significant difference in the dependent variable when addressing the interaction between time and drinker group, $F(2, 1,824) = 1.40, p > .05$. The only significant interaction effect occurred between time and prior behavior, $F(1, 1,824) = 35.47, p < .01$. It is entirely possible that this interaction effect, serving as a covariate, offset any relationship with the dependent variable regarding time alone or the interaction between time and drinker group.

Table 32

Between-Subjects Effects for Intended Alcohol Monitoring and Reduction Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Drinker Group	2	15.38**	.02	.01
Prior Behavior	1	1,555.60**	.46	.01
Gender	1	59.82**	.03	.01
Ethnicity: Black	1	10.83**	.01	.01
Ethnicity: Hispanic	1	9.82**	.01	.01
Ethnicity: Other	1	2.53	.01	.11
Family History	1	4.23*	.01	.04
Age: Elem-Middle	1	3.56	.03	.06
Age: High	1	0.88	—	.35
<i>S</i> within-group error	1,824	(75.49)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

p* < .05. *p* < .01.

Table 33

Within-Subjects Effects for Intended Alcohol Monitoring and Reduction Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Time (T)	1	0.22	—	.64
T x Drinker Group	2	1.40	.01	.25
T x Prior Behavior	1	35.47**	.02	.01
T x Gender	1	2.52	.01	.11
T x Ethnicity: Black	1	1.72	.01	.19
T x Ethnicity: Hispanic	1	0.88	—	.35
T x Ethnicity: Other	1	2.47	.01	.12
T x Family History	1	0.16	—	.69
T x Age: Elem-Middle	1	0.56	—	.46
T x Age: High	1	0.01	—	.97
T x S within-group error	1,824	(57.93)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

* $p < .05$. ** $p < .01$.

The estimated marginal means and standard errors addressing intended and actual alcohol monitoring and reduction PBS use while controlling for the assorted covariates are contained in Table 34. Seven items comprised this factor, yielding scores ranging from a possible low of 7 to a high of 49. Light drinkers had both the highest pre-test intended and follow-up actual scores; moderate drinkers had the second-highest set of scores; heavy episodic drinkers displayed the lowest scores. When converting these scores to mean item endorsement scores on a scale of 1 to 7, the intended alcohol monitoring and reduction pre-test scores ranged from 4.20 among heavy episodic drinkers to 4.61 among light drinkers, but the actual use scores in the follow-up ranged from 3.61 among heavy episodic drinkers to 3.85 among light drinkers. Once again, while drinker group was shown to be a significant factor, neither time nor the interaction between time and drinker group was shown to be significant, possibly due to the strength of the prior behavior covariate. A graphical comparison of these means is located in Appendix D.

Table 34

Estimated Marginal Means for Intended Alcohol Monitoring and Reduction Protective Behavior Use by Drinker Group (N = 1,835)

Drinker Group	<i>n</i>	Pre-Test		Follow-Up	
		<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Light	885	32.30	.27	26.92	.30
Moderate	608	30.87	.31	26.01	.35
Heavy Episodic	342	29.40	.44	25.26	.50

Note. Means evaluated at Prior Behavior = 26.05, Gender = .42, Black = .06, Hispanic = .15, Other = .05, Family History = .35, Elementary/Middle = .13, and High = .70.

The second analysis related to intended PBS use addressed the preventative planning factor. Table 35 addresses the between-subjects effects analysis regarding this dependent variable. Holding time constant, there was no statistically significant difference in intended preventative planning PBS use between respondents in different drinker groups, $F(2, 1,880) = 2.55, p > .05$. Several covariates, however, were significant at either the $p < .01$ level (prior actual behavior, gender, Hispanic ethnicity, and age of first consumption in elementary or middle school) or the $p < .05$ level (Black and Other ethnicities). Most notably, the η^2 value of .46 for prior behavior implies that nearly half of the variability in the dependent variable could be described by prior behavior alone.

Table 35

Between-Subjects Effects for Intended Preventative Planning Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Drinker Group	2	2.55	.01	.08
Prior Behavior	1	780.92**	.46	.01
Gender	1	73.17**	.04	.01
Ethnicity: Black	1	6.16*	.01	.01
Ethnicity: Hispanic	1	13.52**	.01	.01
Ethnicity: Other	1	0.52*	—	.47
Family History	1	0.01	—	.99
Age: Elem-Middle	1	9.52**	.01	.01
Age: High	1	2.81	.01	.09
<i>S</i> within-group error	1,880	(28.44)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

p* < .05. *p* < .01.

Of greater interest was the within-subjects analysis for which results are displayed in Table 36. Although drinker group was not a significant factor when controlling for time, there was a significant interaction between drinker group and time, $F(2, 1,880) = 3.92, p < .05$. Time alone was not a significant factor in

differentiating mean intended preventative planning use, $F(1, 1,880) = 0.02, p > .05$. The interactions between time and prior behavior as well as time and gender were statistically significant at the $p < .01$ and $p < .05$ levels, respectively. The fact that the only non-covariate-related significant interaction from both the between-subjects and within-subjects analyses implies that when analyzed as large groups, there were no differences between the dependent variable for either drinker group or time alone, but when examining the variable while taking both drinker group *and* time into consideration, as well as the covariates, there was a difference in performance.

Estimated marginal means and standard errors for the intended versus actual preventative planning variable, by time and drinker group, are located in Table 37. This scale consisted of six items, which gave the variable a minimum possible score of 6 and a maximum possible score of 42. All of the mean intended behavior scores in the pre-test began at nearly identical levels with moderate drinkers actually showing a slightly lower mean than heavy episodic drinkers. In the follow-up survey measuring actual use, all of the scores lowered from the intended scores in the pre-test, but to increasingly greater extents, as severity of drinker group increased. Converting these scores into mean item endorsement scores, both light and heavy episodic drinkers began with scores of 5.94 for intended preventative planning use as of the pre-test; moderate drinkers had a score of 5.87. The actual scores as of the follow-up became 5.36, 5.31, and 5.14 for

light, moderate, and heavy episodic drinkers, respectively. The statistically significant interaction was likely caused by this group divergence. A graphical comparison of these means is located in Appendix D.

Table 36

Within-Subjects Effects for Intended Preventative Planning Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Time (T)	1	0.02	.01	.89
T x Drinker Group	2	3.92*	.01	.02
T x Prior Behavior	1	8.34**	.01	.01
T x Gender	1	5.42*	.01	.02
T x Ethnicity: Black	1	0.01	—	.97
T x Ethnicity: Hispanic	1	0.85	—	.56
T x Ethnicity: Other	1	2.20	.01	.14
T x Family History	1	0.94	.01	.33
T x Age: Elem-Middle	1	1.37	.01	.24
T x Age: High	1	0.08	—	.78
T x S within-group error	1,880	(20.77)		

Note. Value enclosed in parentheses represents mean square errors. S = subjects.

p* < .05. *p* < .01.

Table 37

Estimated Marginal Means for Intended Preventative Planning Protective Behavior Use by Drinker Group (N = 1,891)

Drinker Group	n	Pre-Test		Follow-Up	
		M	SE	M	SE
Light	908	29.69	0.13	26.80	0.20
Moderate	632	29.36	0.15	26.56	0.24
Heavy Episodic	351	29.68	0.21	25.70	0.34

Note. Means evaluated at Prior Behavior = 27.99, Gender = .42, Black = .06, Hispanic = .15, Other = .05, Family History = .35, Elementary/Middle = .13, and High = .70.

The final repeated measures ANCOVA analysis exploring the differences between intended and actual PBS use involved binge-related behaviors. Table 38 contains the results of the between-subjects effects analysis which controlled for the repeated measure of time. With the factor of time held constant, there was a significant difference in binge-related PBS use utilizing drinker group as a factor, $F(2, 1,932) = 15.01, p < .01$. Approximately 2% of the variability in the dependent variable could be explained by drinker group. Most of the covariates were not significant as controlling factors; however, prior behavior did have a significant relationship, $F(1, 1,932) = 1,392.24, p < .01$. More importantly, 42% of the variability in score could be accounted for by prior behavior alone. The indicator

for the Other ethnicity category was the only other significant covariate at the $p < .05$ level.

Table 38

Between-Subjects Effects for Intended Binge-Related Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Drinker Group	2	15.01**	.02	.01
Prior Behavior	1	1,392.24**	.42	.01
Gender	1	3.42	.01	.07
Ethnicity: Black	1	3.30	.01	.07
Ethnicity: Hispanic	1	1.65	.01	.20
Ethnicity: Other	1	6.73*	.01	.01
Family History	1	0.69	—	.41
Age: Elem-Middle	1	1.03	.01	.31
Age: High	1	3.46	.01	.06
<i>S</i> within-group error	1,932	(13.08)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

* $p < .05$. ** $p < .01$.

The within-subjects effects results, which accounted for the interaction between time and the fixed factor of drinker group, as well as time and each covariate, are reported in Table 39. The analysis indicated a statistically significant relationship between the factor of time and the dependent variable representing binge-related PBS use, $F(1, 1,932) = 22.68, p < .01$. When testing for the interaction between time and drinker group, however, the results were not significant with respect to this dependent variable: $F(2, 1,932) = 1.00, p > .05$. Two covariates displayed significant interactions with respect to time: prior behavior, significant at $p < .01$, and gender, significant at $p < .05$.

Table 39

Within-Subjects Effects for Intended Binge-Related Protective Behavior Use by Drinker Group

Source	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Time (T)	1	22.68**	.01	.01
T x Drinker Group	2	1.00	.01	.37
T x Prior Behavior	1	76.59**	.04	.01
T x Gender	1	5.17*	.01	.02
T x Ethnicity: Black	1	1.28	.01	.26
T x Ethnicity: Hispanic	1	0.02	—	.89
T x Ethnicity: Other	1	0.08	—	.79
T x Family History	1	0.80	—	.37
T x Age: Elem-Middle	1	0.03	—	.86
T x Age: High	1	0.86	—	.35
T x <i>S</i> within-group error	1,932	(10.25)		

Note. Value enclosed in parentheses represents mean square errors. *S* = subjects.

p* < .05. *p* < .01.

The estimated marginal means for intended binge-related PBS behaviors, separated by pre-test intent, follow-up actual use, and drinker group, are displayed in Table 40. This scale consisted of three items, which yielded a possible score range from 3 to 21. Once again, the ANCOVA results indicated

that neither drinker group nor its interaction with time was significant, but the element of time itself was significant. These results were reflected in the estimated marginal means. Although an increase in drinker group led to gradual reductions in both mean intended binge-related PBS use in the pre-test and actual use in the follow-up surveys, the differences were not large enough overall between drinker groups, nor the rates of change disparate enough, to yield statistical significance for either relationship. However, when holding drinker group constant and adjusting for the other covariates, there was an overall reduction as a population between intended use and actual use. Converting these means to average item endorsement scores, the intended use ranged from 4.83 among heavy episodic drinkers to 5.14 among light drinkers. The actual use as of the follow-up ranged from 4.53 among heavy episodic drinkers to 4.81 among light drinkers. These mean scores fell slightly above the halfway point of the seven-point Likert scale. A graphical comparison of these means is located in Appendix D.

Table 40

Estimated Marginal Means for Intended Binge-Related Protective Behavior Use by Drinker Group (N = 1,943)

Drinker Group	<i>n</i>	Pre-Test		Follow-Up	
		<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Light	915	15.43	.28	14.44	.32
Moderate	655	14.81	.33	14.15	.38
Heavy Episodic	373	14.50	.44	13.58	.51

Note. Means evaluated at Prior Behavior = 14.30, Gender = .43, Black = .06, Hispanic = .15, Other = .05, Family History = .34, Elementary/Middle = .14, and High = .70.

A final portion of analysis regarding intended PBS use involved a selection of items asked to all drinkers as part of Question 15 in the follow-up survey addressing intended behavior. Because these items were mostly AlcoholEdu-centric, students were not asked these questions in the pre-test; however, many of these items related to goal-setting behavior and were therefore important to examine descriptively.

Means and standard deviations for these 10 items separated by drinker group are located in Table 41. To ensure equal comparisons across questions, only students who answered all of the questions were included in the analysis. Like the rest of Question 15, the scale on each question ranged from 1 (*never*) to 7

(*always*) in terms of likelihood of using these strategies. Without exception, the mean score of every item decreased steadily as the severity of drinker group increased. Of the 10 items, the behaviors rated by students as the most likely to enact within the next month was to attend alcohol-free social events, followed by putting into practice the knowledge gained through the AlcoholEdu program. The least popular response was to get involved in working on campus alcohol policies. The ranges for the mean responses varied by drinker group; among light drinkers, all of the means fell within the approximate 3-5 range, which corresponded with the center of the scale. Among heavy episodic drinkers, on the other hand, only attendance at alcohol-free social events received a mean score higher than 4.

Table 41

Descriptive Statistics for Post-AlcoholEdu Only Intended Protective Behavior Use Items

Item	Light ^a		Moderate ^b		Heavy Ep. ^c	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Talk with others about your decisions regarding alcohol use	3.54	1.93	3.37	1.88	2.94	1.74
Support the choice not to drink	4.72	1.85	4.00	1.89	3.37	1.92
Attend alcohol-free social events	5.15	1.79	4.73	1.78	4.26	1.82
Help plan alcohol-free social events	3.80	2.04	3.49	1.90	3.02	1.88
Get involved in working on campus alcohol policies	3.23	1.94	2.95	1.77	2.56	1.75
Be better informed of laws and policies regarding alcohol use	4.22	1.92	3.85	1.83	3.35	1.88
Review the goals and personal plan that you created for yourself	4.25	1.95	3.95	1.88	3.47	1.89
Utilize the AlterEdu social networking site	3.50	1.95	3.18	1.87	2.80	1.81
Log into your personal MyAlcoholEdu page to access information and resources	3.49	1.92	3.19	1.84	2.81	1.75
Put into practice what you learned from AlcoholEdu	4.74	1.90	4.43	1.86	3.75	1.94

Note. Heavy Ep. = Heavy Episodic.

^a*n* = 978. ^b*n* = 777. ^c*n* = 569.

Use of Protective Behavioral Strategies (PBS) Among Abstainers

In essence, students who abstain from consuming alcohol engage in the utmost level of PBS. However, students can cite a variety of reasons as to why they choose to not engage in this type of behavior. Question 16 of both the pre-test and follow-up surveys asked students to rate the reasons why they choose not to drink. Students selected a response on a scale of 1 (*not at all important*) to 7 (*very important*). Focusing only on the responses of students who answered all of the items within the question and abstained in both the pre-test and follow-up surveys, means and standard deviations for these items are provided in Table 42.

As of the pre-test, the top five reasons for not drinking included not having to drink in order to have a good time; having to drive; having other things to do; being against one's personal values; and not wanting to lose control. As of the follow-up, these top five reasons remained the same, with the exception of not wanting to spend the money replacing not wanting to lose control. Between the pre-test and follow-up, most of the means decreased between the pre-test and follow-up. The few items that did indicate an increase mainly included the bottom-ranked items, with the largest increase of .17 points occurring for the reason that alcohol was fattening. These students also showed an increased awareness of family alcohol problems, as well as a greater desire to fit in with a group.

