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Alcohol in Academia: Assessing Underage Binge Drinking Personalities and Policies

Shavonne Arthurs

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ALCOHOL IN ACADEMIA: ASSESSING UNDERAGE

BINGE DRINKING PERSONALITIES AND POLICIES

A Dissertation

Submitted to the School of Graduate Studies and Research

in Partial Fulfillment of the

Requirements for the Degree

Doctor of Philosophy

Shavonne Arthurs

Indiana University of Pennsylvania

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Indiana University of Pennsylvania
School of Graduate Studies and Research
Department of Criminology and Criminal Justice

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Issues in binge drinking and associated negative behavioral characteristics are elevated within the traditional college population compared to the non-college population of the same age range. Regardless of campus initiatives, binge drinking rates have remained high across national college populations. There is a need to move towards evidence based practices, providing an adequate baseline for campuses to develop sanctions and prevention efforts. The current study takes a multi level approach, developing an overall model of binge drinking characteristics, while also assessing the generalizability of characteristics across multiple college campuses.

The results of the current study indicate similar predictive power of the overall model of binge drinking characteristics; however, there are variations in indicators of drinking behaviors across various campuses. This may demonstrate cause for universities to take a more individualized approach in assessing and implementing drinking related policies and preventative programs. In addition, a common predictive indicator of college binge drinking across all models is an established drinking behavior in high school. It is important to address the high school to college transition by providing campus initiatives at enrollment and orientation that focus on curbing party school images while demonstrating focus on serious academic achievements.

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Being true to myself, I waited until I was finished (I hope) writing the summary of my student experience because I wanted this to be my main "finish". I knew the day would be here at some point, but thought it was forever out of my grasp for whatever reasoning (I am great at self doubt!). Obviously my journey took many "pushes" both literally and figuratively. I am happy that I get to create this permanent thank you note, although I hope that most of this has gone without saying and will continue to do so.

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CHAPTER I

INTRODUCTION

Overview

University administrators, state and federal legislators, and local and state law enforcement officers have attempted to initiate and enforce a variety of sanctions and alternative activities to deter underage drinking, especially binge drinking. Many campus administrators, adhering to a deterrence ideology, continue to increase sanctions for those identified for underage drinking. Other administrators opt for an education-based solution, spending more funds on anti-drinking campaigns and alcohol and drug related counseling. State legislators, like many campus administrators, believe a reduction in underage drinking and binge drinking can be achieved through an increase in fines and other sanctions, with some laws tying the severity of the sanctions to one's Blood Alcohol Content (BAC); the higher the BAC the more severe the sanction or fine, making a distinction between those underage who use alcohol and those underage who abuse alcohol. Organizations like Mothers Against Drunk Driving (MADD) and the Center for Science in the Public Interest (CSPI) lobby for law enforcement officers and magistrates to take a zero tolerance approach to underage alcohol use. One would think these measures are assisting with the underage drinking problem by reducing the number of incidents. Sadly, this is not the case as both deaths and arrests associated with underage drinking continue to increase with underage binge drinking remaining a steady issue for decades, especially within the college atmosphere (Boekeloo, Novik, & Bush, 2011; Egan & Moreno, 2011; Hevel & Bureau, 2014; Trolian, An, & Pascarella, 2016).

It is important to examine the college population specifically, as college students abuse alcohol at higher rates than their non-college peers (Carter, Brandon, & Goldman, 2010; Centers

for Disease Control and Prevention (CDC), 2016; Read, Radomski, Haas, Wickham, & Borish, 2016; Slutske, 2005). Approximately 60-65% of college students report using alcohol within the past 30 days, with 35-40% of those reporting levels of heavy drinking behavior (Johnson et al., 2016; National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2017; Piazza-Gardner, Barry, & Merianos, 2016). Many college students report having over one binge drinking episode per week with an average of over eight drinks per incident (CDC, 2016; Read et al., 2016; Sharma, Knowlden, & Nahar, 2017). Current self-reports of underage drinking and binge drinking rates among college students seem to question the effectiveness of increased arrests by law enforcement officers, the more severe penalties promoted by legislators, and the punitive as well as educational Universities' anti-drinking policies.

The 18-20 age concentration in heavy binge drinking behavior has a long historical background, stemming from the repeal of prohibition in 1933, with the 21st Amendment allowing states to set their own minimum drinking age (Law Information Institute, 2017). Only six states decided on 21 years of age as their legal drinking age, with 44 states identifying a younger age. When the minimum voting age was reduced to 18 during the 1960s, many youths began drinking alcohol at younger ages. The mentality was being old enough to be drafted into the military meant being old enough to drink alcohol (Waller, McGuire, & Dobson, 2015). Soon after, the Federal Uniform Drinking Age Act of 1984 was passed, which threatened to withhold 10% of all federal highway construction funds from states that did not have a minimum drinking age of 21 (Waller, McGuire, & Dobson, 2015). The fear of losing federal highway funding resulted in a uniformed minimum drinking age of 21 years of age being established in every state in the United States and the District of Columbia.

Since the federal mandate, cultural attitudes in education have changed. Approximately 20.5 million students attended American colleges and universities in the fall of 2017, with over half of those enrollees in the 18-24 traditional college-age range (National Center for Education Statistics ([NCES], 2017). Also, parents are more socially and emotionally attached to their children, with more relaxed attitudes towards drinking behaviors (Flanagan, 2016). Social acceptance of underage drinking seems to be established prior to the start of college living. Parents have begun "social hosting" parties, allowing teenagers to get drunk in known places (Flanagan, 2016) under adult/parental supervision. By accepting this behavior, parental attitudes gear towards the safety of knowing what their teenage children are doing; thus, being able to control the risks involved. Parents form a sort of friendship with their children, so drinking behavior is discussed mutually, partying pictures are not hidden, and parents can be used as an emergency response. The social acceptance of drinking behaviors only magnifies with progression of adult independence in the college atmosphere.

Heavy drinking and various problems associated with drinking have been shown to increase during the high school to college transition (Nguyen, Walters, Wyatt, & Dejong, 2011; Park, Sher, & Krull, 2009). Binge drinking rates increase during the first months at college, mainly due to establishing peer relationships that normalize and validate extreme drinking (Neighbors, Lee, Lewis, Fossos, & Larimer, 2007; Nguyen et al., 2011; Sher & Rutledge, 2007). Social inclusion is important during college, and social and enhancement motives often are prevalent in extreme drinkers (White, Anderson, Ray, & Mun, 2016). In addition is the carefree nature of the movement into adulthood during college. During this time period, college students often live in a life of extremes: extreme studying, extreme athletics, extreme extra-curricular activities, and extreme drinking (Flanagan, 2016). The extreme lifestyle leads to a "drink to get drunk" mentality,

with students not believing themselves to have drinking problems (Boekeloo, Novik, & Bush, 2011; Eisenberg, Hunt, Speer, & Zivin, 2011; Knight, Wechsler, Kuo, Seibring, Weitzman, & Schuckit, 2002; Read et al., 2016; Trolian, An, & Pascarella, 2016).

Increases in enrollment in the underage drinking range, cultural acceptance of underage drinking, and the fear of deep-pocket, multi-million dollar lawsuits have led to an increase in concern for universities to attempt to curb and/or control binge drinking behaviors. College administrators are required by law to implement sanctions regarding underage and problematic drinking, but the specifics of the sanctions are on a campus-by-campus variant (Carey, Scott-Sheldon, Garey, Elliott, & Carey, 2016; U.S. Department of Education, 2006). Though independent of one another, college campuses tend to have similar themed alcohol related policies. Generally, policies include a graduated scaling of monetary fines, alcohol specific education, and academic sanctions (Carey, et al., 2016; U.S. Department of Education, 2006). Many programs also have increased preventative type efforts, a popular example being AlcoholEdu, which is an online program that has a personalized experience aimed to curb alcohol abuse (EVERFI, 2017; Mermelstein & Garske, 2015; Monauti & Bulmer, 2014).