Table 42

Descriptive Statistics for Abstainer-Only Reasons for Not Drinking (N = 985)

Item	Pre-Test		Follow-Up	
	M	SD	M	SD
I don't have to drink to have a good time	6.34	1.42	5.99	1.69
Going to drive	6.18	1.64	5.90	1.76
Have other things to do	6.02	1.63	5.75	1.75
Against my personal values	5.75	1.85	5.51	1.94
Don't want to lose control	5.73	1.85	5.41	1.94
Worried about negative health effects	5.72	1.84	5.38	1.88
Not old enough to drink legally	5.70	1.94	5.40	2.00
Interferes with school work	5.51	2.13	5.16	2.14
People I care about would disapprove	5.48	2.05	5.32	2.00
Don't want to spend the money	5.44	2.06	5.49	1.91
Don't want the image of a "drinker"	5.13	2.23	4.92	2.19
Don't like the taste	5.09	2.14	4.96	2.05
Worried about being caught by authorities	5.03	2.24	4.98	2.11
Don't like being around others drinking	4.99	2.09	4.85	2.10
Don't like the way I act when drinking	4.41	2.25	4.28	2.16

Item	Pre-Test		Follow-Up	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Friends don't drink	4.16	2.24	4.16	2.16
Family alcohol problems	3.78	2.50	3.90	2.39
Interferes with athletics	3.76	2.57	3.61	2.43
Conflicts with my religious beliefs	3.58	2.49	3.61	2.41
Alcohol is fattening	3.54	2.37	3.71	2.30
Want to fit in with a group I like	3.04	2.33	3.14	2.25
Decided to cut down	2.78	2.26	2.79	2.16
Not able to due to medical condition	2.60	2.31	2.69	2.23
Own problems with past alcohol use	2.18	2.09	2.23	2.00

Negative Consequences

The final set of items for trend analysis involved the rate of incurrance of negative consequences. Similarly to the PBS analysis, the survey question regarding negative consequences was first examined through exploratory factor analysis to create scale variables reflecting different types of negative consequences. These variables were then analyzed for differences by drinker

group through the use of inferential statistics. Deviations from the original plan of utilizing repeated measures ANCOVA will be addressed as well.

The negative consequences analysis involved a comparison of the adverse events incurred by moderate and heavy episodic drinkers from the pre-test to the follow-up. Question 11 in both surveys asked respondents, "During the past two weeks, to what degree did the following happen to you when drinking or as a result of your drinking? Don't count things that have happened to you but were not because of drinking." A total of 24 behaviors follow, for which respondents were asked to rate their personal usage on a Likert-type scale of 1 (*never*) to 7 (*always*). All of the behaviors listed were worded in an undesirable fashion (i.e., "Felt sick to your stomach" or "Strained a relationship with a friend") and therefore did not require any further transformation.

Once these steps for data preparation were taken, the items were ready for conducting exploratory factor analysis based upon the pre-test values. Factors were extracted using the maximum likelihood method and rotated using the Promax rotation with Kaiser normalization. Since Promax is an oblique rotation and should only be used with correlated factors, all of the correlations between the extracted factors were checked for sufficient size (above a value of .25) before accepting the results. Since this assumption was met, values of communalities were checked as well to ensure that no value exceeded 1. No issues arose

regarding communalities, so the interpretation of the factor analysis continued as planned.

The factor loading for the actual PBS use items are located in Table 43. The use of Kaiser normalization implies that each extracted factor must explain the equivalent of at least one variable's variance. With this rule in effect, a total of four factors were extracted. While many items clearly loaded most strongly among one particular factor, other items had similar factor loadings among multiple factors. This correlation between factors was accounted for as best as possible by choosing a rotation method such as Promax.

Further examining the groupings of items in Table 43, each factor consisted of a number of items regarding a specific negative consequence. The first factor, abusive behaviors, addressed negative consequences arising from activities that involved physically or emotionally abusing oneself or someone else as a result of drinking. Personal consequences, the next factor, addressed largely less severe consequences that were personal in nature but not as egregious as the abusive behaviors. The third factor, educational and professional, was comprised of all the negative consequences directly related to school or work. The drinking and driving factor consisted of the items associated with a student either drinking and driving him or herself or riding with another driver who was drinking.

Table 43

Factor Loading for Negative Consequences

Item	Factor			
	1	2	3	4
Got into trouble with authorities	.77	.39	.61	.38
Injured another person	.74	.37	.58	.62
Taken advantage of someone sexually	.73	.34	.52	.33
Got involved in a physical fight	.73	.38	.54	.36
Deliberately vomited to continue drinking	.71	.40	.56	.36
Been taken advantage of sexually	.68	.37	.51	.43
Damaged property	.68	.44	.49	.32
Strained a relationship with a friend	.61	.45	.37	.34
Said things you didn't mean that hurt others' feelings	.60	.52	.34	.34
Injured yourself	.56	.52	.36	.28
Was argumentative	.51	.51	.29	.32
Forgot where you were or what you did	.42	.75	.30	.34
Passed out	.45	.72	.36	.25
Got a hangover	.30	.65	.25	.27
Embarrassed yourself	.51	.65	.26	.31

Item	Factor			
	1	2	3	4
Felt sick to your stomach	.31	.63	.25	.22
Did something you regretted	.52	.62	.34	.27
Got behind in school work	.64	.37	.86	.34
Performed poorly on an assignment/test	.64	.44	.85	.35
Missed a class	.59	.41	.71	.27
Missed going to work	.63	.32	.70	.33
Drove after drinking 4 or more drinks	.46	.36	.31	.97
Drove after drinking 5 or more drinks	.48	.36	.34	.94
Rode with a driver who had been drinking	.43	.44	.32	.56

Table 44 provides the names for each of these four scales and the distribution of the 24 associated items. The first scale, abusive behaviors, contained 11 items and had a Cronbach alpha value of .87. The second scale, personal consequences, contained six items and had a Cronbach alpha value of .82. The third scale, educational and professional, contained four items and had a Cronbach alpha value of .87. The final scale, drinking and driving, contained three items and had a Cronbach alpha value of .83. The factor analysis assigned

the items in a logical fashion from a conceptual standpoint; therefore, the researcher did not have to re-assign any items to another category.

After the additive scales addressing the different factors of negative consequences were created, the data were prepared to conduct a repeated measures ANCOVA analysis for each of the four scales. All of the dependent variables were checked for normality via skewness and kurtosis values prior to conducting any analyses. Due to the nature of negative consequences of any type, all four dependent variable distributions were extremely skewed to the right, as many of the moderate and heavy episodic drinkers surveyed did not experience any of the negative consequences listed in each factor and, therefore, scored the factor's absolute minimum value (all *never* responses). As variables with a severe degree of skewness or kurtosis are typically beyond the threshold of transformation into a more normal distribution, all four negative consequence dependent variables were deemed unsuitable for a parametric inferential test such as repeated measures ANCOVA.

Table 44

Scale Creation for Negative Consequences

Scale Name	Item
Abusive Behaviors ^a	Got into trouble with authorities
	Injured another person
	Taken advantage of someone sexually
	Got involved in a physical fight
	Deliberately vomited to continue drinking
	Been taken advantage of sexually
	Damaged property
	Strained a relationship with a friend
	Said things you didn't mean that hurt others' feelings
	Injured yourself
Was argumentative	
Personal Consequences ^b	Forgot where you were or what you did
	Passed out
	Got a hangover
	Embarrassed yourself
	Felt sick to your stomach
	Did something you regretted

Scale Name	Item
Educational and Professional ^c	Got behind in school work
	Performed poorly on an assignment/test
	Missed a class
	Missed going to work
Drinking and Driving ^d	Drove after drinking 4 or more drinks
	Drove after drinking 5 or more drinks
	Rode with a driver who had been drinking

^a11 items, Cronbach $\alpha = .87$. ^b6 items, Cronbach $\alpha = .82$. ^c4 items, Cronbach $\alpha = .87$.
^d3 items, Cronbach $\alpha = .83$.

In selecting an alternate approach for analysis that was more suitable for these Poisson-type distributions, the researcher wished to maintain the focus upon determining whether there were any differences in the extent of change of behavior from pre-test to follow-up between students in different drinker risk groups. Though the original intent involved controlling for other demographic variables, the combination of relatively small subsample sizes for drinker groups and extreme weight upon the single lowest possible value prompted the choice in analytical method to forgo further breakouts by demographics. For example, within the abusive behaviors dependent variable, the subsample size for moderate drinkers was $n = 473$. Of these respondents, 71.5% contributed the minimum possible score of 11. To further attempt to explain the relationship

through additional demographic variables such as gender, ethnicity, family history, or age of first consumption would have required further differentiation among a subsample already lacking in overall variability. Therefore, the focus for analysis was maintained upon drinker group, moderate or heavy episodic.

The analytical method selected was the Mann-Whitney test, a nonparametric inferential test that compares two independent samples to determine if they originated from the same distribution. Because this test is nonparametric in origin, the issues of skewness and kurtosis did not apply and the focus could be maintained upon seeking differences in the two distributions. An additional step in data preparation, calculating a difference score, was necessary prior to performing this comparison. The Mann-Whitney Test compares two independent groups which, in this case, were moderate and heavy episodic drinkers. Each student, however, had two scores for each dependent variable, a pre-test score and a follow-up score. Stressing the importance of change between the two survey periods, a single difference score was created by subtracting the pre-test score from the follow-up score. Ultimately, a positive difference score would imply that a student incurred more frequent negative consequences as of the follow-up period, while a negative score would imply a decrease in incurrance of negative consequences. Descriptive statistics containing the mean values as of the pre-test and follow-up for each dependent variable and drinker group were also provided as points of reference. Using the difference

score alone would not appropriately depict the entire scope of any discrepancies between groups, because it was important to be aware of the actual locations of the distributions.

The first analysis addressed the factor describing abusive behavior-related negative consequences. Descriptive statistics and results of the Mann-Whitney test are displayed in Table 45. This factor was comprised of 11 items, which yielded a minimum possible score of 11 and a maximum possible score of 77. The test, $Z = -1.15, p > .05$, indicated that there was no statistically significant difference in the composition of the difference scores between moderate and heavy episodic drinkers. Between the pre-test and follow-up periods, students in both groups displayed change in a statistically similar fashion. However, the means provided some evidence that while the two groups may have changed at similar rates, both groups incurred, on average, greater numbers of abusive behavior-related negative consequences in the follow-up as compared to the pre-test. Converting the means to average per-item endorsement values, moderate drinkers averaged a score of 1.12 in the pre-test and 1.28 in the follow-up which were both extremely close to the minimum value of 1, corresponding to *never*. Heavy episodic drinkers began with a higher pre-test average endorsement score of 1.36 and increased to 1.55, both values still near the absolute minimum score. A graphical comparison of these means is located in Appendix D.

Table 45

Mann-Whitney Results and Descriptive Statistics for Abusive Behaviors (N = 789)

Group	<i>n</i>	<i>M_r</i>	Pre-Test		Follow-Up	
			<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Moderate	473	402.29	12.28	.15	14.05	.35
Heavy Episodic	316	384.09	14.95	.36	17.14	.58

Note. $Z = -1.15, p > .05$.

The next analysis, with Mann-Whitney results and descriptive statistics highlighted in Table 46, involved the incurrence of personal negative consequences that were not of the same severity as those addressed by the abusive behaviors variable. This factor contained 6 items, yielding a minimum possible value of 6 and a maximum possible value of 42. The Mann-Whitney test, $Z = -3.08, p < .01$, suggested that there was a statistically significant difference in the distribution of rate of change in this dependent variable between moderate and heavy episodic drinkers. A comparison of mean rank values ($M_r = 423.44$ for moderate drinkers; $M_r = 372.34$ for heavy episodic drinkers) showed that the moderate drinkers, having the larger mean rank value, had a greater increase in change rate of this negative consequence than did their heavy episodic peers. The mean values suggest, however, that moderate drinkers may have been on a

convergent path with heavy episodic drinkers in regard to this behavior. The mean item endorsement score for moderate drinkers increased from 1.34 in the pre-test to 1.67 in the follow-up. Both of these mean scores were still lower than those of the heavy episodic drinkers whose mean scores increased slightly from 2.05 in the pre-test to 2.16 in the follow-up. A graphical comparison of these means is located in Appendix D.

Table 46

Mann-Whitney Results and Descriptive Statistics for Personal Consequences (N = 805)

Group	n	M _r	Pre-Test		Follow-Up	
			M	SE	M	SE
Moderate	483	423.44	8.06	.17	10.04	.28
Heavy Episodic	322	372.34	12.31	.35	12.97	.39

Note. Z = -3.08, p < .01.

Mann-Whitney test results and descriptive statistics for educational and professional consequences, the third factor analyzed, are shown in Table 47. The inferential test, Z = -2.35, p < .05, provided evidence that there was a statistically significant difference in the distribution of change rates in educational and professional negative consequences between moderate and heavy episodic

drinkers. In comparing the mean rank values, the results suggested that heavy episodic drinkers, $M_r = 435.43$, experienced a larger growth toward an increased incurrence of these negative consequences compared to moderate drinkers, $M_r = 400.42$. The mean values from the pre-test and follow-up corroborated these results. Converting the overall means to average item endorsement scores, moderate drinkers experienced increased occurrences of these consequences between the pre-test and follow-up surveys with an average rising from 1.06 to 1.41, while the average for heavy episodic drinkers rose from 1.20 to 1.71. Regardless of drinker group, these results indicated very low levels of endorsement. A graphical comparison of these means is located in Appendix D.

Table 47

Mann-Whitney Results and Descriptive Statistics for Educational and Professional (N = 828)

Group	<i>n</i>	M_r	Pre-Test		Follow-Up	
			<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Moderate	495	400.42	4.24	.05	5.62	.16
Heavy Episodic	333	435.43	4.78	.13	6.85	.24

Note. $Z = -2.35, p < .05$.

Results from the Mann-Whitney Test alongside descriptive statistics for the analysis on the final dependent variable, drinking and driving, are located in Table 48. The results of the inferential test, $Z = -4.90$, $p < .01$, provided evidence of a statistically significant difference in the distribution of drinking and driving-related consequence changes between moderate and heavy episodic drinkers. Unlike the analyses for the other three dependent variables, these results suggested that moderate and heavy episodic behaviors moved in opposite directions. The mean rank score among heavy episodic drinkers ($M_r = 367.41$) was substantially lower than the mean rank score for moderate drinkers ($M_r = 441.85$) due to a decline in this consequence among heavy episodic drinkers and an increase in the consequences among moderate drinkers. It was also important to examine the average item endorsement scores. Despite the increase among moderate drinkers and the decrease among heavy episodic drinkers regarding this dependent variable, all of the average item endorsement scores fell between 1 (the absolute minimum, corresponding to *never*) and 2. Specifically, the average for moderate drinkers rose from 1.14 to 1.30 and fell among heavy episodic drinkers from 1.89 to 1.77. The two means were still reasonably separated as of the follow-up. A graphical comparison of these means is located in Appendix D.

Table 48

Mann-Whitney Results and Descriptive Statistics for Drinking and Driving (N = 823)

Group	<i>n</i>	<i>M_r</i>	Pre-Test		Follow-Up	
			<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Moderate	493	441.85	3.41	.05	3.90	.10
Heavy Episodic	330	367.41	5.68	.22	5.30	.21

Note. $Z = -4.90, p < .01.$

CHAPTER 5 DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

This chapter contains a discussion of the results of the data analysis and a summary of findings organized around the two research questions used to guide the study. The results of the product evaluation, performed as one component of the analysis, as well as implications for practice, policy and future research are also presented. Concluding remarks provide any pertinent commentary not addressed elsewhere within the chapter.

Discussion

Research Question 1

What differences, if any, exist in the demographic composition of the incoming freshmen students between those who completed the AlcoholEdu program as prescribed and those who did not complete the program, as measured by gender, ethnicity, drinker status, drinker risk group, age of first alcohol consumption, and family history of alcoholism?

Research Question 1 was used to examine the factor of completion of the AlcoholEdu program. In the context of this study, completion status served as the first step in measuring program influence: If students did not choose to follow program directions, they did not step inside the proverbial “front door” of AlcoholEdu by receiving the intervention as intended. As a population-level

intervention, the program must have the ability to reach all facets of a student population.

A total of 26.5% of the study population was categorized as improper completers by not beginning the intervention on time, not completing the education component, or not completing the follow-up survey. Although students who did not complete the follow-up survey may have received the whole intervention, their unwillingness to complete the final survey indicated a lack of serious thought regarding the AlcoholEdu program. Within this subpopulation of 1,475 improper or non-completers, differences with respect to various demographics were mixed in magnitude.