Regardless of sanctions and preventative efforts, rates of binge drinking and associated behaviors among college students have remained high nationally across campuses (Brown-Rice, Furr, & Jorgensen, 2015; Chauvin, 2012; Mermelstein & Garske, 2015; Monauti & Bulmer; Ragsdale et al., 2012; Scott-Sheldon, Carey, Elliot, Garey, & Carey, 2014; White & Hingson, 2015). College students have demonstrated behaviors that normalize binge drinking behaviors. Many misperceive the range of consequences associated with excessive drinking and how socially accepted the behaviors are (Brett, Leavens, Miller, Lombardi, & Leffingwell, 2016). Students view heavy drinking as part of the college experience, developing positive views of independence,

social relationships, and recreational fun (Miller, Meier, Lombardi, Leavens, Grant, & Leffingwell, 2016). The social acceptance and enhancement of binge drinking perpetuates the problem and causes students to continuously ignore potential legal, academic, and health consequences associated with the behavior (Patrick, Schulenberg, Martz, Maggs, O'Malley, & Johnston, 2013; White, Anderson, Ray, & Mun, 2016; White, Kraus, & Swartzwelder, 2006).

College students experience elevated risks for alcohol use disorders of 31%, compared to 4.7% in the general population (Ashenhurst, Harden, Corbin, & Fromme, 2015; Hasin, Stinson, Ogburn, & Grant, 2007; Knight et al., 2002). Other health concerns include future addiction, unsafe gender, property damage, drunk driving, memory loss, injury, and assault (Ashenhurst, et al., 2015; Hundersmarck, 2015; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994; White & Hingson, 2013). Pre-drinking activities, such as pre-gaming, drinking games, and mixing alcohol with energy enhancers can cause additional health issues (Haas, Smith, Kagan, & Jacob, 2012; Read et al., 2016; Striley & Khan, 2014; Zamboanga et al., 2016). Academically, heavy drinking affects intellectual development and is associated with lower levels of critical thinking skills (Trolian, An, & Pascarella, 2016; Ziegler et al., 2005). Also, those who binge drink tend to miss class, fall behind in school, and have poorer test performances and overall grade point averages (GPAs) when compared to non-binge drinking peers (Piazza-Gardner, Barry, & Merianos, 2016; Presley & Pimentel, 2006; Wechsler, Lee, Nelson, & Kuo, 2002).

Despite the continued problems associated with binge drinking behaviors, evidence based practices and formal testing of sanctions and preventative measures across college campuses are scarce. Studies that have been conducted show limited effectiveness, at best (Brown-Rice, Furr, & Jorgensen, 2015; Chauvin, 2012; Mermelstein & Garske, 2015; Monauti & Bulmer, 2014; Ragsdale et al., 2012). Studies largely have concentrated on specific campuses and behaviors,

disregarding the larger social picture. Multi-campus studies have been limited, with those that have been completed relying on secondary data sources (White, Anderson, Ray, & Mun, 2016). Questions remain as to why college campuses continue to develop sanctions and preventative efforts towards excessive drinking behaviors without moving towards evidence based practices. The current study takes a multi-level approach, developing an overall model of underage binge drinking characteristics, while also determining the generalizability of characteristics through primary data collection across multiple campuses.

Purpose of the Study

The intent of this research was to assess the generalizability of underage drinking characteristics; thus, determining the effectiveness of current sanctions and preventative techniques implemented across college campuses. Theoretically, based on current campus initiatives, it seems that there are general social characteristics that cause students to gravitate towards underage drinking. With similar policies and preventative measures, campuses are targeting underage drinking behaviors and binge drinking behaviors in the same way, which indicates students generally demonstrate the same alcoholic pathway.

This ideology and effectiveness of policy was assessed using quantitative research methods (regression models). The survey used has been tested multiple times at the same college campus, demonstrating reliability across measures. The current study examined the validity of the survey instrument, by distribution across multiple college campuses in the same state. A multi-site study produces a more accurate portrayal of underage drinking pathways; thus, demonstrating if campuses should continue to produce similar structuring of alcohol policies and preventative measures.

Research Concepts

The current research differed from previous research in four important ways. First, previous research has concentrated on more individualized approaches in determining underage drinking and binge drinking characteristics. Many previous studies have concentrated on certain social ideals like Greek life, gender, behavioral characteristics, and environmental characteristics. These studies have failed to produce an overall model of underage drinking and binge drinking, which would be a useful comparative for the effectiveness of college initiatives in alcohol prevention and deterrence. Those who have attempted to deduce an overall pattern have relied on secondary data sources, which do not directly link college underage students' drinking behaviors nor binge drinking behaviors to a theoretical causation of crime, other than deterrence theory; which, with the current sanctions in place has not been effective in reducing underage drinking; thus, the necessity for continually increasing sanctions (Patrick & Schullenberg, 2011; Piazza-Gardner, Barry, & Merianos, 2016; Sharma, Knowlden, & Nahar, 2017; White, Anderson, Ray, & Mun, 2016).

The current study aimed to produce an overall model of underage drinking behavior, relying on primary data specifically aimed at identifying indicators of excessive drinking. The survey instrument had been tested over multiple years at the same college campus. The multiple survey distributions have been useful to provide a more succinct model, allowing for non-significant measures to be removed, while leaving room for the addition of potentially significant measures based on current research about underage alcohol use. Throughout multiple tests, the variables currently within the survey have proven to be reliable and valid indicators of underage alcohol use and underage alcohol abuse at a single site; thus, the necessity for external validity assessment.

Second, this study examined the potential for varied pathways in underage drinking behavior by analyzing gendered models of drinking patterns. Previous research consistently has shown gender differences in binge drinking amounts, with males typically drinking more than females on average, but does not account for differences in behavior between the two (Cheng, Cantave, & Anthony, 2016; Kuntsche et al., 2015; Seedall & Anthony, 2013). The most recent survey distribution indicated gendered pathways among criminology undergraduates. The overall model was comparable when comparing criminology majors to all other majors. When comparing female criminology majors to male criminology majors, the model accounted for more variations in underage drinking behaviors as well as binge drinking behaviors in males and fewer variations in these drinking behaviors in females in comparison to the overall model.

To examine the gender differences further, this study added impulsivity and risk taking measures to the survey instrument. The questions used to examine risk taking and impulsivity in the current study are from the Grasmick attitudinal scale of self-control. The Grasmick scale has been used effectively in a variety of research studies examining self-control, thus demonstrating construct validity (Piquero & Rosay, 1998; Piquero & Tibbetts, 1996; Walters, 2016). Previous research has demonstrated subscales and subcomponents of the Grasmick scale can be used to sufficiently examine individual self-control measures (DeCamp, 2015).

Studies that have associated impulsivity and risk taking to underage drinking and binge drinking largely have been studied independently of other underage alcohol drinking characteristics (Cheng, Cantave, & Anthony, 2016; Egan & Moreno, 2011; Fernie, Peeters, Gullo, Christiansen, Cole, Sumnall, & Field, 2013; Harris, Jenkins, & Glaser, 2006; Kazemi, Wagenfeld, Van Horn, Levine, & Dmochowski, 2011; Nguyen, Walters, Wyatt, & Dejong, 2011). As mentioned earlier, it is important to examine the variety of characteristics associated with underage

and binge drinking behaviors in an overall model. The current study examined impulsivity and risk taking, along with other variables associated with underage and binge drinking behaviors established in prior research. Those variables are average drinks per week in high school, parental approval of underage drinking, number of close friends who consume alcohol, gender, and social Greek life involvement.

Third, the survey was distributed across multiple college campuses in the Commonwealth of Pennsylvania. All are state schools and members of the Pennsylvania State System of Higher Education (PASSHE). The typology of students throughout the state system is similar, except for one that has a slightly larger minority representation. Prior research has failed to generalize underage and binge-drinking behaviors and largely have relied on singular college campus populations (Egan & Moreno, 2011; Nguyen et al., 2011). Studies that have looked at multi-campus populations have used secondary data sources, which do not have the specific focus of examining underage and binge drinking characteristics (Piazza-Gardner, Barry, & Merianos, 2016; Sharma, Knowlden, & Nahar, 2017). This study had the specific focus of establishing generalizability of the survey instrument. The way in which current anti-drinking measures and policies have been established are indicative of similar drinking patterns nationwide. With that in mind, the results from this study should be similar across multiple campuses. If the results are not similar across campuses, there may be a need to re-evaluate the way in which "one size fits all" alcohol policies and preventative measures are established.