Statistical analysis indicated that there was a significant relationship between gender and completion status. Men were more likely than women to not respond as requested to the AlcoholEdu program. While most of the literature regarding differences in drinking-related issues by gender addressed actual drinking and protective behavior-related aspects rather than receptiveness to following through with a mandatory educational alcohol intervention, the concept of willingness to change relates to the completion factor. The finding in the current study related to those of Barnett et al. (2006) who found that women had a greater likelihood of changing heavy drinking behavior than men. It was possible that men did not feel as much of a need to learn any more about their

relationship with alcohol than they previously knew, as compared to women, and therefore did not fully participate in the intervention.

On the other hand, ethnicity did not present itself as a factor related to completion of the program. These findings contradicted those of McCaughrin (1995) on some level, as he found a disparity between White and Black students regarding interest levels in AOD programs. Completion, however, is not necessarily synonymous with interest, so the findings in the current study were helpful in clarifying the body of literature on this topic.

Family history of alcoholism also did not hold a statistically significant relationship with completion status. In specifically referring to factors of why students may or may not respond to a mandatory call for participation for a particular intervention, research was lacking in the area of family history of alcohol issues. Nevertheless, prior research suggesting that students with a heavy or problematic-drinking parent were more likely than peers to miss class or fall behind in coursework (Powell et al., 2004) were applicable; in essence, AlcoholEdu was a mini-course for students. From this perspective, the current study did not agree with the findings of Powell et al. However, since skipping regular classes does not lead to a consequence as serious as the placement of an academic hold, this lack of relationship between family history and completion status for the AlcoholEdu program was justifiable.

A significant factor of completion status, as well as one with reasonable explanatory power as indicated by effect size, was age of first consumption. Abstainers had the lowest likelihood of not completing the program. Among non-abstainers, the younger students were when they first drank alcohol, the greater the likelihood of their not properly completing the AlcoholEdu program in its entirety. Unfortunately, the long-time young drinkers were the individuals most in need of intervention, as they had the longest period of time to build positive expectancies from drinking (Dunn & Goldman, 1996) and were the most likely to meet criteria for alcohol dependence (Hingson et al., 2003). Once again, the literature regarding completion of a mandatory intervention with respect to a factor such as age of first consumption was sparse, but this result aligned with previous findings addressing the existence of hard-to-break established behavioral norms.

The final two variables for which a relationship was tested with completion status, drinker status and drinker group, not only indicated statistical significance, but also the largest effect size (drinker group). These findings demonstrated that when describing AOD program compliance, a critical factor lies in not only whether or not students drink, but how heavily. The compliance likelihood patterns followed in the same fashion as age of first consumption: abstainers had the lowest likelihood of improper completion, and heavy episodic drinkers, the most severe category, had a very high likelihood of improper

completion. These results helped to confirm the fears of Cronce et al. (2004), who stated that the use of campus-wide alcohol assessments “may create distrust in students regarding the intent or purpose of the screening. . . students may be suspicious of a assessment or screening if they fear it signals a ‘crackdown’ or is intended to identify the ‘troublemakers’” (p. 100). In the realm of AOD education, the heaviest-drinking students would qualify as the “troublemakers” and, therefore, may be contemptuous of the purpose of the program.

The results from Research Question 1 addressed the self-efficacy determinant of social cognitive theory, the guiding theoretical framework for the current study addressed in Chapter 1. Self-efficacy serves as one of the more critical components in leading to health behavior change (Bandura, 2004). Although individuals who completed the AlcoholEdu program in the allotted time did not necessarily change their behavior, completion status served as a proxy for taking the first step toward starting the process. The analysis indicated that the quarter of the students who did not complete the program properly were lacking in this self-efficacy. Additionally, the fact that students who were drinkers since prior to high school or were currently heavy episodic drinkers were the least likely to properly complete the program made sense from the self-efficacy perspective. These students likely had the most deeply ingrained drinking habits and, therefore, had little interest in completing the program due to a lack of belief that they could, or needed to, change their drinking behavior.

Research Question 2

Which drinker risk groups, if any, show the greatest degree of willingness to change alcohol use habits in the areas of (a) consumption, (b) use of protective behavioral strategies, and (c) negative consequences, when gender, ethnicity, age of first alcohol consumption, and family history of alcoholism serve as contributing variables?

The behavior of the students identified through Research Question 1 as having properly completed the AlcoholEdu program was further analyzed in Research Question 2. The research associated with this question addressed the concept of change in select areas and the degree to which these changes differed among groups. Although the present study did not have a mechanism for detecting what change would have occurred without the presence of the AlcoholEdu course, valuable findings regarding differences between students of different demographics were established.

Consumption

The first segment of Research Question 2 addressed differences in levels of alcoholic consumption. One method of examining the changes in consumption levels between the pre-test and follow-up periods was to track the shifts from one drinker group to another. In this population of students, 60% were identified as drinkers as of the pre-test, a rate slightly higher than the 51% to 54% identified through previous freshman-based research (Sax, 1997; White & Swartzwelder,

2009). This statistic, however, did not dramatically worsen as the semester progressed. Overall, nearly 80% of the students who self-identified as abstainers prior to beginning college remained in this category as of the follow-up later in the semester. The majority of the students who became drinkers did not progress to the more severe categories. Only eight percent of the original abstainer population claimed to have consumed alcohol within the past two weeks to any extent. In examining reverse movement, approximately 12% of light drinkers became abstainers as of the post-test. In total, the 60% drinker rate as of the pre-test increased to 64% as of the follow-up. Compared to the general rate (81%) of college students who consumed alcohol within the past month (Johnston et al., 2008), the rate among these freshmen was much lower, though it is important to note that the comparison statistics included students older than freshmen.

The second most retentive group was on the opposite end of the drinking spectrum. A total of 64% of the heavy episodic drinkers remained in the category, while the remaining 36% moved to less severe drinking categories. These results aligned with those of Barnett et al. (2006), who found that within a subgroup of heavily drinking college students, 30% had a plan to change or reduce drinking behaviors. On a positive note, the overall subpopulation of binge drinkers in this study was much smaller than has been estimated in other studies. Johnston et al. (2009) uncovered a 12th grade binge drinking rate of 25%, while the same group of authors estimated this rate to have increased to 41%

among a general college student population in a 2008 study. In the current study, only 10% identified themselves as binge drinkers in the pre-test; the rate increased to 16% at the time of the follow-up.

Shifts in drinker group were also analyzed by gender. Though most of the group movement trends were consistent between genders, the heavy episodic drinking trends were of particular interest. A greater percentage of men who began college as heavy episodic drinkers remained in the category at the time of the follow-up as compared to women who began college in the same category. Once again, although this population did not contain a particularly large proportion of heavy episodic drinkers compared to national studies, the divide between men and women with respect to this behavior, as observed by Wechsler, Dowdall, Davenport, and Castillo (1995) as well as Johnston et al. (2009), began to develop as of the follow-up survey. Both gender subpopulations contained approximately 10% heavy episodic drinkers at the start of the school year. By the follow-up survey, the female heavy episodic percentage increased to 14% while the male percentage in the same category rose to 18%.

The general concept of gender serving as a notably divisive factor in terms of consumption levels followed through to the second portion of the consumption analysis which employed repeated measures ANCOVA to determine differences in average weekly drinking. Gender, which was intended to serve as a covariate, displayed a significant interaction effect with the

independent variable of drinker group (moderate or heavy episodic), prompting the splitting of the analysis by gender.

Among women, drinker group, time, and the interaction between these two variables were significantly related to levels of consumption. All of the covariates with the exception of family history were significantly related to the dependent variable, but none interacted with time. These results implied that students with different demographic characteristics varied in drinking behavior, but did not *change* in differing fashions. Results diverged to some extent among men. Drinker group and the interaction between time and drinker group were both significantly related to levels of consumption, but the effect of time itself was not significant. Essentially, while there were distinct differences in drinking behavior among the two drinker groups with and without respect to time, the male population of moderate and heavy episodic drinkers in this study did not significantly alter consumption behavior when addressed as a whole.

The results confirmed findings that in general, men simply drank more alcohol than women (American College Health Association, 2009; Barnett et al., 2006) but also reflected the findings of Barnett et al. in terms of willingness to change drinking behavior. Women in the moderate category reduced their weekly drinking by 28% while those in the heavy episodic category displayed a reduction of 40% between the pre-test and follow-up surveys. On the other hand, men reduced drinking by 4% and 24% in the moderate and heavy episodic

categories, respectively. In all, evidence from the current study matched the findings of prior researchers with respect to consumption levels and willingness to change.

Use of Actual Protective Behavioral Strategies (PBS)

The next segment of Research Question 2 involved an analysis of the changes exhibited among the study population regarding actual protective behavioral strategies (PBS) use. Before examining the changes that occurred in this area, exploratory factor analysis was utilized to identify the underlying factors constituting PBS. Four factors were extracted: (a) influence avoidance, (b) preventative planning, (c) alcohol monitoring and reduction behaviors, and (d) binge-related behaviors. Since identical analyses were conducted for each of these four factors, results will be discussed jointly in order to make comparisons.

Holding the factor of time constant, all of the repeated measures ANCOVA analyses indicated significant differences in PBS use with regard to the four dependent factors. However, some differences in outcome were evident between the four factors when the presence of time was included. When examining the results for influence avoidance, which included strategies that students could use to stave off undue influence from peers while drinking, time was not an influential factor when drinker group was held constant.

Nevertheless, differences did become apparent in this variable when examining

the interaction between time and drinker group. Changes over time did not occur in the population considered as a whole, but differences occurred within the smaller subpopulations of the various drinker groups. The reverse held true when alcohol monitoring and reduction behaviors were examined: The factor of time was significant, but the interaction between time and drinker groups were not. Such a result implied that although the overall population behavior changed with respect to this variable, the changes in individual drinker group behaviors were similar.

The true value of the analysis involved the results addressing the differences between drinker groups with respect to willingness to change behavior. Since each variable was analyzed separately on a different scale, the most straightforward way of comparing results between factors and groups was to convert each factor's average value into a mean item endorsement score corresponding with the single-item scale ranging from 1 to 7. Prior to examining the behavior by drinker group, it was valuable to compare the overall distributions of each of the four PBS variables on this scale. Preventative planning, which involved drinking and driving-type behavior and utilizing friends to prevent over-drinking, was the highest-endorsed strategy across all drinker groups. Binge-related behaviors were the second-most endorsed, followed by alcohol monitoring and reduction behaviors. Influence avoidance, which included behaviors such as holding a drink to deter others from asking

about drinking, avoiding drinking games, and avoiding trying to out-drink others, was the least popular group of behaviors. The results aligned reasonably with those identified in an American College Health Association (2009) survey; the three most popular PBS strategies on that particular survey were categorized within the two more highly-endorsed categories in this study, while the three least popular PBS strategies from their survey were categorized within the current study's two lesser-endorsed categories.

Across all four dependent variables, light drinkers consistently showed declines in their mean use of each type of PBS. Moderate drinkers showed declines in the use of most PBS types as well. Influence avoidance was an exception, as these students showed a slight gain in usage. Alcohol monitoring and reduction, the one variable for which there was not a significant interaction between drinker group and change, showed an identical rate of decline for moderate drinkers compared to the light drinkers. Regarding the other two variables, rates of decline were not as severe among moderate drinkers as was shown among light drinkers. Finally, although heavy episodic drinkers demonstrated the lowest levels of overall endorsement as of the pre-test compared to light and moderate drinkers, they demonstrated increases in three of four types of PBS use between the pre-test and follow-up. Preventative planning, the only variable for which the heavy episodic drinkers indicated a mean endorsement score above the mid-point of 4, was the variable for which a

slight decline occurred. This decline, however, was less severe than that of the light and moderate drinkers. Overall, these results were in agreement with those of the consumption analysis which showed a decline in consumption among heavy episodic drinkers that would align with increased PBS use.

Although the demographic-type covariates were not the focus of Research Question 2, the analysis was conducted in a manner so that a determination could be made as to the utility of these demographics for future research. In three of four analyses, gender served as a significant covariate. Although research by Walters et al. (2007) described differences in types of PBS utilized by men and women rather than differences in levels of use, this study contributed to the evidence that differences do exist between genders with respect to PBS use. Age of first consumption was also a strong covariate, displaying significance for all four inferential tests. The importance of considering this factor as a covariate was made apparent by Hingson et al. (2003), who found that underage drunkenness led to increased likelihoods of engaging in risky drinking-related behaviors. Most of the ethnicity-related indicators were not significant; however, the Hispanic variable was significant in three of four analyses. The reviewed studies mainly addressed White, Black, and Asian students, so the evidence noting the importance of Hispanic students relating to PBS use was not previously apparent. Finally, family history showed very little indication of serving as a

significant covariate. Previously reviewed literature did not address this factor as being directly related to PBS use, so this result was considered as a new finding.

Use of Intended Protective Behavioral Strategies (PBS)

Analysis was also conducted regarding the differences between the PBS strategies students intended to use prior to the AlcoholEdu course and their actual usage levels later in the semester. Before examining the changes that occurred in this area, exploratory factor analysis was utilized to identify the underlying factors constituting the overall link between intended and actual PBS use. Although there was a large overlap between constructs measured for the actual PBS use analysis, some items were not included in the list of possible intended behaviors and could not be measured for this dimension of the analysis. Therefore, a new exploratory factor analysis was conducted to address the relationships between the remaining items. Three factors were extracted: (a) alcohol monitoring and reduction, (b) preventative planning, and (c) binge-related behaviors. Since identical analyses were conducted for each of these three factors, results will be discussed jointly in order to draw comparisons.

When the factor of time was held constant, only two of the three repeated measures ANCOVA analyses, alcohol monitoring and reduction and binge-related behaviors, indicated significant differences in overall PBS endorsement between drinker levels. In this set of analyses, the factor of time addressed both

time and the status of the value representing either intended or actual use. Most of the utility in describing the relationships between these factors originated from the within-subjects measures that also accounted for time. When drinker group was held constant, only one of the three dependent variables, binge-related behaviors, displayed a significant difference between intended and actual behavior. In contrast, when the interaction between time and drinker group was considered, only preventative planning behaviors displayed significant differences. As a whole, the level of intent to use certain protective strategies prior to starting the AlcoholEdu program matched the actual usage levels later in the semester.

In converting the estimated marginal means to average endorsement scores, the covariate-controlled means for each PBS construct could be compared on the same 1-7 scale as found in the individual survey items, eliminating the difficulties in comparing constructs with differing minimum and maximum values. The highest pre-test intended and follow-up actual means were found within the preventative planning construct. As suggested by the lack of significant drinker group-only and time-only effects, the pre-test intended mean endorsement scores were almost identical across groups (5.87 for moderate drinkers, 5.94 for both light and heavy episodic drinkers). When considered independently of drinker groups, there was no significant difference between intended and actual behaviors; however, there was a wider discrepancy between

intended and actual behavior among heavy episodic drinkers as compared to the other groups, which led to the significant interaction between time and drinker group.

The next most widely-endorsed behaviors were in the category of binge-related PBS strategies. In this case, pre-test intended behavior mean item endorsement scores declined as drinker group increased as did follow-up actual use. There were significant differences between intent and actual use when all students were considered as a whole, but since the scores between intended and actual declined at statistically similar rates, there was no interaction effect between drinker group and time. No single group increased or decreased more significantly in actual use of the items within this PBS construct. All of the intended and actual behavior average item endorsement scores were within the 4 to 5 range, which was slightly above the midpoint of the scale.

The least widely-endorsed behaviors were in the alcohol monitoring and reduction category. This factor, which consisted of the items requiring some extra effort on the part of the student (e.g., setting a limit on drinks, pacing drinks to one or fewer per hour, and alternating non-alcoholic and alcoholic beverages), only yielded significant differences as a whole by drinker group. Both the pre-test intended and follow-up actual average item endorsement scores declined as drinker group increased. However, there were no significant

differences between intended and actual use, with or without drinker group being held constant.

The analysis regarding intended versus actual PBS behavior contained ties to two different social cognitive theory determinants, perceived self-efficacy and outcome expectations. Intended PBS linked to perceived self-efficacy, as it indicated level of desire and belief in ability to change the use of protective behaviors. These results varied by intended PBS factor. For alcohol monitoring and reduction behaviors as well as binge drinking behaviors, the pre-test intended PBS levels steadily decreased as drinker group increased. Preventative planning was the exception with no intended behavior differences between drinker groups. It is possible that the desire to change intended behavior was linked to comfort with the concept of change. Once again, the preventative planning behaviors included the types of behaviors students had likely been taught for years, thus, increasing their levels of self-efficacy or beliefs that they could carry out these behaviors. The alcohol monitoring behaviors, which had the lowest intended PBS scores, were likely the most unfamiliar, particularly prior to beginning the AlcoholEdu program, and were rated with the lowest levels of self-efficacy.

The second link to social cognitive theory involving intended PBS use encompassed the outcome expectations determinant. The comparison between intended and actual PBS use demonstrated the attainment (or non-attainment) of

intended goals. Within the alcohol monitoring and reduction variable, there were no significant differences between intended and actual. This demonstrated that although these items were the lowest-rated of all, compared to the other two factors, the outcomes matched the expectations. Within preventative planning, the overall highest-endorsed intended PBS, the differences in outcomes were only apparent when factoring for drinker group. The more severe the drinker group, the less likely were students to meet their expected outcomes. Binge-related behaviors demonstrated a different pattern; outcomes were significantly lower than the intended behaviors, but these differences were similar in degree for each drinker group.

An auxiliary area of the intended versus actual PBS behavior analysis that was reviewed involved the outcomes of tests for significance regarding the covariates utilized in the study. The same covariates were used in the actual and intended PBS analyses, but the intended PBS analyses added the factor of prior behavior. This covariate was consistently the strongest of all, indicating significant relationships with the dependent variables across all the analyses as well as high η^2 values signifying a large explanation of variability in score. Gender and ethnicity also served as strong covariates with significant relationships among the alcohol monitoring and reduction and preventative planning dependent variables. Family history and age of first consumption, however, did not appear to be significant covariates for the model. These

findings regarding covariate strength contributed to the respective bodies of literature addressing each of these demographic factors.

Summary statistics were also provided to determine the degree to which students in different drinker groups, as of the follow-up survey, intended to utilize some of the goal-setting activities performed as a part of the AlcoholEdu program. The most highly endorsed activity for intended use was to attend alcohol-free social events. On the scale ranging from 1 to 7 (*never* to *always*), this item was the only one with a mean score above 5 among light drinkers and a mean score above 4 among heavy drinkers. One survey item in this section related directly to the goal setting determinant of the underlying social cognitive theory framework of this study, "Review the goals and personal plan that you created for yourself." Mean scores ranged from 3.35 among heavy episodic drinkers (below the midpoint) to 4.25 among light drinkers (slightly above the midpoint). This result can be related to the intended PBS-related self-efficacy and outcome expectations: The more serious the drinker, the less self-efficacious students were in having the desire to enact safer behaviors; the weaker the goals set by students, the less intense were the levels of the resulting outcomes.

Use of Protective Behavioral Strategies (PBS) Among Abstainers

An additional topic in the area of PBS use that was addressed in the study applied only to students who abstained from alcohol. Some of the most popular

reasons were personal or moral in nature. The concept of drinking clashed with personal values; students did not want to lose control; negative health effects were of concern; and this subpopulation from the larger population of underage students believed that drinking, when not of the legal age, was wrong. Two of the top three reasons were socially related: These students did not feel as if drinking was a requirement for having a good time or noted that they had other things to do. Refraining from drinking due to a subsequent arrangement for driving, the second-most popular reason among these students, aligned with one of the more popular PBS strategies among their drinking peers.

From the perspective of social cognitive theory, the results of the abstainer-focused PBS analysis addressed the outcome expectations determinant. These students set these particular social, moral, and personal expectations for themselves in order to lead to the desired behavior of abstaining from alcohol. These strong expectations, however, were lowered between the beginning and middle of the semester as indicated by the declining means among most of the items. Items that did become more popular between pre-test and follow-up, as indicated by increasing means, were either financial (not wanting to spend money on alcohol), or physical (worries about weight gain, having a medical condition, or having a fear of a history of alcohol use, either self-induced or family-related) in nature. Therefore, while the outcome expectations did not

change, their strength varied as students progressed in their first semester of college.

Negative Consequences

The final dimension of Research Question 2 involved an analysis of the changes exhibited among the study population regarding incurrence of negative alcohol-related consequences. Before examining the changes that occurred in this area, exploratory factor analysis was utilized to identify the underlying factors constituting negative consequences. Four factors were extracted: (a) abusive behaviors, (b) personal consequences, (c) educational and professional consequences, and (d) drinking and driving-related consequences. Since identical analyses were conducted for each of these four factors, the following results are discussed jointly in order to make comparisons.

In preparing to conduct inferential tests to determine significant changes among the negative consequence factors, analytical plans were altered due to the nature of the distributions of these factors. Unlike the consumption and PBS factor distributions, which displayed approximately normal qualities either as-is or after a straightforward arithmetic transformation, each negative consequence factor was extremely skewed to the right. Simply stated, even among moderate and heavy episodic drinkers, students did not experience many negative consequences, particularly within the more egregious items included in the

abusive behaviors factor. Therefore, most students contributed the absolute minimum value for each factor with others endorsing some of the behaviors at low levels.

In determining an appropriate alternative analytical method, the focus of the research question involving differences among factors between the different drinker groups was maintained. Ultimately, a difference variable was created for each factor to help determine whether there was a discrepancy between moderate and heavy episodic drinkers in rate of incurrence of each of the four factors. Three of the four Mann-Whitney tests indicated significant differences in rates of change between the two applicable drinker groups for the following factors: personal consequences, educational and professional consequences, and drinking and driving-related consequences.

Mean scores for each factor were then converted to average item endorsement scores in order to standardize the factors using the same 1-to-7 scale as found in the surveys and yield fair comparisons. Among all four factors, the heavy episodic drinkers consistently had higher levels of endorsement than did moderate drinkers. All mean scores for each factor and group increased (worsened) by some extent between pre-test and follow-up, with the exception of drinking and driving. This factor yielded a significant Mann-Whitney result due to an increased negative behavior endorsement among moderate drinkers and a decreased endorsement among heavy episodic drinkers. Both groups increased

endorsement of negative behaviors in the personal consequence and educational and professional categories. In the case of personal consequences, moderate drinkers increased to a larger extent than did heavy episodic drinkers, while the reverse held true for educational and professional consequences. Once again, despite all of the references to worsening, nearly all of the mean endorsement scores were below 2 on the scale of 1 to 7. This placed all means extremely close to *never*. The only exception was represented by the mean scores for heavy episodic drinkers in the area of personal consequences where the mean endorsement scores increased from 2.05 to 2.16.

Compared to the expectations regarding negative consequences as set by previous research, the results of the current study were mixed. The research aligned with prior studies indicating that heavier drinkers were more likely to endure higher levels of negative consequences than were their lighter-drinking peers (Presley & Pimentel, 2006; Swartzwelder, 2009; Wechsler, Lee, Kuo et al., 2002). However, in all areas other than drinking and driving-related negative consequences incurred by heavy episodic drinkers, mean endorsement of negative consequences increased from the beginning of the year to later in the semester. Considering that the students participated in an expectancy-focused, personalized feedback and norms clarification-centric, harm-reduction-based alcohol intervention, the results of the current study did not match results of previous research indicating declines in negative consequences, even among

heavy drinkers (Marlatt et al., 1998; Mun et al., 2009; White, 2006). However, Walters and Neighbors (2005) warned about the uncertainty as to whether feedback affects a particular area of drinking, including negative consequences.

The negative consequences analysis was linked to the outcome expectations determinant of social cognitive theory. Due to prior behaviors, such as consumption and PBS use, students experienced certain levels of physically and socially aversive effects of alcohol use. All of the results indicated that due to taking precautions, even among heavy episodic drinkers, the overall levels of incurrence of negative consequences remained low. Moderate drinkers, through their exercise of restraint with alcohol, subsequently experienced fewer negative consequences of any type as compared to heavy episodic drinkers. This was true despite the rise in consequences between pre-test and follow-up for students in both drinker groups.

Program Evaluation

One element of the design of the current study involved a review of the results in the context of a program evaluation. The CIPP model was chosen because of its highly adaptable, management-oriented approach that allows for summative evaluations in a retrospective fashion. This evaluation also needed to fit harmoniously with the social cognitive theory-based design of the study as a whole, but due to the CIPP model's ability to be used on a component-by-

component basis to fit the specific evaluative needs of a given project, this constraint did not manifest itself into any large issues. The researcher maintained focus on the product evaluation, designed to “identify and assess outcomes – intended and unintended, short term and long term. . . to help the broader group of users gauge the effort’s success in meeting targeted needs” (Stufflebeam, 2003, p. 3).

If an evaluator were to conduct a formative or summative CIPP evaluation in its entirety from start to finish, all four components – context, input, process, and product – would be addressed. In the current study, the researcher maintained focus upon the final component, product evaluation but needed to at least acknowledge the very basic essence of the context, which was identified through UCF’s AOD department through mission and goal-setting. Within all of the department’s activities, the mission has been to address high-risk drinking through comprehensive solutions with the goal of maintaining a campus wherein students have the support to make healthy choices with respect to alcohol. The department’s goal with respect to alcohol use among FTIC freshmen involved a high level of intent to utilize PBS behaviors among all students who did endorse current alcohol use, particularly among those that the current study categorized as alcohol monitoring and reduction-related behaviors. Therefore, the evaluation addressed two major areas: (a) the degree to which negative consequences were incurred among the students who participated in the

AlcoholEdu program, which served as one indicator of whether students made healthy alcohol-related life choices; and (b) the analysis of intended PBS use which was a specific area of interest for the UCF AOD department.

A product evaluation consists of several evaluative subparts: impact, effectiveness, sustainability, and transportability. Depending on the specific evaluation task, any or all of these subparts can be used (Stufflebeam, 2003). In the case of the current study, the first two subparts, impact and effectiveness, were used. Although this evaluation was retrospective and summative in nature, this was the first year during which a population-wide study could take place. Therefore, the evaluations regarding sustainability and transportability could not be measured until future years to determine whether the results from the current year would be sustained over several years. Additionally, in order to remain within the scope of the study, data collection was limited to evidence-based (i.e., the departmental assessment plan and other institutional research-based data) and survey-based methods used to gather student feedback.

The first part of the evaluation assessed the AlcoholEdu program's impact, or reach to the target audience, with the end goals in mind. Due to the mandatory design of the 2008-09 administration, approximately 97% of the entire freshman class was reached by the program. The potential impact was, therefore, large. Also, due to the design of the implementation, the program's ability to appropriately reach the targeted group of beneficiaries (incoming summer and

fall FTIC freshmen) without also inappropriately reaching a non-targeted group was maximized. The UCF implementation of the AlcoholEdu program had an excellent ability to reach the targeted population of new students. Other types of alcohol intervention programs often may intend to reach an entire population but are either not made mandatory or are based upon a convenience sample, such as students who happen to visit a certain location.

The only weaknesses regarding impact involved timeliness and follow-up. Of the population evaluated for this study, 26.5% either did not complete the whole program (pre-test through follow-up survey) or completed it in an untimely fashion. Most of the students (93.6% of this group) who were in this category did not complete the program rather than being untimely. The likelihood of these somewhat unreached students being high-risk with respect to alcohol was high, as these improper completers were significantly more likely to be male, drinkers since prior to high school, or currently heavy episodic drinkers. Therefore, while most of these students received the AlcoholEdu experience, they did not fully complete it in thinking about the changes they did or did not make later in the semester. Although the AlcoholEdu program implementation was definitely solid in impact, some weaknesses still existed in ensuring that students followed up with their program experiences.

The other aspect of the product evaluation that was addressed in the present study involved effectiveness, the quality and significance of the program

outcomes. In order to measure the extent to which students in the targeted program population made healthy alcohol-related life choices, the analytical results regarding negative consequences were examined. Students who drink in a responsible fashion do not incur negative consequences to the same extent as irresponsible drinkers. This rationale prompted the selection of negative consequences as the evaluative measure. Negative consequences were only measured among students who actively (within the past two weeks) drank. On average, these students reported experiencing very few of these consequences at all.

Among the factors created from groupings of various items, almost all indicated increases between the pre-test and follow-up later in the semester among both moderate and heavy episodic drinkers. In the case of personal consequences, which included items such as hangovers, headaches, and passing out, these increases were larger among moderate drinkers than among heavy episodic drinkers. The reverse held true for educational and professional consequences such as missing class or work. Heavy episodic drinkers decreased the occurrence of drinking and driving-related consequences compared to their lesser-drinking peers, but the incurrence of abusive behaviors increased among both groups of students at similar rates. This information, in combination with the fact that both moderate and heavy episodic drinkers reduced their amounts of weekly drinking, suggested that students were indeed moving in the right

direction regarding healthy life choices. Further conclusions of effectiveness could not be drawn at this time, since this change process represented baseline values for future comparisons.

Intended PBS use served as the other major area of interest for the UCF AOD department regarding the use of the AlcoholEdu program. The behaviors that were of particular interest were contained within the alcohol monitoring and reduction factor: alternating non-alcoholic and alcoholic beverages and setting a limit on how many drinks students have during a given occasion. Although the behaviors in this category were, on average, given the lowest intended use value compared to preventative planning and binge-related behaviors as of the pre-test, students realistically estimated the use of these behaviors as of the follow-up survey. They were endorsed at a moderate level among all drinker types but steadily decreased as drinking level increased. Preventative planning behaviors, which included many drinking and driving-related protective strategies, were the most highly endorsed among all groups. Once again, effectiveness can only be rated in the long-term, and the behaviors indicated by students in the survey could not be directly attributed to AlcoholEdu. The present research, however, established baselines for future effectiveness evaluations.

Overall, the product evaluation for the AlcoholEdu program as related to UCF's specific goals with its incoming freshmen for summer and fall 2008 indicated that there was no reason to discontinue the program. The policies set

into place for the program's delivery assured that the target students were reached, although there was some room for improvement in the follow-up. The results relating to program effectiveness were somewhat inconclusive and will remain so until more points of comparison can be identified. There was, however, evidence that students did adopt healthier drinking-related behaviors through decreased consumption and, despite some minor increases, maintained a low level of occurrence of negative consequences. Further research needs to be performed to determine how to make alcohol monitoring and reduction behaviors more viable to students for use when they choose to drink.

Significant Findings of the Study

Researchers have long treated alcohol use as a major issue at colleges and universities in America since their inception. The enduring enigma surrounding successful methods for prevention of alcohol-related issues has led to institutions utilizing large quantities of resources yet the issues still continue. As higher education continues to evolve, intervention and the associated research must do the same. The present study, in exploring one of the latest evolutions of the alcohol prevention process, illustrated a variety of findings that were not only significant from a statistical perspective, but also meaningful from the view of either confirming the results of prior research or presenting an unexpected

possibility. These significant findings shaped recommendations for future action through policy and further research.

Research Question 1 enabled the exploration of the relationships of demographic variables to the full and timely completion of the AlcoholEdu program. General literature linked all of the demographic variables of interest—gender, ethnicity, family history of alcoholism, age of first consumption, drinker status, and drinker risk group—to different levels of difficulty regarding alcohol use and abuse for students in the collegiate setting. This particular research question, however, did not address the effects of these demographic qualities on actual alcohol use, PBS use, or incurrence of negative consequences. Rather, the focus was on a willingness to participate in and follow through with an online alcohol intervention targeted to the entire population of incoming freshmen students.