Last, there have been alcohol policy changes within the parent campus of the current study and in the Commonwealth of Pennsylvania since the last survey distribution. During the lapse in time, Pennsylvania raised the underage drinking fine from $300 to $500 (Alcohol Policy Information System, 2016). Also, the parent campus has increased the underage drinking fine from

$150 to $300. The results from the previous survey distribution were compared to the current survey distribution at the parent campus to determine if the increased fines had a significant effect on underage and binge drinking behaviors. There was not a significant difference between the regression models of the previous study to the current, which indicated there was no deterrent effect associated with the fine increase. Students had similar drinking patterns regardless of the fine increases.

Analysis

Ordinary Least Squares Regression (OLS) was used to predict the characteristics associated with variation in underage and binge drinking amounts[1]. OLS is an effective analysis to examine the relationship between a continuous response variable (number of alcoholic drinks consumed per week on average and number of binge drinking episodes per month on average) and various explanatory variables, either continuous or properly coded dichotomous categorical (number of alcoholic drinks consumed per week on average as a high school senior, number of drinking friends, social Greek life involvement, gender, parental attitudes towards underage drinking, risk taking, and impulsivity). Each college campus was analyzed separately. The models were examined for model-fit. The study found drinking behaviors varied across campuses. The parent university model was most similar in fit to university 3 (medium sized, public, rural university with a high minority representation in northeastern Pennsylvania). Also, the individual models were examined to determine if there were similar predictive variables between the campus models. The study found consistency in indicators of average drinks as a high school senior and Greek life

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[1] Once the data are collected and descriptive statistics identified; a count model, like negative-binomial or Poisson may be preferred over OLS as these statistics handle distributions that are skewed to the right because of the nature of counts better than OLS, w/o having to transform the DV.

involvement across campus models but varied elsewhere, demonstrating social variations in drinking behaviors across different universities.

Each campus model was separated by gender (male and female) to determine if the model-fit and predictive elements within are similar. The campus models were compared to one another to determine if the pathways were similar towards underage and binge drinking behaviors specific to gender across multiple campuses. The study found average drinks per week during high school and Greek life involvement were significant in both models, while parental approval was an additional indicator for males and risk taking behaviors was an additional indicator for females. This indicates a gendered pathway towards drinking.

To compare deterrent effects regarding increased monetary sanctions, a Z-score comparison was used to compare the weekly average of alcoholic drinks consumed from the previous distributed survey wave to the current one. The study determined there was not a significant difference in weekly alcoholic drinks consumed, indicating stability in drinking behavior over time and disregard for the implementation of higher sanctions for underage drinking. A limitation to this method is that there are different sample populations analyzed from the previous study to the current one. However, previous survey distributions have had the same general average of weekly consumed alcoholic drinks in different sample populations, which indicates underage drinking behavior has been consistent over multiple years to include the number of students under the age of 21 who report consuming alcohol while in college (approximately 80%). This study would at least highlight a potential relationship in stricter sanctions to a change in drinking patterns.

Summary

Generally speaking, underage alcohol consumption, especially binge drinking, has remained a consistent problem across college campuses for decades, regardless of policy and preventative measures in place (Hundersmarck, 2015; Johnston et al., 2016; NIAAA, 2017). High school alcohol consumption has been a consistent indicator of college drinking consumption, which indicates little societal emphasis about the issues associated with underage drinking. There does appear to be a societal interest in binge drinking as the weekly levels of alcohol consumption during college often double as parental monitoring diminishes. Partially due to established behaviors and a lack of parental monitoring, deterrent and preventative style polices have had little to no effect on college campuses (Mermelstein & Garske, 2015; Scott-Sheldon, Carey, Elliott, Garey, & Carey, 2014; White & Hingson, 2013). Also, many campuses have not tested the policies and preventative measures in place, which strays from a more desired evidence based practice(s).

It is important to establish predictive characteristics for underage and binge drinking behaviors to determine the best approach to resolve the issues related to underage drinking, especially when binge drinking occurs. Prior research has focused on establishing relationships between certain individual characteristics and binge drinking behaviors. This approach is likely due to a reliance on secondary data sets and/or individual campuses approaches, but does not assist in policy development or assessment. Establishing predictive characteristics should assist with preventative style, measurable policies being developed.

This study also examined the effects of increased monetary sanctions to assist with determining if deterrent style measures are effective in reducing underage drinking behavior. This comparison, coupled with predictive model behaviors assisted in identifying more effective

approaches and measures on college campuses towards reducing underage drinking and the associated binge drinking.

The use of multi-campus samples also assisted in establishing effectiveness of campus policies and preventative measures. Many campuses choose the same style of both deterrent and preventative approaches towards their campus alcohol policies. The study determined significant variations in indicators of drinking behaviors across the various universities, indicating a potential need to take a more geographical approach to policies and preventative measures. This also indicates a potential need for evidence-based practices to be established throughout individual campuses. Colleges need to analyze their own polices and measures to determine individual effectiveness due to varying underage drinking pathways. Establishing more effective measures will assist in relieving social and legal issues associated with underage drinking and binge drinking behaviors, while devoting limited monetary resources to policies and preventions that actually work.

CHAPTER II

LITERATURE REVIEW

Underage Drinking in the College Atmosphere

Alcohol is the most commonly used drug among youths in the United States, with

approximately 4,300 deaths annually related to underage drinking (Albers, Siegel, Ramierz, Ross,

DeJong, & Jemigan, 2015; Centers for Disease Control and Prevention, 2015; Hingson, Heeren,

Winter, & Wechsler, 2005; Moreno, Cox, Young, & Haaland, 2015). Alcohol also is associated

with risky behavior. Annually, there are 200,000 alcohol related emergency room visits from

individuals under the age of 21 (Albers et al., 2015; Center for Behavioral Health Statistics and

Quality, 2012). A large majority of these individuals attend college, as binge drinking increases to

hazardous levels within the academic atmosphere (Ashenhurst, Harden, Corbin, & Fromme, 2015;

Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Nguyen, Walters, Wyatt, &

Dejong, 2011; Park, Sher, & Krull, 2009; Sher & Rutledge, 2007). The transition from high school

to college is considered a critical time when alcohol abuse patterns escalate at a much faster rate

when compared to non-college peers (Ashenhurst et al., 2015; Blanco et al., 2008; Knight,

Wechsler, Kuo, Seibring, Weitzman, & Schuckit, 2002; Moser, Pearson, Hustad, & Borsari, 2014).

The first few weeks of college are when drinking patterns are instilled, largely stemming from

behaviors established during high school (Borsari, Murphy, & Barnett, 2007; Moser et al., 2014).

Individuals between the ages of 18 and 22 who are enrolled at college full time are more

likely to use alcohol and binge drink when compared with the general, non-college population,

with the onset of alcohol use averaging at 16.9 years of age (Ashenhurst et al., 2015; Marshall,

Roberts, Donnelly, & Rutledge, 2011; Thombs & Briddick, 2000). Within the college population,

students who are under 21 years of age are three times as likely to abuse alcohol when compared

with students 21 years of age and older (Huang, DeJong, Schneider, & Towvim, 2010). The socialization of college life also creates a normative atmosphere for alcohol use and misuse (Brett, Leavens, Miller, Lombardi, & Leffingwell, 2016; Brown-Rice, Furr, & Jorgensen, 2015; Capone, Wood, Borsari, & Laird, 2007). College students tend to misunderstand typical negative alcohol experiences and how acceptable they are to others, which contributes to the normalization of consequences associated with underage and binge drinking. Same-gender students view alcohol-related ramifications as more acceptable as the sanctions become the norm and more students experience similar consequences [lack of personal sanctions – guilt and shame] (Brett et al., 2016). The importance of social inclusion and "fitting in", along with a fear of exclusion are notable reasons for increases in alcohol usage in the underage college population (Neighbors et al., 2010; Prince et al., 2015). In addition, experimental alcohol use that starts with underage drinking often shifts to frequent or excessive use (binge drinking) in the college atmosphere (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016; Moreno et al., 2015; Olmstead, Roberson, Pasley, & Fincham, 2015).

The degree to which students identify with this culture has a direct impact on the level of underage alcohol abuse (Osberg, Insana, Eggert, & Billingsley, 2011; Pearson & Hustad, 2014). The college drinking culture functions differently from regular social norms, where a strong bond to the culture is more important than one's perception of the culture (Moser et al., 2014; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007; Osberg, Billingsley, Eggert, & Insana, 2012). Within the drinking culture, there are subcultures based on class year and differing drinking logistics within each class (Hoeppner et al., 2012). Subcultures of class year provide explanation as to why binge drinking is more concentrated in lower class levels compared to upper class levels. Younger students tend to binge drink more often as a demonstration of social inclusion.