In assessing the results regarding Research Question 1, expected outcomes essentially came true. Gender, age of first consumption, drinker status, and drinker risk group displayed significant relationships with the completion status variable. Within each of these relationships, the demographic groups least likely to complete the program included men, students who first started drinking prior to high school, and heavy episodic drinkers. Interestingly, but not surprisingly, all of these demographics described students most likely to need help with alcohol issues. Of these demographic groups, the strongest relationships, as

measured by effect sizes, involved age of first consumption and drinker type. These results were of particular interest because the two strongest predictors were directly related to a student's own drinking history and current habits. Other predictors, which addressed demographics not directly related to a student's own drinking, were either not statistically significant or not as strongly related as the drinking-related variables. These outcomes presented critical information addressing the AlcoholEdu program's ability to reach students who most needed the program.

The descriptive analysis addressing movement between drinker categories supported the literature that, despite underage status of freshmen students, the majority of these students consumed alcoholic beverages to some extent prior to entering the college environment. Examining the population as a whole, the slight (4%) increase in the overall percentage of students who claimed to drink at all did not represent a dramatic rise in drinkers among the freshmen class. However, it is important to remember that the theoretical background of the AlcoholEdu program was built upon the harm-reduction model, not the abstinence-only model. Therefore, the 80% retention of abstainers was promising, especially when considering that only 2% of these original abstainers claimed to engage in dangerous binge-drinking within the two-week period prior to the follow-up survey.

Interesting results also occurred among those identified in the pre-test as heavy episodic drinkers. When the results were separated by gender, the statements in the literature (Barnett et al., 2006) suggesting that heavy-drinking men were less likely to have the desire to change their habits as compared to women were confirmed in this study. Among men, 75% of the pre-test heavy episodic drinkers remained in the category as of the follow-up compared to 55% of women. However, the fact that among all students in the pre-test heavy episodic drinker group 36% refrained from binge drinking up to the mid-semester follow-up implied that these behaviors were not necessarily regularly practiced by a large segment of this subset of the student population.

Examining consumption rates by the numbers, the findings of the present study supported the findings of Wall (2007) and Lovecchio et al. (in press) that AlcoholEdu may play an important role in reducing alcohol consumption. The results from the analysis regarding movement among drinker groups matched the results of the average weekly consumption analysis. Both men and women, particularly those in the heavy episodic drinker categories, showed significant reductions in average number of drinks consumed per week between the pre-test and follow-up. Although women in this category did not have the high averages of their male counterparts in the pre-test, their reduction percentage was greater than that of the men in the same drinker category. Moderate drinkers of both genders showed reductions as well, but the changes among men in this category

were not significant in nature. The separation in performance between men and women was not surprising, but the significant reductions were of particular interest especially considering the college environment with respect to alcohol culture around the time of the follow-up (i.e., football games and other social opportunities for drinking).

Regarding the analysis of differences in actual PBS use between the pre-test and follow-up surveys, there was a mix of expected and somewhat surprising results. In separating average levels of use of each type of PBS by drinker group, use levels consistently decreased as drinker group increased in severity, following the evidence brought forth by prior PBS-related research (Walters et al., 2007). As was expected, students endorsed the preventative planning-related PBS strategies to the highest extent when compared to the other three sets of strategies. Four of six of the items within the preventative planning factor directly referenced drinking and driving. 21st century students have grown up in a culture so acutely aware of the dangers of drinking and driving that these behaviors have likely become ingrained in the minds of students to some extent even if they have not had to exercise these behaviors personally until more recent times in their lives. Addressing the preventative planning behaviors, a less expected result was the significant, even decrease among all drinker groups in use between the pre-test and follow-up surveys. Though these behaviors remained the highest-endorsed of the four PBS factors, the significant

decline indicated that students had become lax in regard to what should have been more ingrained behaviors.

A promising result within the actual PBS analysis was the fact that in three of four categories, heavy episodic drinkers increased their use of PBS between the pre-test and follow-up periods. These changes were substantially more positive than those displayed by light and moderate drinkers. These students were in need of the greatest degree of change in protective behaviors and the results indicated that this desirable result came to fruition.

The intended PBS use analysis provided some additional interesting insight regarding endorsement of protective behaviors between students of different drinker groups. Within the actual-only PBS analysis, there were significant declines in usage as drinker group intensified. In the intended-versus-actual analysis, this same trend held true for two of three factors (alcohol monitoring and reduction and binge-related behaviors) but not for preventative planning. Although the preventative planning factors in the actual and intended PBS analyses were slightly different due to survey limitations, most behaviors overlapped. Therefore, it was somewhat surprising to discover that there was essentially no difference between drinker groups in the intended use of this behavior. Once again, this factor consisted of items that have likely been ingrained in lessons for many years, so students may have been most inclined to utilize these items prior to the AlcoholEdu program.

The ideal result from these analyses would have involved either a match between intended PBS use in the pre-test and actual PBS use in the follow-up or an increase in actual use in the follow-up. Adjusting for prior behavior, this result held only partially true. Regarding alcohol monitoring strategies, there was no significant difference between intended and actual use, controlling for prior behavior. Preventative planning and binge-related behavior did display differences between intended and actual use but not in the desired direction. Preventative planning, however, was the only factor for which any one drinker group had a larger discrepancy than others (heavy episodic). In agreement with the actual PBS analysis, this factor was the only one for which heavy episodic drinkers did not increase use between pre-test and follow-up. Overall, this analysis indicated a disconnect between how students thought they should act regarding alcohol, even prior to an alcohol intervention program, and what they actually did in practice.

No particularly unusual results arose from the analysis of abstainer reasons for not drinking. Since the analysis only involved students who were abstainers in both the pre-test and follow-up periods, no results were influenced by the start of new drinking behavior among this group. However, the overall endorsement scores did decrease between the pre-test and follow-up surveys for the majority of the items. The order of popularity of the items did not change much at all; however, students did not collectively, on average, feel as strongly

about the reasons why they chose to abstain from alcohol as they did at the start of the school year. The change could not be attributed to any singular factor, but it was possible that these students' commitment to not drink was weakened by exposure to the college environment. It is also possible that the AlcoholEdu program did not offer any more substantial evidence to these students as to why they should not drink as compared to any previously known reasons.

One of the most unexpected results of the analysis involved the incurrence of negative consequences. Despite the literature stating the magnitude of negative consequences faced by drinkers, particularly those in the heavy episodic group (Busteed, 2008; Schaus et al., 2009; White & Swartzwelder, 2009), most students in the present study did not claim to have incurred these effects of drinking. The extremely skewed distributions indicated that large numbers of students rated each item within the four identified groupings of negative consequences – abusive behaviors, personal consequences, educational and professional consequences, and drinking and driving – with the lowest or second-to-lowest possible response.

However, despite the surprising attributes of the distribution, the trends made apparent through the literature noting that heavy episodic drinkers have incurred negative consequences to a greater extent than lighter drinkers were confirmed in the current study. Additionally, despite the low average endorsement rates across all factors, the fact that abusive behaviors, the grouping

containing the most egregious consequences (i.e., getting in trouble with authorities, damaging property, injuring oneself or others) received the lowest endorsement among both moderate and heavy episodic groups, while personal consequences, the grouping containing the most anecdotally “typical” consequences of drinking (i.e., embarrassing oneself, having a hangover, feeling sick to one’s stomach) received the highest endorsement, was not at all surprising. Nevertheless, the decrease in drinking-and-driving-related consequences among heavy episodic drinkers, the only decrease between pre-test and follow-up, was contradictory to the results indicated by the actual PBS use analysis. The factor addressing drinking-and-driving preventative behaviors indicated a decrease in utilization among all drinker groups. It was noted in literature reviewed (Araas & Adams, 2008; Martens et al., 2004, 2005, 2007) that decreased PBS led to increased negative consequences, yet the opposite held true in the present study.

One final area of interest involved the covariates. While these demographic variables were not the focus of the study, all of these variables were selected to serve as controlling factors because of their previously proven relationship with many student drinking-related issues. In the present study, the covariates had a mixed record in demonstrating significance with the factors of completion status, consumption, and PBS use. Gender was one of the strongest covariates, indicating a significant relationship with completion status,

prompting separate consumption analyses to be run, and serving as a significant control factor for actual and intended PBS analyses. Ethnicity and age of first consumption were both fairly strong additions to most of the analyses. Exceptions were the ethnicity-completion status relationship and the non-significant relationship between age of first consumption and the dependent variables for intended PBS behavior. Finally, though prior researchers have reported a link between family history and alcohol use, it was not a significant covariate in almost all of the analyses performed in the present study. Despite the genetically-related links between family and alcohol use, prior research building upon links in the home environment may have weakened in recent years with a more widespread dissolution of the stereotypical “nuclear family.”

Implications for Practice and Policy

Upon examination of the in-depth analysis regarding alcohol consumption, PBS, and negative consequence-related trends among the FTIC freshmen of the current study, both before and after participation in an online alcohol intervention, several recommendations were identified for practice and policy. Implications in three major areas were developed: (a) the AlcoholEdu program itself; (b) the surveys designed to gather attitudes and measure change; and (c) the educational administrators and AOD professionals who hold

responsibility for implementing the AlcoholEdu program and other alcohol-related interventions.

It is important to remember that the trends identified in this study could not in any way be claimed as a direct result of the AlcoholEdu program. However, the changes that occurred in the alcohol-related behavior of these students provided a “snapshot” of the progression in behavior among the freshman population with the AlcoholEdu program that was in place at the time of the present study. On a widespread level, the institution should continue the use of AlcoholEdu as a population-level tool for exposing incoming freshmen to an alcohol intervention. Results were promising in the areas of abstaining students continuing to do so and reduction in weekly drinking, particularly among women. Additionally, students in the most severe category, heavy episodic drinkers, showed gains in the use of most types of protective behaviors. Although already lowly-endorsed groups of negative consequences increased in incurrance between pre-test and follow-up, there was no evidence that AlcoholEdu may have worsened these consequences; in fact, the program may have simply mitigated the potential for more severe increases of consequences.

One suggested area of improvement for the program involves the treatment of abstaining students. These students may wonder why they are taking an alcohol intervention in the first place if they do not drink. Although abstainer retention was high in this study between pre-test and post-test and a

reasonable proportion of pre-test light drinkers dropped to abstainer status as of the follow-up survey, the abstainer responses regarding the reasons why they chose not to drink mostly decreased in strength between the pre-test and follow-up surveys. Long-term tracking was not available to analyze the trend over a longer period of time, but the AlcoholEdu program may be able to utilize the most popular responses and build more motivational, social norms-based program content focusing on these popular reasons.

The fact that in the statistical analyses some covariates were more applicable than others can provide some important guidance for program development. As the AlcoholEdu modules were designed at the time of the study, content was customized by abstainer and drinker status as well as gender. Aside from differentiation between genders regarding definitions of binge drinking, this factor was solidified as an important one to keep as a critical descriptor of consumption habits, PBS use, and incurrence of negative consequences. Content delivery can also be potentially altered based upon two additional factors, ethnicity and age of first consumption. Because these two factors address unchangeable demographic qualities (as opposed to some of AlcoholEdu's other collected demographics, such as living arrangements and campus activity involvement) and were determined to be critical covariates, there is strong potential for Outside the Classroom to cater expectancy challenges and norms to these specific groups of students.

Results also revealed some ways by which the surveys, the most critical components of the AlcoholEdu program for measuring change, could be altered. One change would involve the length of the time between the end of the intervention and the deployment of the follow-up survey, or even the addition of one or more follow-up surveys. Larimer and Cronce (2002) noted that one of the major weaknesses of assessments of college alcohol intervention programs involved the shortness of most follow-up periods. Ideally, the addition of another follow-up survey designed to be taken by the end of freshman year could produce much more long-term, meaningful results. Yearly follow-ups could also determine whether the AlcoholEdu program instilled seeds of behavioral change within the participants.

Although the AlcoholEdu survey was comprehensive, its design as a population-level intervention opens a door to opportunities to make some improvements to obtain a more expansive view of a campus's drinking situation. Therefore, proper question selection is critical. Researchers have indicated the problematic nature of negative consequences in that they not only affect drinkers but non-drinkers as well. Endorsement of negative consequences in this study was low, but there was no way to determine how drinking would have affected peers through the survey answers. Adding some of these items would provide a more campus community-oriented perspective. Another drawback within this analysis was the fact that separate factors needed to be created to measure pre-

test versus follow-up actual PBS use and pre-test intended versus follow-up actual PBS behavior. Although certain questions relating specifically to the AlcoholEdu program could not be asked of students in the pre-test, Outside the Classroom should consider adding some items to the intended behavior question so that a greater degree of parallelism can be achieved.

Additionally, despite the existing length of the survey, questions regarding drinking as students relate to their campus and community environments and applicable policies were noticeably absent. Considering the presence of these areas in the underlying program methodology and content, items gathering student opinions on these issues will strengthen the potential of the AlcoholEdu program to fit into the recommended environmental model of campus AOD prevention (DeJong & Langford, 2002).

From the university's perspective, the analysis regarding completion can serve as a reason to incentivize the completion of the follow-up survey. With 26.5% of the study population not completing the survey in a timely fashion or not participating in the follow-up survey, a critical portion of the population was missing for detailed analysis. Male students and heavy episodic drinkers, two of the most at-risk subpopulations, contributed to a large portion of this group. At the time of the study, the completion of the educational modules was required of all FTIC freshmen students to prevent a hold, which would prevent these individuals from registering for spring classes, from being placed upon their

records. Nearly all students ultimately fulfilled this requirement; however, no incentive of that magnitude was put into place for the completion of the follow-up survey. For purposes of tracking the well-being of these students and gathering data for future improvement, the ideal recommendation would involve the same sanctions being applied to students who did not complete the follow-up as for not completing the educational modules (an academic hold).

University administrators may also want to consider using the pre-test and possibly the follow-up surveys as screeners for additional intervention. AlcoholEdu has been suggested for use as an effective part of a comprehensive, multi-level, campus-wide AOD prevention program, not as a sole solution to campus alcohol issues (Dowdall, 2009). Results from the analysis indicated possible evidence of effectiveness among high-risk, heavy episodic drinkers in decreasing average consumption and increasing the use of protective behaviors while drinking. The AlcoholEdu program, however, is a single program at the beginning of a student's college career. To prevent the potential for relapse, or to even continue the potential for improvement, AOD administrators can follow up with these students to provide additional brief motivational interventions if necessary. Students may be sensitive to a perceived violation of privacy in this process and a culture of distrust toward the administration could grow; at the same time, if appropriate steps for privacy are taken in the process, the potential for long-term health behavior improvement exists within this approach.

A final policy recommendation addresses the place of alcohol education and interventions at the primary and secondary education levels. Literature and review of current policies indicate that in the current K-12 system, any preventative alcohol education or interventions cannot utilize the same harm-reduction techniques as found at the postsecondary level. This study provided evidence that students who begin drinking at a young age are at greater risk for not being receptive to alcohol interventions once they reach college, particularly if they are also male. The education students receive regarding alcohol at a young age has not been strong enough to deter a particular group of students from drinking early; meanwhile, all subsequent education these same students receive has not changed their behavior. By the time these students reach college, their behavior has become highly ingrained. Although the present study cannot yield specific recommendations of actions to take at the K-12 level, AOD professionals at this level should take note of these results when considering future curriculum developments, particularly ones addressing the harm reduction approach.

Implications for Future Research

Despite the comprehensive nature of the current study, every analytical possibility could not be explored due to constraints on time and available resources. These constraints, in conjunction with the results obtained from the

study, led to several possibilities for future research to explore the potential of AlcoholEdu at a deeper level.