The party-style environment of college allows for acceptance of reckless behaviors, indecisiveness, and decreased levels of self-control (Ashenhurst et al., 2015; Dick et al., 2010; Jentsch et al., 2014; McCrae & Costa, 1994; McCrae et al., 1999; Quinn, Stappenbeck, & Fromme, 2011). These negligent behaviors are specific to the college population, as many "age out" of hazardous involvement with alcohol (Ashenhurst et al., 2015; Donovan et al., 1983; Littlefield et al., 2009; Prince et al., 2015). Due to the mentioned college risk factors, the majority of alcohol abuse studies have concentrated on students attending colleges or universities.

Administrative Responses

The misuse of alcohol on college campuses has remained a steady concern for the past three decades (Asburn & Lipka, 2011). Due to consistent undergraduate alcohol abuse patterns, many colleges have spent a significant amount of time revising campus polices, taking a more restrictive stance. The majority of campus policies focus on a deterrent effort, including fines, sanctions for all students, and drug testing for athletes (Ashburn & Lipka, 2011). These efforts often are combined with educational alcohol awareness activities and programs (Creemens, Usdan, Talbott-Forbes, & Martin, 2011; Marshall, Roberts, Donnelly, & Rutledge, 2011; Mitchell, Toomey, & Erickson, 2005). Even with the variety of initiatives, binge drinking rates and behaviors have remained consistent, suggesting the efforts may not be leading to successful interventions (Chauvin, 2012; Hundersmarck, 2015; Mermelstein & Garske, 2015; Ragsdale et al., 2012; White & Hingson, 2013). Currently, 40% of college students admit to getting drunk within the past month, and approximately one in seven college students report consuming ten or more drinks in a day (Brett et al., 2016; Johnson et al., 2016). The limited effectiveness of current policies designed to reduce alcohol consumption by underage college students calls into question their usefulness in curbing underage and binge-drinking behaviors.

College and university alcohol use policies have been a requirement for many years. The Drug Free Schools and Communities Act Amendments of 1989 mandated that college campuses must have a program in place to prevent illicit drug and alcohol use by students (Lipperman-Kreda, Grube, & Paschall, 2010). These amendments include the distribution of information about policies and awareness of punishments due to failure of compliance. Also, Education Department General Administrative Regulations (EDGAR) requires that all students must receive a copy of their respective campus drug and alcohol policy each academic year (Creemens et al., 2011).

Additionally, college administration is required by law to have disciplinary actions in place regarding underage and problematic drinking (U.S. Department of Education, 2006). A variety of sanctions currently are used including fines, academic sanctions, alcohol education programs, and counseling efforts. There is limited research about the effectiveness of policies, activities, and programs on college campuses. Approximately 20% of college and university administrations have reported formally testing the implementation of their policies (DeJong & Langford, 2002). Of these colleges and universities, research found many students are aware of rules and regulations regarding alcohol use, but do not comply with them (Creemens et al., 2011; Mitchell et al., 2005; Terry, Garey, & Carey, 2014; Wechsler, Lee, Gledhill-Hoyt, & Nelson, 2001). Research outside of administration has demonstrated similar results, showing at best a mixed results of policy effectiveness (Brown-Rice, Furr, & Jorgensen, 2015; Hundersmarck, 2015; Jackson, Sher, Gotham, & Wood, 2001; Monauti & Bulmer, 2014). Based on the results from research examining policy effectiveness, there appears to be a need to either re-test policy initiatives or revamp policies completely.

Currently, the majority of colleges and universities prohibit alcohol use and possession on campus (Mitchell et al., 2005). Campus efforts to increase student understanding of the hazardous

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behavior of alcohol abuse heightened during the 1980s, but has since tapered (Ashburn & Lipka, 2011). Regardless of these efforts, alcohol abuse has remained an issue among college students for over three decades, with a steady increase in alcohol related problems since the mid-1990s (Ashburn & Lipka, 2011; White & Hingson, 2013). College campuses continually have revised alcohol policies in reaction to the steady problem; however, many have implemented policies without rigorously testing them (Crawford & Novak, 2006; DeJong & Langford, 2002; Marshall et al., 2011; Mitchell et al., 2005). Alternative activities also have limited effectiveness and often do not attract the desired students (Brown-Rice, Furr, & Jorgensen). "Mocktail" parties tend to perpetuate the problem, causing many to heavily drink elsewhere, and having the association of places where social outliers go (Hundersmarck, 2015). Similar interventions have been shown as ineffective, even when targeting heavy alcohol users specifically (Scott-Sheldon, Carey, Elliott, Garey, & Carey, 2014). Due to the demonstrated ineffectiveness of policies, college campuses may be wasting valuable time and financial resources implementing policies and initiatives that do not demonstrate effectiveness.

Other studies have shown that students are aware of the majority of campus alcohol policies, but simply disregard following them (Taylor, Johnson, Voas, Turrisi, 2006; Toomey & Wagenaar, 2002; Wechsler, Lee, Gledhill-Hoyt, & Nelson, 2001). A few studies have shown slight reductions in binge drinking with knowledge of policies, but underage alcohol abuse still was highly prevalent (Wechsler et al., 2001). Less than half of college students are accepting of campus policies, even with acknowledgement they exist (Marshall, Roberts, Donnelly, & Rutledge, 2011). The majority of underage students also drink at both on and off campus social functions, regardless of this being in direct violation of alcohol policies (Creemens et al., 2011; Marshall et al., 2011). Interviews with college students who have violated alcohol policies revealed that students find

alcohol abuse integral to student life and feel a sense of entitlement to drink irresponsibly

(Crawford & Novak, 2006; Terry, Garey, & Carey, 2014; Wolburg, 2001). Overall, research has

demonstrated college student behavior is not influenced by knowledge of campus alcohol policy,

and behavior is more likely related to attitudes and intentions in regard to alcohol use.

What is Binge Drinking?

Alcohol is said to be prone to abuse patterns due to its distribution through legally and

culturally accepted means, in comparison to other less commonly abused substances during college

years (Moss, Chen, & Yi, 2013). Currently, alcohol is the most frequently used substance by

college students when assessing Alcohol, Tobacco, and Other Drugs [ATOD] (Hingson, et al.,

2005; Moreno et al., 2015). Research has struggled to demonstrate consistency in measuring

average consumption, as it tends to fluctuate throughout an academic semester. Those who drink

alcohol during the week are more prone to risky drinking behaviors in comparison to students who

only drink on the weekends (Hoeppner et al., 2012). Weekly drinking habits also fluctuate in

regards to academic requirements, holidays, and calendar and local events (Del Boca, Darkes,

Greenbaum, & Goldman, 2004). Students believe that there is a freedom and flexibility during

college years to drink with limited negative consequences (Wolburg, 2001). Due to variable

measures, The Centers for Disease Control and Prevention (CDC) have established general

guidelines for measuring alcohol abuse. Under the CDC, binge drinking is defined as consuming

4-5 (women-men) or more drinks in a single setting, and heavy drinking is defined as consuming

8-15 (women-men) or more drinks per week (CDC, 2016). Under these guidelines, national

surveys have concluded 37-44% of college students report recent episodic heavy drinking

(Johnston et al., 2016; Wechsler & Nelson, 2008). Approximately 60% of college students

consumed alcohol in the previous month, with 2 out of every 3 binge drinking during the same

time period (Center for Behavioral Health Statistics and Quality, 2015). Again, this is concerning at the university level because college students have elevated drinking patterns compared to their non-college peers. Students consume more alcohol and drink more regularly than non-students of the same age range (Carter, Brandon, & Goldman, 2010).