Although the researcher was able to explain the changes that occurred within one institution's incoming freshman class between the beginning of their higher education careers and a point in time later in the semester, no comparisons were able to be made as to what changes may have occurred among these students in the same period of time had they not participated in the AlcoholEdu program. Therefore, a possibility for future research would involve the identification of another university as a peer institution not implementing the AlcoholEdu program and utilizing it as a control group in a comparison study. This task would not be the most straightforward in nature considering the potential for very comprehensive AOD programs at different institutions as well as the questions that arise in any exercise in identification of peers (i.e., size, scope, culture). This would, however, permit the continuance of leading research in the right direction to determine whether AlcoholEdu truly makes a difference.

Another recommendation is to continue to conduct research after the institution has implemented the AlcoholEdu program in a mandatory fashion for several years. The 2008-09 academic year that was addressed in the current study was the first year during which the institution made completion of the AlcoholEdu program mandatory for all incoming FTIC freshmen and was a baseline year for population-level analysis. As of the 2009-10 academic year, the

institution continued the mandatory implementation of the program and has continued the potential for eventual development of a multi-year analysis that can be compared to both internal trends and the constantly updated body of literature regarding trends in alcohol use among college students as well as applicable AOD interventions.

An additional option is to expand the analysis nationally to include other institutions. With the steadily growing presence of the AlcoholEdu program at colleges and universities nationwide, the potential to gather a very large body of knowledge regarding the efficacy of this program increases with each passing year. Comparisons can be made on a multi-year basis with other institutions that have implemented the AlcoholEdu program on a population-wide level to freshmen, although the ideal comparative group would include those institutions that have also made completion of the program mandatory. Potentially, a recommendation to implement the program in this fashion coming from Outside the Classroom could strengthen the opportunity for this kind of research.

The categorization of drinkers into three groups, light, moderate, and heavy episodic, proved to be an effective factor in the study for the separation and differentiation of trends. However, with the exception of the criteria used to calculate meeting the binge drinking definition once within a two-week span, frequency of drinking was not addressed in the study. To qualify for moderate drinker status, a student needed to have one drink in the past week. Another

student in the same moderate category may have consumed several drinks over several days but did not meet the binge drinking definition. This discrepancy becomes even more critical when examining the heavy episodic category. The researcher utilized the definitions found in prior research involving the AlcoholEdu program; however, future research regarding PBS use or incurrance of negative consequences could move in the direction of Presley and Pimentel (2006) and address frequency as well as quantity when describing and categorizing different types of drinkers.

The overall low endorsement of negative consequences by even the heaviest drinkers prompted a need for more research into the way AOD professionals operationalize this phenomenon. Particularly among incoming freshmen, most students do not experience the majority of extreme consequences due to drinking. Therefore, future research in this area can involve the implementation of additional surveys to measure the types of negative consequences that students actually experience, perhaps yielding consequences not currently being asked of students by programs such as AlcoholEdu. Subsequent students who participate in the program may then be asked to address items that better capture the behavior of the majority of drinkers.

Despite the attention already given to gender within the AlcoholEdu educational pathway, this study solidified the fact that men and women think and behave differently with respect to alcohol. An analysis of the AlcoholEdu

program alone may not provide all the answers regarding the best way to address these differences through an intervention. Therefore, future research must continue in defining the specifics of male alcohol-related behavior and discovering the methods by which AOD professionals can best reach this at-risk segment of students.

A final recommendation for future research involves the use of qualitative methods to receive a more holistic picture of the campus drinking situation from the freshman perspective. In examining the variables for which overall endorsement unexpectedly declined among certain groups, randomly selected students could be asked for their explanations of the logic behind their changing opinions. As valuable as questionnaire-based research can be, even with instruments as comprehensive as those found as a part of the AlcoholEdu program, the use of such pre-formed instruments and numerically-based results can lose some of the potentially valuable voices of respondents. Following up with qualitative research can apply faces, logic, and opinions of students that may otherwise become lost.

Conclusion

The use of alcohol among college students in the United States, which dates back to the inception of the nation's higher education system, will likely remain for years to come. Although alcohol use in general has been considered

commonplace, alcohol abuse can turn into a clinically diagnosable disease for any given individual if intervention does not occur. Among college students, rates of various levels of drinking have fluctuated over the past 25 to 30 years but have overall displayed a slow decline in prevalence. Incidence of dangerous binge-drinking, however, has remained relatively constant over this span of time. When examining the drinking habits of young adults in their early 20s, those individuals who were enrolled in college engaged in binge drinking more often than those who were not (Johnston et al., 2008, 2009). Therefore, colleges and universities remained as environments where the effect of simply being enrolled was viewed as a risk increaser for the consequences of misuse of alcohol which can range from hangovers and headaches to missed classes, strained relationships with others, physical and sexual abuse, injuries, and even death.

Colleges and universities have not built a lengthy history in combating dangerous alcohol use among students. As recently as the middle of the 1950s, alcohol education was simply not a part of the curriculum (Straus & Bacon, 1953). However, by the dawn of the 21st century, due to the effects of national mandates such as the Drug-Free Schools and Communities Act of 1989 Amendments, it was nearly impossible to locate an institution of higher education that was not implementing some sort of AOD prevention program on campus. As the continuance of binge drinking in colleges and universities has indicated, the mere existence of AOD programming on a campus does not

necessarily imply that improvements will occur. In the area of alcohol policies, overall campus culture must be considered (Schuh & Shore, 1997); one type of approach does not fit all institutions. Prior studies indicated that an environmental approach adapted to the individual institution is desirable. Such approaches address issues of alcohol use not just from the individual student perspective but also from the perspectives of the institution and surrounding communities with integration of laws and regulations as well (DeJong et al., 2007; DeJong & Langford, 2002). Essentially, effective AOD programs must be comprehensive in nature.

Even if AOD programs are appropriately comprehensive, the content and delivery must be appropriate for the given population. Prior research has denounced the use of abstinence-only approaches in favor of harm-reduction approaches in educational efforts. These approaches do not eschew alcohol use completely but urge students to protect themselves from damaging negative consequences through the use of protective behaviors. A combination of harm-reduction-centric approaches has been recommended by organizations such as the NIAAA (2002). These approaches include norms clarification, motivational enhancement, cognitive behavioral skills, brief motivational interventions, and challenges to student expectancies of alcohol. With an increasing ability to deliver these approaches via convenient online methods, colleges and universities are able to reach a greater number of students with a minimal

allocation of resources. However, with the rapidly growing landscape of online AOD programming, researchers have been trying to determine whether these products have truly improved student health outcomes.

In the present study, the researcher addressed one university's implementation of AlcoholEdu, an increasingly popular online AOD prevention program, which was required for all incoming FTIC freshmen to complete. Previous researchers (Lovecchio et al., in press; Wall, 2005, 2007) indicated that among general populations of students, the AlcoholEdu program was effective in reducing alcohol use, increasing the use of protective behaviors, and minimizing adverse alcohol-related repercussions. Nevertheless, prior studies did not provide any indication as to whether AlcoholEdu has particularly different levels of effectiveness in improving student outcomes in these areas between students who drink to differing extents. By comparing results by drinker group, recommendations could be made as to potential areas for improvement in the program in changing alcohol-related health outcomes for college students. In addition to exploring the differences in effectiveness of AlcoholEdu at the selected institution among students in different drinker groups with respect to consumption, protective behavior use, and incurrance of negative consequences, the researcher also investigated differences among students in willingness to complete all parts of the program as required.

The analysis of results uncovered that in terms of completing the full program as requested, which included a follow-up survey of alcohol use and related attitudes, three major factors determined whether or not students were willing to complete a mandatory program: gender, age of first alcohol consumption, and drinker status. Specifically, students who were male, started drinking prior to high school, or were identified as heavy episodic drinkers were less likely than peers to complete the AlcoholEdu program in its entirety in the appropriate time frame.

Regarding the analysis of changes in behavior among students who did appropriately complete the AlcoholEdu program, certain results were promising. Approximately 80% of the students who were identified as abstainers in the pre-test maintained that status as of the follow-up. Between the pre-test and follow-up surveys, there was a reduction in total weekly drinking among all groups but particularly among the heaviest drinkers. In regard to the use of protective behaviors, heavy episodic drinkers displayed significant increases in the areas of influence avoidance, alcohol monitoring and reduction behaviors, and binge-related behaviors, as compared to light and moderate-drinking peers who either showed no changes at all or slight decreases in use. All students indicated unexpectedly low levels of incurrance of negative consequences. Despite these results, there was a significant difference in the degree of change of incurrance of drinking and driving-related consequences. Heavy episodic drinkers showed a

decrease; moderate drinkers showed an increase. Due to factors beyond the researcher's control, it was not possible to compare these results to that of a control group so conclusions could not be made that AlcoholEdu caused these changes; however, these outcomes do not match the types of trends commonly seen in the literature when students begin college life and do not experience any sort of intervention.

At the same time, there were some results to which particularly close attention should be paid for future interventional program development. There was a notable separation between genders regarding the retention of heavy episodic drinkers. Approximately 75% of male drinkers identified in the heavy episodic group maintained that status as of the follow-up, but only 55% of female drinkers in the same category remained at that level. Among students who abstained as of the pre-test and follow-up, the reasons why they chose to do so did not change to any great extent over the course of the semester. The extent to which they supported most reasons, however, showed a decrease. Additionally, despite the overall low levels of incurrence of negative consequences, there were increases among both the moderate and heavy episodic groups that, according to the literature, contradicted the somewhat constant or increasing uses of protective strategies indicated by the present study.

Despite the lack of ability to attribute any change, positive or negative, directly to the use of the AlcoholEdu program, this study provided a solid

baseline for future comparisons of student use of the program. Future implications for expanding research would involve the use of multiple years of data, comparative peers not using the program, and further refinement of the survey tool to produce more substantive comparisons. As the results indicated, the issue of underage alcohol use among college students was just as prevalent as it historically had been. Postsecondary institutions have an opportunity to guide students to act responsibly with respect to alcohol. Though no single solution will solve associated issues, the right blend of approaches can transform an entire university's culture and way of thinking among its members. The evidence provided by this study supports the continuance of including AlcoholEdu as one of the first steps to which students are exposed in building that culture of responsible alcohol use.

APPENDIX A
PRE-TEST SURVEY

AlcoholEdu® for College

Survey 1: 2008-09 (Pre-matriculation)

This survey asks about your current beliefs, attitudes, and experiences. We will customize AlcoholEdu to match your specific needs based on what you tell us about yourself.

This survey is **anonymous**. None of the information you provide will be linked to you in any way. Your individual response to any question you're asked in this course will never be identified with you or reported.

If there are questions you would prefer not to answer, you can choose to leave them blank, but we hope you'll answer all questions as completely as you can. The information you provide will help us evaluate the effectiveness of the course.

Please complete this entire survey in one sitting.

Alert: This survey is only considered complete when you click the final "Submit Responses and Continue" button.

1. Which of the following best represents your own attitude about alcohol?

- Drinking is never a good thing to do
- Drinking is all right, but a person should never get drunk
- Occasionally getting drunk is okay as long as it doesn't interfere with academics or other responsibilities
- Occasionally getting drunk is okay even if it does interfere with academics or other responsibilities
- Frequently getting drunk is okay if that's what the individual wants to do

2. To what degree is it acceptable for people to:

	Never						Always
	1	2	3	4	5	6	7
Drink underage							
Get drunk on school nights							



3. How likely or unlikely is it that the following things would happen to you personally if you were to drink 3 or 4 alcohol beverages:

	Very unlikely						Very likely
	1	2	3	4	5	6	7
Get into trouble with authorities							
Get into trouble with your parents							
Feel less stressed							
Feel happy							
Get a hangover							
Feel sick to your stomach							
Feel more attractive							
Forget where you were or what you did							
Do something you'd regret							
Feel more confident or sure of yourself							
Be outgoing in social situations							
Feel out of control							
Pass out							
Feel clumsy							
Feel comfortable pursuing an opportunity to have sex							
Feel connected with the people around me							
Ride with a driver who was drunk or high							
Be argumentative							
Strain a relationship with a friend							
Be taken advantage of sexually							
Take advantage of someone sexually							



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4. When someone is sexually assaulted, to what degree is each of the following persons responsible:

	Not at all						Completely
	1	2	3	4	5	6	7
Person who was sexually assaulted							
Person who committed the sexual assault							

5. During the past year, have you consumed alcohol (i.e., had more than a few sips of beer, wine, or liquor)?

- Yes
- No

If "no" participants skip to Q16 (skip past the calendar and drinking-related questions)

6. Please mark which of the following best matches your current situation:

- I see no need to change the way I drink alcohol.
- I am thinking about drinking alcohol in a healthier and safer way.
- I am ready to try drinking alcohol in a healthier and safer way.
- I am currently trying to drink alcohol in a healthier and safer way.



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7. How important to you is each of the following reasons for drinking alcoholic beverages?

	Not at all important						Very important
	1	2	3	4	5	6	7
To get drunk							
As a reward for working hard							
Because you like the taste							
To have a good time with my friends							
To celebrate							
To experiment							
Because of anger or frustration							
To decrease inhibitions							
Feel less stressed							
Feel happy							
Feel more attractive							
Feel more confident or sure of yourself							
Be outgoing in social situations							
Feel comfortable pursuing an opportunity to have sex							
Feel connected with the people around me							

8. During the past two weeks, have you consumed alcohol (i.e., had more than a few sips of beer, wine, or liquor)?

- Yes
- No

If "no" participants skip to Q14 (skip past calendar to drinking-related questions)



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9. Think back over the past two weeks. Please enter how many alcoholic drinks you had on each day, or enter zero ("0") for days that you did not drink.

You need to replace each question mark ("?) with a number.

NOTE: A drink is defined as a 12-ounce beer, an 8.5-ounce malt beverage, a 12-ounce wine cooler, a 5-ounce glass of wine, or 1.5-ounces of liquor, whether in a mixed drink or as a shot.

[INSERT PHOTO](#)

[month]						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	1	2

The calendar will have question marks instead of blank fields to indicate that participants need to fill in a number for each date.

For question #10, display the calendar with the day where they had the highest number of drinks highlighted (or arrow to the day). This number of drinks will also be used for BAC calculations.

NOTE: If there are multiple days with the highest number of drinks, then the arrow or highlight should indicate the most recent such occasion.

10. The single occasion in the past two weeks on which you reported having the highest number of drinks is indicated on the calendar. On this particular day, over what time period were you drinking?

_____ Hours _____ Minutes



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11. During the past two weeks, to what degree did the following happen to you when drinking or as a result of your drinking? *Don't count things that have happened to you but were not because of drinking.*

	Never 1	2	3	4	5	6	Always 7
Got a hangover							
Passed out							
Forgot where you were or what you did							
Did something you regretted							
Felt sick to your stomach							
Performed poorly on an assignment/test							
Got behind in school work							
Missed a class							
Missed going to work							
Injured another person							
Injured yourself							
Got involved in a physical fight							
Damaged property							
Drove after drinking 4 or more drinks							
Drove after drinking 5 or more drinks							
Rode with a driver who had been drinking							
Strained a relationship with a friend							
Said things you didn't mean that hurt others' feelings							
Was argumentative							
Got into trouble with authorities							
Deliberately vomited to continue drinking							



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Embarrassed yourself							
Been taken advantage of sexually							
Taken advantage of someone sexually							

12. During the past two weeks, how many times have you had five or more drinks in a row within a 2 hour period?

- Never
- Once
- Twice
- Three or more times

13. During the past two weeks, how many times have you had four or more drinks in a row within a 2 hour period?

- Never
- Once
- Twice
- Three or more times

14. When you drink, to what degree do you do the following:

	Never 1	2	3	4	5	6	Always 7
Eat food before or while drinking							
Intentionally not eat food before drinking							
Pace your drinks to 1 or fewer per hour							
Set a limit on how many drinks you'll have							
Alternate non-alcoholic beverages with alcoholic drinks							
Keep track of how many drinks you've had							
Make your own drinks to control the amount of alcohol you have							
Not accept drinks from a shared source (e.g., punch bowl)							



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Make plans to avoid driving after drinking							
Have a friend let you know when you've had enough to drink							
Limit the amount of money you bring to spend on alcohol							
Hold a drink so people stop bothering you about drinking							
Avoid drinking games							
Know where your drink has been at all times							
Stop drinking at a predetermined time							
Put extra ice in your drink							
Avoid trying to "keep up" or "out drink" others							
Monitor your BAC (Blood Alcohol Concentration) to reduce drinking-related problems							
Choose a drink containing less alcohol							
Choose a drink containing more alcohol							
Chug alcohol							
Do shots							
Start drinking before going out (i.e., pre-gaming)?							
Prevent a friend from driving under the influence of alcohol							
Don't drink so you can serve as a designated driver							
Use a designated driver							



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15. During the next 30 days to what degree do you plan to:

	Never 1	2	3	4	5	6	Always 7
Reduce the number of times you drink per week							
Reduce the number of drinks you have each time you drink							
Eat food before or while drinking							
Pace your drinks to 1 or fewer per hour							
Set a limit on how many drinks you'll have							
Alternate non-alcoholic beverages with alcoholic drinks							
Keep track of how many drinks you've had							
Make plans to avoid driving after drinking							
Have a friend let you know when you've had enough to drink							
Avoid drinking games							
Monitor your BAC (Blood Alcohol Concentration) to reduce drinking-related problems							
Choose a drink containing less alcohol							
Chug alcohol							
Do shots							
Start drinking before going out (i.e., pre-gaming)?							
Prevent a friend from driving under the influence of alcohol							
Not drink so you can serve as a designated driver							



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16. When you choose not to drink alcohol, how important are the following reasons?

	Not at all important						Very important
	1	2	3	4	5	6	7
Drinking is against my personal values							
Drinking conflicts with my religious beliefs							
I'm not old enough to drink legally							
I don't like the taste							
I'm going to drive							
My friends don't drink							
Alcohol is fattening							
I don't want to lose control							
I don't like being around others who are drinking							
I don't like the way I act when drinking							
I am worried about the negative effects on my health							
I am not able to drink due to a medical condition							
I've decided to cut down							
People in my family have had alcohol problems							
I've had problems with alcohol use in the past							
Drinking interferes with my athletic activities							
Drinking interferes with my school work							
People I care about would disapprove							
I am worried about being caught by authorities							
I don't have to drink to have a good time							



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I want to fit in with a group I like							
I don't want the image of a "drinker"							
I have other things to do							
I don't want to spend the money							

17. In the past two weeks, have you used any of the following? *Do not include anything you used under a doctor's order. Please check all that apply.*

- I have not used **any** of the following in the past two weeks
- Marijuana
- Cocaine (in some form)
- MDMA ("Ecstasy," "XTC," "Adam")
- Methamphetamine ("meth," "crystal," "crank," "ice," "speed," "crystal meth")
- Rohypnol ("roofies") or GHB
- Medications used to treat Attention-Deficit/Hyperactivity Disorder: (Ritalin®, Adderall®, Cylert®)
- Barbiturates (prescription-type sleeping pills like Quaaludes, "downs," "yellow-jackets")
- Amphetamines (prescription-type stimulants, also called "speed," "uppers," "ups")
- Tranquilizers (prescription-type drugs like Valium®, Xanax®, Librium®)
- Heroin
- Other opiate-type drugs (controlled substances like codeine, OxyContin, Darvon, Vicodin, Dilaudid, Demerol, Lomotil, Percocet, Percodan)
- LSD
- Other psychedelics or hallucinogenics like mushrooms, mescaline, or PCP
- Salvia Divinorum or Salvinorin A ("Maria Pastora," "Sage of the Seers," "Diviner's Sage," "Sally-D," or "magic mint")
- Anabolic steroids
- Chewing tobacco ("snuff")
- Cigarettes
- Inhalants (breathable chemical vapors, also called "whippets," "poppers," or "snappers")

18. How old were you when you first started drinking, not counting small sips or tastes of alcohol?

- Never did this
- 9 years or younger
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21 years and older



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19. How old were you when you first got drunk?

- Never did this
- 9 years or younger
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21 years and older

20. To what degree are you enthusiastic about AlcoholEdu?

Not at all						Very
1	2	3	4	5	6	7

DEMOGRAPHICS

21. What sex are you?

- Male
- Female

22. Choose one answer that *best* describes your race/ethnicity:

- Black/African American (non-Hispanic)
- Caucasian/White (non-Hispanic)
- Hispanic/Latino
- Asian/Pacific Islander
- Native American Indian/Native Alaskan

23. Are you a United States citizen?

- Yes
- No

If "yes" participants skip to Q25

24. If you are not a United States Citizen, how many years have you lived in the United States?
_____years



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25. What year of school are you entering?

- Freshman (First-year)
- Sophomore (Second-year)
- Junior (Third-year)
- Senior (Fourth/Fifth/Sixth-year)
- Graduate or professional school student
- Other
- Not a student

26. How old are you?

- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24 or older

27. What is your current weight? We need this to calculate your blood alcohol concentration (BAC).
Please enter your weight in either pounds or kilograms.

_____ pounds
_____ kilograms

28. From what state did you graduate high school?

- AL
- AK
- AS
- AZ
- AR
- CA
- CO
- CT
- DE
- DC
- FM
- FL
- GA
- GU
- HI
- ID
- IL
- IN
- IA
- KS
- KY
- LA
- ME



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- MH
- MD
- MA
- MI
- MN
- MS
- MO
- MT
- NE
- NV
- NH
- NJ
- NM
- NY
- NC
- ND
- MP
- OH
- OK
- OR
- PW
- PA
- PR
- RI
- SC
- SD
- TN
- TX
- UT
- VT
- VI
- VA
- WA
- WV
- WI
- WY
- Did not graduate in the United States

29. Which best describes your intended living arrangements for college?

- College residence hall
- Substance-free residence hall
- Fraternity or sorority
- On-campus apartment or house
- Off-campus apartment or house
- At home with family



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30. Do you intend to be a member of any of the following while at college? *Please check all that apply.*
- Fraternity or sorority
 - Volunteer /community service organization
 - Student religious group
 - Intercollegiate athletic team
 - Intramural or club athletic team
 - Health education group
 - Media organization (e.g., newspaper, radio, magazine)
 - Substance abuse prevention peer education group
 - Minority or ethnic organization
 - Political or social action group
 - Music or other performing arts group
31. Describe the highest level of education reached by your mother (or female guardian).
- Not applicable
 - Some high school
 - High school graduate/GED
 - Technical school graduate
 - Some college
 - College graduate
 - Graduate school
32. Describe the highest level of education reached by your father (or male guardian).
- Not applicable
 - Some high school
 - High school graduate/GED
 - Technical school graduate
 - Some college
 - College graduate
 - Graduate school
33. What is your intended enrollment status?
- Full-time student
 - Part-time student
34. Did you transfer, or are you transferring, to this institution this term?
- Yes
 - No
35. With whom do you intend to live while at college? *Please check all that apply.*
- Alone
 - With 1 roommate
 - With 2 or more roommates
 - With parent(s)
 - With steady boyfriend/girlfriend, partner, or spouse
 - With child(ren)
 - Other



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36. How many of your blood relatives have been a problem drinker or alcoholic, either now or in the past?

- Number of parents _____
- Number of brothers/sisters _____
- Number of grandparents _____
- Number of uncles/aunts _____
- Number of first cousins _____



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APPENDIX B
FOLLOW-UP SURVEY

AlcoholEdu® for College

Survey 3: 2008-09 (Pre-matriculation)

Welcome to the third and final AlcoholEdu survey. This survey asks about your current beliefs, attitudes, and experiences. We are interested in how your attitudes about drinking and your drinking patterns may have changed since taking the course.

As we told you at the beginning of the course, this survey is **anonymous**. None of the information you provide will be linked to you in any way. Your individual response to any question you're asked in this course will never be identified with you or reported.

If there are questions you would prefer not to answer, you can choose to leave them blank, but we hope you'll answer all questions as completely as you can. The information you provide will help us evaluate the effectiveness of the course.

Please complete this entire survey in one sitting.

Alert: This survey is only considered complete when you click the final "Submit Responses and Continue" button.

1. Which of the following best represents your own attitude about alcohol?

- Drinking is never a good thing to do
- Drinking is all right, but a person should never get drunk
- Occasionally getting drunk is okay as long as it doesn't interfere with academics or other responsibilities
- Occasionally getting drunk is okay even if it does interfere with academics or other responsibilities
- Frequently getting drunk is okay if that's what the individual wants to do

2. To what degree is it acceptable for people to:

	Never						Always
	1	2	3	4	5	6	7
Drink underage							
Get drunk on school nights							



3. How likely or unlikely is it that the following things would happen to you personally if you were to drink 3 or 4 alcohol beverages:

	Very unlikely						Very likely
	1	2	3	4	5	6	7
Get into trouble with authorities							
Get into trouble with your parents							
Feel less stressed							
Feel happy							
Get a hangover							
Feel sick to your stomach							
Feel more attractive							
Forget where you were or what you did							
Do something you'd regret							
Feel more confident or sure of yourself							
Be outgoing in social situations							
Feel out of control							
Pass out							
Feel clumsy							
Feel comfortable pursuing an opportunity to have sex							
Feel connected with the people around me							
Ride with a driver who was drunk or high							
Be argumentative							
Strain a relationship with a friend							
Be taken advantage of sexually							
Take advantage of someone sexually							



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4. During the past year, have you consumed alcohol (i.e., had more than a few sips of beer, wine, or liquor)?
- Yes
 - No
- If "no" participants skip to Q16 (skip past the calendar and drinking-related questions)

5. Please mark which of the following best matches your current situation:
- I see no need to change the way I drink alcohol.
 - I am thinking about drinking alcohol in a healthier and safer way.
 - I am ready to try drinking alcohol in a healthier and safer way.
 - I am currently trying to drink alcohol in a healthier and safer way.

6. How important to you is each of the following reasons for drinking alcoholic beverages?

	Not at all important						Very important
	1	2	3	4	5	6	7
To get drunk							
As a reward for working hard							
Because you like the taste							
To have a good time with my friends							
To celebrate							
To experiment							
Because of anger or frustration							
To decrease inhibitions							
Feel less stressed							
Feel happy							
Feel more attractive							
Feel more confident or sure of yourself							
Be outgoing in social situations							
Feel comfortable pursuing an opportunity to have sex							
Feel connected with the people around me							



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7. During the past two weeks, have you consumed alcohol (i.e., had more than a few sips of beer, wine, or liquor)?
- Yes
 - No

If "no" participants skip to Q14 (skip past calendar to drinking-related questions)

8. Think back over the past two weeks. Please enter how many alcoholic drinks you had on each day, or enter zero ("0") for days that you did not drink.

You need to replace each question mark ("??") with a number.

NOTE: A drink is defined as a 12-ounce beer, an 8.5-ounce malt beverage, a 12-ounce wine cooler, a 5-ounce glass of wine, or 1.5-ounces of liquor, whether in a mixed drink or as a shot.

INSERT PHOTO

[month]						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
5	6	7	8	9	10	11
12	13	14	15	16 _____	17 _____	18 _____
19 _____	20 _____	21 _____	22 _____	23 _____	24 _____	25 _____
26 _____	27 _____	28 _____	29 _____	30	1	2

The calendar will have question marks instead of blank fields to indicate that participants need to fill in a number for each date.

For question #9, display the calendar with the day where they had the highest number of drinks highlighted (or arrow to the day). This number of drinks will also be used for BAC calculations. **NOTE:** If there are multiple days with the highest number of drinks, then the arrow or highlight should indicate the most recent such occasion.

9. The single occasion in the past two weeks on which you reported having the highest number of drinks is indicated on the calendar. On this particular day, over what time period were you drinking? _____ Hours _____ Minutes



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10. In the past two weeks when you consumed alcohol, where did you spend most of your time drinking?

- A bar or nightclub
- A restaurant
- In an on-campus residence (residence hall/campus apartment)
- In an off-campus residence (non-campus apartment)
- Fraternity/sorority house
- At an athletic event (tailgate, etc.)
- Outdoor setting
- In a car

11. During the past two weeks, to what degree did the following happen to you when drinking or as a result of your drinking? *Don't count things that have happened to you but were not because of drinking.*

	Never 1	2	3	4	5	6	Always 7
Got a hangover							
Passed out							
Forgot where you were or what you did							
Did something you regretted							
Felt sick to your stomach							
Performed poorly on an assignment/test							
Got behind in school work							
Missed a class							
Missed going to work							
Injured another person							
Injured yourself							
Got involved in a physical fight							
Damaged property							
Drove after drinking 4 or more drinks							
Drove after drinking 5 or more drinks							
Rode with a driver who had been drinking							
Strained a relationship with a friend							



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Said things you didn't mean that hurt others' feelings							
Was argumentative							
Got into trouble with authorities							
Deliberately vomited to continue drinking							
Embarrassed yourself							
Been taken advantage of sexually							
Taken advantage of someone sexually							

12. During the past two weeks, how many times have you had five or more drinks in a row within a 2 hour period?

- Never
- Once
- Twice
- Three or more times

13. During the past two weeks, how many times have you had four or more drinks in a row within a 2 hour period?

- Never
- Once
- Twice
- Three or more times



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14. When you drink, to what degree do you do the following:

	Never 1	2	3	4	5	6	Always 7
Eat food before or while drinking							
Intentionally not eat food before drinking							
Pace your drinks to 1 or fewer per hour							
Set a limit on how many drinks you'll have							
Alternate non-alcoholic beverages with alcoholic drinks							
Keep track of how many drinks you've had							
Make your own drinks to control the amount of alcohol you have							
Not accept drinks from a shared source (e.g., punch bowl)							
Make plans to avoid driving after drinking							
Have a friend let you know when you've had enough to drink							
Limit the amount of money you bring to spend on alcohol							
Hold a drink so people stop bothering you about drinking							
Avoid drinking games							
Know where your drink has been at all times							
Stop drinking at a predetermined time							
Put extra ice in your drink							
Avoid trying to "keep up" or "out drink" others							
Monitor your BAC (Blood Alcohol Concentration) to reduce drinking-related problems							
Choose a drink containing less alcohol							
Choose a drink containing more alcohol							



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Chug alcohol							
Do shots							
Start drinking before going out (i.e., pre-gaming)?							
Prevent a friend from driving under the influence of alcohol							
Don't drink so you can serve as a designated driver							
Use a designated driver							



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15. During the next 30 days to what degree do you plan to:

	Never 1	2	3	4	5	6	Always 7
Talk with others about your decisions regarding alcohol use							
Support the choice not to not drink							
Reduce the number of times you drink per week							
Reduce the number of drinks you have each time you drink							
Eat food before or while drinking							
Pace your drinks to 1 or fewer per hour							
Set a limit on how many drinks you'll have							
Alternate non-alcoholic beverages with alcoholic drinks							
Keep track of how many drinks you've had							
Make plans to avoid driving after drinking							
Have a friend let you know when you've had enough to drink							
Avoid drinking games							
Monitor your BAC (Blood Alcohol Concentration) to reduce drinking-related problems							
Choose a drink containing less alcohol							
Chug alcohol							
Do shots							
Start drinking before going out (i.e., pre-gaming)?							
Prevent a friend from driving under the influence of alcohol							



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Not drink so you can serve as a designated driver							
Attend alcohol-free social events							
Help plan alcohol-free social events							
Get involved in working on alcohol policies on your campus							
Be better informed of laws and policies regarding alcohol use							
Review the goals and personal plan you created for yourself							
Utilize the <i>AlterEdu</i> social networking site							
Log into your personal <i>MyAlcoholEdu</i> page to access information and resources							
Put into practice what you learned from <i>AlcoholEdu</i>							