The Pitfalls of Binge Drinking

In addition, elevated drinking behavior is a public health concern concentrated within the undergraduate college population (Ashenhurst et al., 2015; Bachman et al., 1997; Donovan, Jessor, & Jessor, 1983; Johnston et al., 2016; Littlefield, Sher, & Wood, 2009). Regular undergraduate binge drinking behavior is reported by approximately 40% of students (Johnston et al., 2016). In addition, the undergraduate population has an elevated risk for alcohol use disorders (AUDs) compared to the general population of the same age range at 31% to 4.7%, respectively (Ashenhurst et al., 2015; Hasin et al., 2007; Knight et al., 2002). While many students mature out of hazardous drinking behaviors, some do persist in involvement, which can lead to severe health consequences in adulthood (Ashenhurst et al., 2015; Bachman et al., 2002; Boyd, Corbin, & Fromme, 2014; Jackson, et al., 2001).

There are several general negative consequences of prolonged alcohol abuse, along with many causes concentrated in the college environment. Social consequences include injury, unplanned sexual activity, drunk driving, memory loss, property damage, and assault (Ashenhurst et al., 2015; Brown-Rice, Furr, & Jorgensen, 2015; Capone, Wood, Borsari, & Laird, 2007; White & Hingson, 2013). More specific to college students are consequences of injury, engagement in unwanted and/or unprotected sex, physical fighting, poor studying habits, and academic failure (Brown-Rice, Furr, & Jorgensen, 2015; Hundersmarck, 2015; Ragsdale et al., 2012; Read, Merrill, Kahler, & Strong, 2007).

Binge drinking behaviors can cause collateral damage with other members of the campus community, too. Non-drinking students can experience instances of interrupted studying, aggression and assault issues, and having to deal with safety issues with intoxicated peers (Carey, Scott-Sheldon, Garey, Elliott, & Carey, 2016; Hingson, Zha, & Weitzman, 2009; Wechsler et al., 2002). The institutions themselves can run into issues dealing with expenses associated with property damage, security, emergency services, and concerns with nearby communities dealing with noise and other drinking related issues (Carey et al., 2016; Carey, McClurg, Bolles, Hubbell, Will, & Carey, 2009; Gebhardt, Kaphingst, & DeJong, 2000; Perkins, 2002). With the plethora of negative consequences associated with alcohol abuse, it is important to determine the main indicators to potentially alleviate the detriment within the undergraduate population and broader campus community.

Binge Drinking Characteristics

Regardless of campus policy initiatives, alcohol misuse and abuse is still a steady issue. Researchers have attempted to understand characteristics that are indicative of binge drinking behaviors in efforts to understand and potentially curb the problem. One of the more common associated characteristics is established high school drinking behaviors. Numerous studies have shown that pre-college drinking is a strong indicator of college alcohol abuse. Developmental factors are related, with children who have parents who abuse alcohol being more likely to abuse alcohol themselves (Bijettebier et al., 2006; Fischer, Forthun, Pidcock, & Dowd, 2007; Ham & Hope, 2003). Other studies have shown, in general terms, parents influence college student drinking patterns (Marshall et al., 2011; Wood, Read, Mitchell, & Brand, 2004). This support, or at least tolerance, of pre-college alcohol consumption is a cause for concern because early onset of alcohol use is a indicator of adult alcohol abuse and dependence (Moss, Chen, & Yi, 2013; Strom,

Adolfsen, Fossum, Kaiser, & Martinussen, 2014). Additionally, adolescent males tend to abuse

alcohol more often than adolescent females, which follows the same pattern as college abuse

(Moss, Chen, & Yi, 2013). Preventative high school programs have had a limited effect and simply

do not work for long term drinkers (Strom et al., 2014). Additionally, pre-college drinking

behaviors often continue or perpetuate when reaching the college level (Bachman et al., 1997;

Olmstead et al., 2015). Conclusions from research regarding high school drinking patterns mimic

the results when studied at the college level.

Regarding social aspects of college, involvement in Greek life and having friends who

drink heavily are among the strongest indicators of alcohol abuse (Crawford & Novak, 2006;

Creemens et al., 2011; Mitchell et al., 2005; Taylor et al., 2006). Additionally, research has shown

that Greek life members experience more alcohol related problems than the non-Greek life

population, and are more likely to experience injuries that require medical treatment (Brown-Rice,

Furr, & Jorgensen, 2015; Chauvin, 2012; Creemens et al., 2011; O'Brien et al., 2012). Greek life

behavior is difficult to regulate due to the majority of campuses having off-campus Greek life

housing (Baer, 2002; Creemens et al., 2011). Campuses cannot fully contain Greek life social

events for this reason (Creemens et al., 2011). Also, pre-college drinkers tend to seek out

environments that support drinking behaviors, which often is associated with social Greek life

involvement (Borsari & Carey, 1999; Brown-Rice, Furr, & Jorgensen, 2015). In addition, alcohol

abuse is a continued problem in Greek life, regardless of program initiatives (Chauvin, 2012;

Ragsdale et al., 2012). Greek life tends to have a strong presence on many college campuses,

which has the opportunity to influence non-Greek members, also.

With regards to demographic characteristics, Caucasian American males have displayed the

highest levels of alcohol abuse, but both genders engage in risky drinking behaviors (Brown-Rice,

Furr, & Jorgensen, 2015; Crawford & Novak, 2006; Weitzman & Chen, 2005). Recent studies have indicated female alcohol use is steadily on the rise (Ferrer & Marks, 2016; Grucza, Norberg, Bierut, 2008; World Health Organization, 2014). This increase in female alcohol consumption, especially in underage drinkers, may influence drinking patterns in males, too, as peer relationships are an established influence of binge drinking behaviors (Miller, Meier, Lombardi, Leavens, Grant, & Leffingwell, 2016).

Surveying Binge Drinking Characteristics

Most research concentrates on certain characteristics within binge drinking. There is limited research that attempts to fully predict all influential factors in underage drinking abuse. In building to the current study, a survey has been developed and engineered three separate times over the past few years in attempts to address that issue. The surveys were distributed over varying years, with each one being adapted to the next survey wave in an attempt to better explain the variations in binge drinking behaviors. The updated survey being used for the current study is looking to not only better explain variations in binge drinking behaviors, but also to assess external validity of the survey instrument. Each developed survey is outlined from three different studies, with significant factors discussed. Also, adaptions are explained for each further developed survey instrument. These survey modifications and findings leads to the discussion of adaptions for the survey being used in the current study, along with discussion of testing for external validity.

Study One

A survey was initially developed in 2012 to quantify predictive characteristics of binge drinking behavior based on previous research. The cross-sectional study surveyed undergraduate students at a large, public, rural university in Pennsylvania. The surveys were hand distributed to students in randomly selected introductory level liberal studies courses and lower level

criminology courses. A total of 527 surveys were completed with a minimum age of 18 and a maximum age of 20 with a mean age of 19.50 years ($SD = 0.537$). This distribution was representative of a traditional university, and the ages of the students generally could be attributed to lower class levels (mainly freshman and sophomore levels). This is an optimal sample age, as stated above, due to alcohol abuse levels characteristically being higher in students who are below the legal drinking age, but who have been enrolled at the college or university for at least one year (Huang et al., 2010).

Students were asked to report alcohol consumption levels. For this study, a drink referred to an alcoholic beverage and was defined as a 12-ounce beer, 6 ounces of wine, or one ounce of distilled spirits (hard alcohol). For example, if a person drank one 40-ounce Fosters, it actually would be considered $40/12 = 3.33$ drinks; similarly, a 12-ounce Long Island Ice Tea equals two drinks, as do doubles and 12-ounce wine coolers. This definition was stated at the start of the survey.

Study one dependent variable. The dependent variable used for analysis was the average weekly consumption of alcoholic drinks. Students were asked how many drinks they consume on a weekly average. Approximately 76% of the sample reported consuming at least one alcoholic drink per week, which was slightly higher than the national average identified in Monitoring the Future data, but matched the alcohol use data for Pennsylvania's juveniles reported by the Pennsylvania Commission on Crime and Delinquency (PCCD).

Study one independent variables. Independent variables used for analysis were age, gender, Greek life membership, major, parental drinking approval, five closest male drinking friends, five closest female drinking friends, and knowledge of campus policies.

Age was a continuous variable, and gender was coded as a dichotomous variable with 0 = Female and 1 = Male. Students were asked if they were members of a social Greek sorority or fraternity. Greek life membership was coded as a dichotomous variable with 0 = Not a Greek life member and 1 = Greek life member. College majors aside from Criminology were not representative enough for analysis, so major was coded as a dichotomous variable with 0 = Other Major and 1 = Criminology Major.

Parental Drinking Approval (PDA) was a scale created by collapsing questions related to parental approval of underage drinking. Students answered these questions on an interval scaling of 0 to 3, asked as dichotomous "yes" or "no" questions (0 = "no" and 1 = "yes"). Students were asked if their parents approved of underage drinking as long as no one got into trouble, if they have consumed alcohol underage with their parent's knowledge, and if they were allowed to consume alcohol at home underage. These responses were combined to create a continuous variable of 0 to 3, 0 = Low level of PDA to 3 = High level of PDA.

Peer drinking behaviors were asked based upon gender. Students were asked how many of their five closest female friends drink and how many of their five closest male friends drink. These variables were examined as separate, continuous variables.

The knowledge of the campus's alcohol policy was assessed by creating a variable based on correct responses to the current policy. Students were asked five true or false questions pertaining to their knowledge of campus policies. Topics discussed were university sanctions based on off-campus arrest, what agency reviews reported underage drinking offenses, presence of lawyers, administrative fees acquired, and if acquittal of off-campus arrest still can result in university sanctions. Answers were coded as 0 = Incorrect and 1 = Correct. The scores were added

together to provide an overall knowledge of campus policies index ranging from 0 to 5 correct responses.

Study one results. Ordinary Least Squares (OLS) regression analysis was used to estimate the effects of the independent variables on the likelihood of weekly alcohol consumption. Although several of the independent variables entered into the model failed to obtain statistical significance, the overall model was significant, $F = 24.856$, $p < 0.001$ (Durbin-Watson = 1.987, R^2 = 0.302). The model had an adjusted R^2 of 0.290. Both R^2 values were close in proximity, which is indicative of no inflation occurring.

Gender was the strongest indicator. Males consume approximately five more drinks per week on average than females. A high number of close female friends who drink was the next strongest indicator. Basically, for each female friend a respondent had who drank out of their top five female friends, the respondent's drinks per week were increased by 1.634 drinks. This finding held true for both female and male respondents. The third strongest indicator was Parental Drinking Approval (PDA). For each one point increase in the PDA, the respondent's drinks per week increased .190 drinks. For example, a student who had a high score on the PDA (3) would consume on average .57 more drinks per week than a student who had a PDA score of 0 (strictest parental approval). The weakest indicator that remained statistically significant was Greek life involvement. Students involved in social Greek organizations drank approximately three more drinks per week than non-Greek life members. In summary, the findings suggest the being male, having a large number of close female friends who drink, having high parental drinking approval, and being a member of Greek life increase the likelihood of consuming more alcohol beverages on average per week.

Study Two

The original survey was revised in 2013. The goal was to adjust variables in hopes of creating a more predictive model for underage and binge drinking characteristics. Several questions were removed from the survey that captured information, which previous findings suggested were not good indicators of underage drinking and binge drinking and two variables were added to the survey: average drinks per week as a high school senior and college class start times.

High school alcohol use has been linked to heavy amounts of alcohol use during college (Bijttebier, Goethals, & Ansoms, 2006; Crawford & Novak, 2006; Fischer, Forthun, Pidcock, & Dowd 2007; Ham & Hope, 2003). Also, studies have indicated college course schedules have an influence on drinking behaviors. One study found undergraduate students who do not have class on Fridays tend to drink twice as much on Thursday nights as those who have Friday classes (Howard, Patrick, & Maggs, 2015). Similar results were found for students who had Friday classes that started at noon or later. Students with early Friday morning courses (prior to noon) tended to drink the least. Other studies have indicated students are at a greater risk for alcohol consumption when they have limited responsibilities the following day. Research also has demonstrated unregulated sleep patterns indicative of later course schedules have an increased risk for excessive alcohol consumption, which impedes academic success (Onyper, Thacher, Gilbert, & Gradess, 2012). Additionally, course work with next day responsibilities of things like exams and assignments tend to deter excessive drinking (Skidmore, J. R. & Murphy, J. G., 2011). Research hints at a general class time connection, but mostly concentrates on end of class week time and behavior associations. Survey two classified class times without concentration on Thursday/Friday schedules and peak academic or holiday times.

The cross-sectional study surveyed a different population of undergraduate students at the same large, public, rural university as survey one. The surveys were hand distributed to students in randomly selected introductory level liberal studies courses. A total of 342 surveys were completed with a minimum age of 18 and a maximum age of 20 with a mean age of 19.42 years ($SD = 0.524$). The ages of the students were attributed to lower class levels (primarily sophomores).

Study two dependent variable. The dependent variable used for analysis was the same variable used in study one: the average weekly consumption of alcoholic drinks. Students were asked how many drinks they consume on a weekly average under the established guidelines of a standard drink from study one. Approximately 78% of the sample reported consuming at least one alcoholic drink per week (76% in survey 1).

Study two independent variables. Significant independent variables were gender, Greek life membership, five closest female drinking friends, average drinks per week as a high school senior, and college class start time. Gender was coded as a dichotomous variable with 0 = Female and 1 = Male. Students were asked if they were members of a social Greek sorority or fraternity. Greek life membership was coded as a dichotomous variable with 0 = Not a Greek life member and 1 = Greek life member.

Peer drinking behaviors were asked based upon gender. Students were asked how many of their five closest female friends drink. The variable was examined as a continuous variable ranging from zero to five.

Average drinks per week as a high school senior was examined as a continuous variable. Students were asked retrospectively how many drinks they consumed on a weekly average as a

high school senior. Approximately 58.8% of the sample reported consuming at least one alcoholic drink per week as a high school senior.

A sophomore level college course with 42 on-campus sections was selected. The range of times for this course started at 8 AM and continued until 6 PM. The course had numerous sections for each time frame and was offered on Monday/Wednesday/Friday and Tuesday/Thursday permitting students a variety of options as opposed to several individual courses offered at specific times. College class start time was coded as a dichotomous variable. Initially, class times were separated into three groups: early (classes that started before 11 am), midday (classes that started from 11 am until 3 pm), and late (classes that started after 3 pm). An independent sample *t* test identified no statistical differences on the variables of interest between early and late class starting times, so they were grouped together and analyzed as one category. For the analysis, college class start time was analyzed using two categories: 0 = early/late and 1 = midday.

Study two results. OLS regression analysis was used to estimate the effects of the independent variables on the likelihood of weekly alcohol consumption. The overall model was significant, F = 92.260, *p* < 0.001 (Durbin-Watson = 2.078, R^2 = 0.579). The model had an adjusted R^2 of 0.572. Both R^2 values were close in proximity, which is indicative of no inflation occurring. Additionally, the inclusion of the two new variables increased the amount of variance explained in college alcohol consumption from 30% to almost 58%.

Average drinks per week as a high school senior was the strongest indicator for this model. Students who drink during their senior year tend to double their drinking behavior when they begin college. For each alcoholic drink consumed at the high school level, an additional alcoholic drink was consumed at the college level.

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A high number of close female friends who drink was the next strongest indicator. Basically, for each female friend a respondent had who drank out of their top five female friends, the respondent's drinks per week increased by 1.290 drinks. Students who had five close drinking female friends drank approximately 6.5 more drinks per week than students who had zero close drinking female friends. The third strongest indicator was class start time. Students with midday class start times drank 2.573 more drinks on average per week than students with early or late class start times. The next strongest indicator was Greek life involvement. Students involved in social Greek organizations drank approximately three more drinks per week than non-Greek life members. The final indicator significantly related to underage drinking was gender. Males consume approximately two more drinks per week on average than females. In summary, the findings suggest drinking during senior year of high school, having female friends who drink, selecting midday classes, being a member of a social fraternity or sorority, and being male increases the number of alcoholic drinks consumed per week.

Study Three

The survey used in study two was again revised for study three conducted in 2015. The goal, again, was to adjust the survey to create a stronger predictive model in comparison to study two. In addition to the significant indicators from study two (high school alcohol consumption, class start time, involvement in Greek life, having close female friends who drink, and gender), childhood exposure, college major and gender interactions were analyzed to determine if they significantly would impact the overall model for predicting variations in average alcoholic drinks consumed.