16. When you choose not to drink alcohol, how important are the following reasons?

	Not at all important						Very important
	1	2	3	4	5	6	7
Drinking is against my personal values							
Drinking conflicts with my religious beliefs							
I'm not old enough to drink legally							
I don't like the taste							
I'm going to drive							
My friends don't drink							
Alcohol is fattening							
I don't want to lose control							
I don't like being around others who are drinking							
I don't like the way I act when drinking							



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I am worried about the negative effects on my health							
I am not able to drink due to a medical condition							
I've decided to cut down							
People in my family have had alcohol problems							
I've had problems with alcohol use in the past							
Drinking interferes with my athletic activities							
Drinking interferes with my school work							
People I care about would disapprove							
I am worried about being caught by authorities							
I don't have to drink to have a good time							
I want to fit in with a group I like							
I don't want the image of a "drinker"							
I have other things to do							
I don't want to spend the money							



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17. In the past two weeks, have you used any of the following? *Do not include anything you used under a doctor's order. Please check all that apply.*

- I have not used any of the following in the past two weeks.
- Marijuana
- Cocaine (in some form)
- MDMA ("Ecstasy," "XTC," "Adam")
- Methamphetamine ("meth," "crystal," "crank," "ice," "speed," "crystal meth")
- Rohypnol ("roofies") or GHB
- Medications used to treat Attention-Deficit/Hyperactivity Disorder. (Ritalin®, Adderall®, Cylert®)
- Barbiturates (prescription-type sleeping pills like Quaaludes, "downs," "yellow-jackets")
- Amphetamines (prescription-type stimulants, also called "speed," "uppers," "ups")
- Tranquilizers (prescription-type drugs like Valium®, Xanax®, Librium®)
- Heroin
- Other opiate-type drugs (controlled substances like codeine, OxyContin, Darvon, Vicodin, Dilaudid, Demerol, Lomotil, Percocet, Percodan)
- LSD
- Other psychedelics or hallucinogenics like mushrooms, mescaline, or PCP
- Salvia Divinorum or Salvinorin A ("Maria Pastora," "Sage of the Seers," "Diviner's Sage," "Sally-D," or "magic mint")
- Anabolic steroids
- Chewing tobacco ("snuff")
- Cigarettes
- Inhalants (breathable chemical vapors, also called "whippets," "poppers," or "snappers")



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APPENDIX C
INSTITUTIONAL REVIEW BOARD APPROVAL



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2012 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

NOT HUMAN RESEARCH DETERMINATION

From : **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To : **Elayne Reiss**

Date : **December 15, 2009**

Dear Researcher:

On 12/15/2009, the IRB determined that the following proposed activity is not human research as defined by DHHS regulations at 45 CFR 46 or FDA regulations at 21 CFR 50/56:

Type of Review: Not Human Research Determination
Project Title: Evaluation of an Online Alcohol Education Program for
First-Time-in-College Students
Investigator: Elayne Reiss
IRB ID: SBE-09-06609
Funding Agency: None

University of Central Florida IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are to be made and there are questions about whether these activities are research involving human subjects, please contact the IRB office to discuss the proposed changes.

On behalf of the IRB Chair, Joseph Bielitzki, DVM, this letter is signed by:

Signature applied by Janice Turchin on 12/15/2009 11:40:20 AM EST

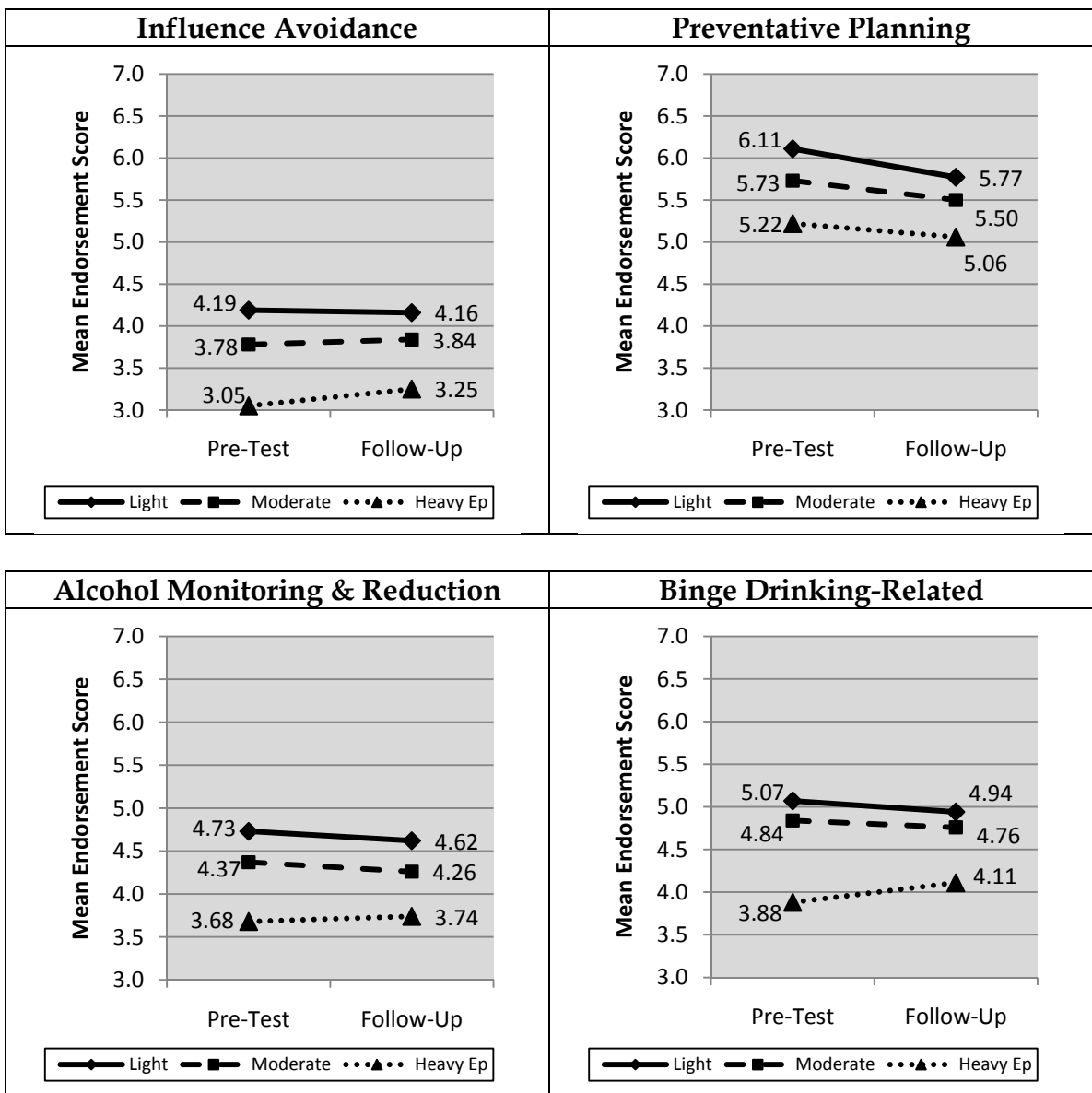
A handwritten signature in black ink that reads "Janice Turchin".

IRB Coordinator

APPENDIX D
ADDITIONAL GRAPHS FOR RESEARCH QUESTION 2

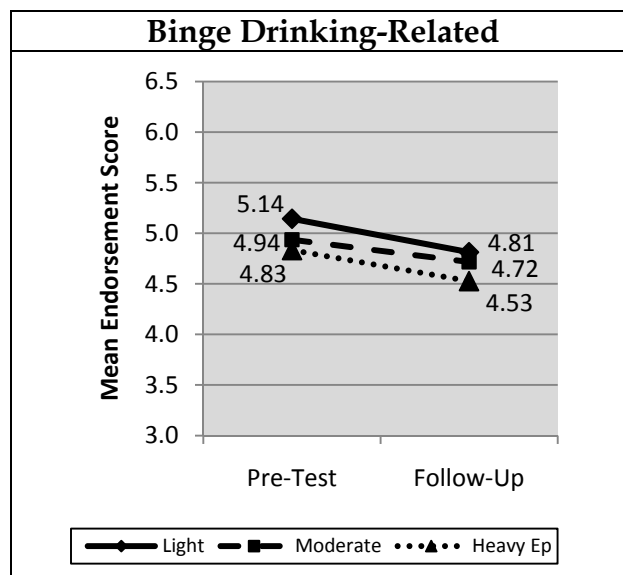
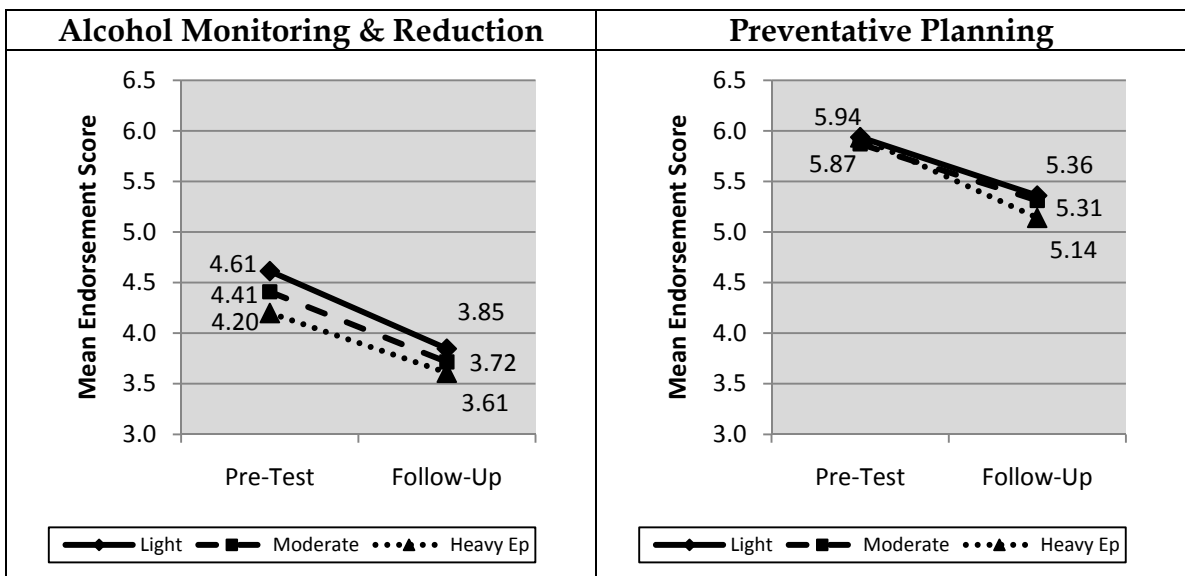
Mean Item Endorsement for Actual PBS Analysis

For purposes of side-by-side comparison, the estimated marginal means for each of the four factors associated with the analysis regarding change in actual PBS behavior among students in different drinker risk groups were converted into a consistent scale. All of the individual items comprising each composite score were measured on a scale of 1 (*never*) to 7 (*always*) so the means associated with these scores were divided by the number of items comprising the factor, yielding a mean ranging from a minimum possible value of 1 to a maximum possible value of 7.



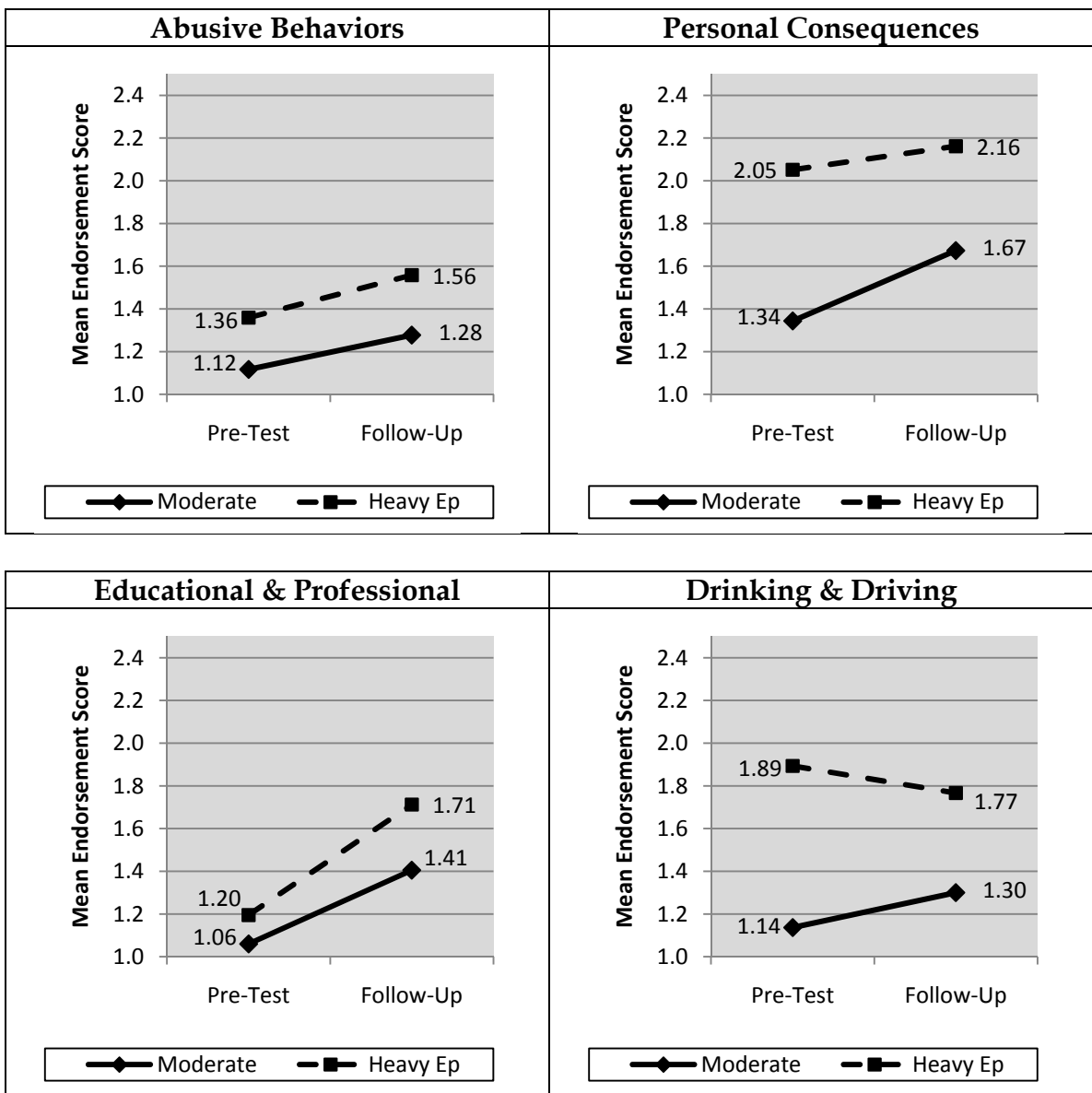
Mean Item Endorsement for Intended PBS Analysis

For purposes of side-by-side comparison, the estimated marginal means for each of the four factors associated with the analysis regarding comparison between actual and intended PBS behavior among students in different drinker risk groups were converted into a consistent scale. All of the individual items comprising each composite score were measured on a scale of 1 (*never*) to 7 (*always*) so the means associated with these scores were divided by the number of items comprising the factor, yielding a mean ranging from a minimum possible value of 1 to a maximum possible value of 7.



Mean Item Endorsement for Negative Consequences Analysis

For purposes of side-by-side comparison, the estimated marginal means for each of the four factors associated with the analysis regarding change in incurrence of negative consequences among students in different drinker risk groups were converted into a consistent scale. All of the individual items comprising each composite score were measured on a scale of 1 (*never*) to 7 (*always*) so the means associated with these scores were divided by the number of items comprising the factor, yielding a mean ranging from a minimum possible value of 1 to a maximum possible value of 7.



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