As previously noted, parental and social factors have been shown to influence adolescent drinking behaviors (Gerrard, Gibbons, Reis-Bergan, Trudeau, Vande Lune, & Buunk, 2002). Since

early onset of alcohol use indicates the potential for alcohol misuse in the future, this was an important factor to analyze (Moss, Chen, & Yi, 2013; Strom, Adolfsen, Fossum, Kaiser, & Martinussen, 2014). Since parental acceptance was previously significant in the first survey distribution, but not the second; the current survey included additional elements concentrating on accessibility and awareness of presence of alcohol in adolescence.

The influence of college major on drinking characteristics has limited previous research. A study by Wolaver (2002) indicated that there could be potential differences. Results from the study indicated business majors tended to drink more heavily than engineering majors. Since it is an untapped area, it was determined to be useful for comparison in this survey.

Previous research does not account for gender or college major differences in drinking behaviors (Cheng et al., 2016; Seedall & Anthony, 2013). It is established that males tend to drink more than females on average, but does not pose or measure possible reasons why this occurs. There is a bit of uneven distribution in some college majors. Computer science tends to have more males, while health, education, social work, arts, and communication tend to have more females (Bui, 2017). There may be underlying gender associations in choices of major that could influence drinking behaviors, considering gender already is a significant factor in binge drinking characteristics.

The cross-sectional study surveyed a different population of undergraduate students at the same large, public, rural university used in studies one and two. The surveys were hand distributed to students in randomly selected introductory level liberal studies courses and lower level criminology courses. A total of 354 surveys were completed with a minimum age of 18 and a maximum age of 20 with a mean age of 19.50 years ($SD = 0.567$). This is representative of a

traditional university, and the ages of the students generally can be attributed to lower class levels (primarily sophomores).

Study three dependent variable. The dependent variable used for analysis was the same used for analysis in studies one and two: average weekly consumption of alcoholic drinks. Students were asked how many drinks they consume on a weekly average with the same standards of definition of a single drink from study one. Approximately 79% of the sample reported consuming at least one alcoholic drink per week (76% in survey 1 and 78% in survey 2), all of which align with the PCCD data for the year involving the study.

Study three independent variables. Significant independent variables in the overall model were gender, Greek life membership, major, class start time, five closest male and female drinking friends, childhood alcohol exposure, average drinks per week as a high school senior, and knowledge of campus policy. After examining based on gender and major interactions, childhood alcohol exposure and knowledge of alcohol policies were significant in certain models. Gender was coded as a dichotomous variable with 0 = Female and 1 = Male. Students were asked if they were members of a social Greek sorority or fraternity. Greek life membership was coded as a dichotomous variable with 0 = Not a Greek life member and 1 = Greek life member. Major was coded as a dichotomous variable with 0 = Other major and 1 = Criminology major. Majors outside of criminology were not representative enough to analyze separately.

A sophomore level college course with 42 on-campus sections was selected. The range of times for this course started at 8 AM and continued until 6 PM. The course had numerous sections for each time frame and was offered on Monday/Wednesday/Friday and Tuesday/Thursday permitting students a variety of options as opposed to several individual courses offered at specific times. College class start time was coded as a dichotomous variable. Initially, class times were

separated into three groups: early (classes that started until 11 am), midday (classes that started from 11 am until 3 pm), and late (classes that started after 3 pm). An independent sample *t* test identified no statistical differences on the variables of interest between early and late class starting times, so they were grouped together and analyzed as one category. For the analysis, college class start time was analyzed using two categories: $0 = $ early/late and $1 = $ midday.

Peer drinking behaviors were asked based upon gender. Students were asked how many of their five closest female friends drink and how many of their five closet male friends drink. The variables were examined as continuous variables ranging from zero to five.

Childhood alcohol exposure was a scale created by combining responses related to alcohol exposure during childhood. Students answered questions as a dichotomous "yes" or "no". Students were asked if their parents kept alcohol in the house when they were growing up, if alcohol was present at social events during childhood, and if at least one parent drank socially. These responses were combined to create a continuous variable of 0 to 3, $0 = $ Low levels of childhood alcohol exposure to $3 = $ High levels of childhood alcohol exposure.

Average drinks per week as a high school senior was examined as a continuous variable. Students were asked retrospectively how many drinks they consumed on a weekly average as a high school senior. Approximately 58.6% of the sample reported consuming at least one alcoholic drink per week as a high school senior (58.8% in survey 2, not measured in survey 1).

The knowledge of campus policies variable was formed by creating an index of the amount of correctly answered true or false questions regarding campus policy. Students were asked five true or false questions pertaining to their knowledge of campus policies. Topics discussed were university sanctions based on off-campus arrest, what agency reviews reported underage drinking offenses, presence of lawyers, administrative fees acquired, and if acquittal of off-campus arrest

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can still result in university sanctions. Answers were coded as 0 = Incorrect and 1 = Correct. The scores were combined to provide an overall knowledge of campus policies index ranging from 0 to 5 correct responses. Although this variable was excluded in survey 2 after not being significant in survey 1, a change in sanctions at the university (increased fines and punishments) and additional mandated freshman training about the University's alcohol and drug policies warranted its reassessment.

Study three results. OLS regression analysis used to estimate the effects of the independent variables on the likelihood of weekly alcohol consumption. The overall model was significant, $F = 73.387$, $p < 0.001$ (Durbin-Watson = 1.981, $R^2 = 0.587$). The model had an adjusted R^2 of 0.579. Both R^2 values were close in proximity, which is indicative of no inflation occurring. Additionally, the inclusion of the two new variables increased the amount of variance explained in college alcohol consumption from 53% to almost 59%.

The strongest indicator was average drinks per week in high school. Students who drink during their senior year tend to double their drinking behavior when they begin college. For each alcoholic drink consumed at the high school level, an additional alcoholic drink was consumed at the college level.

A high number of close female friends who drink was the next strongest indicator. Basically, for each female friend a respondent has who drank out of their top five female friends, the respondent's drinks per week increased by 1.245 drinks. Students who had five close drinking female friends drank approximately 6.25 more drinks per week than students who had zero close drinking female friends. Greek life involvement was the next strongest indicator for this model. Students involved in Greek life consumed an additional four drinks per week compared to non-Greek life students.

The next indicator significantly related to underage drinking was gender. Males consume approximately two more drinks per week on average than females. The last significant indicator was childhood alcohol exposure. For each one point increase in childhood alcohol exposure, the respondent's drinks per week increased 0.70 drinks. For example, a student who had a high score on of childhood alcohol exposure (3) would consume on average 2.1 more drinks per week than a student who had a childhood alcohol exposure score of 0 (strictest parental approval). In summary, the findings suggest being a member of a social fraternity or sorority, having female friends who drink, drinking during senior year of high school, being male, and having parents who have less restrictive attitudes towards drinking increases the number of alcoholic drinks consumed per week.

Two additional OLS Regression analyses were performed, separating gender and major. OLS regression analysis was used to estimate the effects of the independent variables on the likelihood of weekly alcohol consumption among males in regards to major. For male other majors, the overall model was significant, $F = 23.270$, $p < 0.001$ ($R^2 = 0.574$). The model had an adjusted R^2 of 0.549. Both R^2 values were close in proximity, which was indicative of no inflation occurring. For male criminology majors, the overall model was significant, $F = 33.719$, $p < .001$ ($R^2 = 0.728$). The model had an adjusted R^2 of 0.707. Both R^2 values were close in proximity, which was indicative of no inflation occurring. Regarding males specifically, the amount of variance explained in college alcohol consumption according to our model was more explanatory in relation to criminology majors when compared to other majors. There also were differences in indicators indicative of variations in drinking patterns based on male majors.

For male other majors, significant variables included Greek life involvement, class start time, close female drinking friends, and high school alcohol consumption. For male criminology majors, significant variables included Greek life involvement, close female drinking friends,

knowledge of alcohol policies, high school alcohol consumption, parental attitudes, and childhood alcohol exposure. One distinctive difference was male criminology majors drank more on average as knowledge of campus alcohol policy increases. Male criminology majors who fully understood the alcohol policies (5) drank 7.5 more drinks per week on average than those who did not understand the alcohol policies (0). Also, male criminology majors who were exposed to alcohol more in adolescence drank less on average than those who were not exposed.

For female other majors, the overall model was significant, F = 37.520, $p < 0.001$ ($R^2 =$ 0.551). The model had an adjusted R^2 of 0.536. Both R^2 values were close in proximity, which was indicative of no inflation occurring. For female criminology majors, the overall model was significant, F = 6.660, $p < .001$ ($R^2 = 0.393$). The model had an adjusted R^2 of 0.334. Both R^2 values were close in proximity, which was indicative of no inflation occurring. Regarding females specifically, the amount of variance explained in college alcohol consumption according to the model was more explanatory in relation to other majors when compared to criminology majors.

For female other majors, significant variables included class start time, high school alcohol consumption, and close female drinking friends. For female criminology majors, significant variables included Greek life involvement and high school alcohol consumption. Female criminology majors who are members of Greek life drank approximately seven more drinks on average than non-Greek female criminology majors. Also, female criminology majors drank almost double the amount of drinks as female non-criminology majors, on average. The analysis of major and gender interactions is summarized in Table 1.

These results suggested there may be gendered and/or behavioral pathways to alcohol misuse and abuse. Other college majors generally replicated the overall model in regards to variation in weekly alcohol consumption. Criminology majors displayed different variations in

weekly alcohol consumption based on gender. The model explained much less variance in alcohol consumption in female criminology majors compared to all majors combined, while explaining much more variance in alcohol consumption in male criminology majors compared to all majors combined. Overall, the model reflects the most explanatory variability in heavy drinking behaviors among male criminology majors.

Table 1

Summary Gender and Major Models with Ranked Significant Variables

Variable	Overall Model	Male Non Crim	Male CRIM	Female Non Crim	Female CRIM
Adjusted R^2	0.579	0.549	0.707	0.536	0.334
Average drinks per week in high school	1	1	1	1	1
Five closest female friends	2	2	4	2	
Greek Social Life	3	3	2		2
Gender	4				
Parental attitudes			3		
Class start time		4		3	
Childhood exposure			6		
Knowledge of campus alcohol policy			5		

The Current Study

The current study is multifaceted. First, similar to the previous studies, the current study aimed to add additional variables, along with ruling out others, to increase the predictive power of the model in accounting for the variability in college student drinking behaviors. Risk taking and impulsivity characteristics were added to determine if they significantly impacted the overall model. It was believed that the addition of risk taking and impulsivity variables to the new model would increase the R^2 identified in study three, which was .587, adjusted to .579.

Prior research examined specific characteristics about underage college drinking. Studies have not encompassed significant indicators together to provide a more informative measure of the causations of underage drinking. Most studies have focused on the origination of drinking patterns (environmental, genetic, gender, familial) without considering behavioral characteristics (Dreer,

Ronan, Ronan, Dush, & Elliot, 2004; Dunagan, Haynes, Linkenbach, & Shatwell, 2003; Kazemi et al., 2011; Leeman, Toll, & Volpicelli, 2007; Simons, Christopher, & Mclaury, 2004; Timberlake, Hopfer, Rhee, Friedman, Haberstick, Lessem, & Hewitt, 2007; Wechsler et al., 2002; Westmass, Moeller, & Woicik, 2007). Comparing childhood exposure, college major, gender, and risk taking and impulsivity in regards to drinking patterns provided an additional layer of understanding, along with exposing gendered pathways in drinking behavior. Creating a model with established significant indicators, along with the addition of behavioral measures, provided a more comprehensive analysis of underage drinking patterns.

Differences in pathways of alcohol consumption between male and female criminology majors from study three may indicate there are certain gendered personality characteristics that reflect in someone choosing to work in the criminal justice field. Previous research demonstrated there are gendered paths towards risk taking and impulsivity. Males tend to perceive behaviors as less risky, take more risks, and are less socially anxious than females (Reniers, Murphy, Lin, Bartolome, & Wood, 2016). Additionally, females tend to be more impulsive compared to males (Gardner & Steinberg, 2005; Waldeck & Miller, 1997). Lastly, females are more sensitive to adversity and uncertainty, which causes them to exude risk taking behaviors less than males (Lee, Chan, Leung, Fox, & Gao, 2009; van den Bos, Homberg, de Visser, 2013).

Research has suggested risk taking and impulsivity are linked to binge drinking behavior (Albers, Siegel, Ramirez, Ross, DeJong, Jernigan, 2015; Fernie, Cole, Goudie, & Field, 2010; Fernie, Peeters, Gullo, Christiansen, Cole, Sumnall, & Field, 2013; Field, Claassen, & O'Keefe, 2001; O'Brien et al., 2006). Underage college student drinkers tend to have more high-risk behavioral patterns than those of legal drinking age (Egan & Moreno, 2011). These behaviors include heavy drinking, fighting, injuries requiring medical treatment, and reckless driving

behaviors, such as speeding and not wearing a seat belt (Albers et al., 2015; Egan & Moreno, 2011; Field et al., 2001; Kazemi, Wagenfeld, Van Horn, Levine, & Dmochowski, 2011; O'Brien et al., 2006; Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). Previous research has demonstrated a link between low psychological mindedness (PM) and alcohol use, which is indicative of risk taking behaviors (Ferrer & Marks, 2016). Also, gender differences are noted in risk-taking. Research has additionally suggested males and females demonstrate varying degrees of risk-taking behavior regarding underage drinking. Females tend to initiate drinking behaviors at a younger age, while males tend to drink more persistently and for social enhancement (Brynes, Miller, & Schafer, 1999; Cheng, Cantave, & Anthony, 2016; Goldman, 2002; Harris, Jenkins, & Glaser, 2006; Kuntsche et al., 2015). Males also have perceived less risk in heavy drinking behaviors and the belief that health problems can result from drinking alcohol (Bewick, Mulhern, Barkham, Trusler, Hill, & Stiles, 2008; Egan & Moreno, 2011; Spigner, Hawkins, & Loren, 1993; Svenson, Jarvis, & Campbell, 1994).

Previous research additionally has linked impulsiveness to alcohol involvement (Camatta & Nagoshi, 1995; Goudriaan, Grekin, & Sher, 2007; Jackson & Matthews, 1988; Marczinski, Combs, & Fillmore, 2007; Simons, Carey, & Raluca, 2004; Stoltenberg, Batien, & Birgenheir, 2008). Actions used to measure impulsivity include delayed discounting procedures (choices between small immediate rewards and larger rewards available after a delay), liveliness, lack of planning, sensation seeking behavior, and a tendency to act without thinking (Engs, 1998; Fernie et al., 2013; Kazemi et al., 2011; Patton, Stanford, & Barratt, 1995; Stanford, Greve, & Dickens, 1995; Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). Research has demonstrated a link between heavy drinking and lacking impulse control, cautiousness, and dutifulness (Ferrer & Marks, 2016). In the underage drinking range (ages 18-20), non-drinkers were found to be less

impulsive than binge drinkers (Cyders, Flory, Rainer, & Smith, 2009; Goudriaan, Grekin, & Sher, 2007; Kazemi et al., 2011; Marczinski et al., 2007; Stoltenberg et al., 2008).

Hagan, Simpson, and Gillis (1987) suggested that the behaviors and actions of female children were more closely monitored than male children in the patriarchal family; thus, the female children were shielded from most risk taking behaviors. The majority of female children's "inappropriate" social behaviors in the patriarchal family model were related to impulsiveness, where male children were permitted to venture into risk taking behaviors. Hagan et al. (1987) noted that the daughters gained freedom as the mother gained power in the family (p. 792). Where the socialization process for female children in the patriarchal family fostered passiveness or submissiveness, the socialization of female children in the egalitarian family taught them that risk taking was acceptable. Hagan et al. (1987) argue that the rise in female offending can be attributed to females being socialized to take risks, which are required to be successful in today's marketplace, where they must compete with males for employment opportunities. Hagan et al. note the lower rates of female offending is related to many households still operating under a patriarchal family model. Important to this study is the addition of the impulse and risk-taking variables to determine if the lower alcohol consumption rates for female criminology and criminal justice students is associated with increased risk taking (entering the field of criminology) or more related to impulsivity when compared to males in the same discipline.

Regarding the survey instrument, there is a need to generalize information to other populations. Currently, the study holds internal reliability and sample generalizability. The survey has been tested multiple times, yielding similar results for established variables associated with underage binge drinking (high school drinking patterns, gender, Greek life involvement). Regarding sample generalizability, results obtained throughout the previous study reflect underage

drinking behaviors of the university as a whole. Based on the previous survey distribution, it is difficult to make conclusions outside of the university where the study was conducted. To establish external validity, the next step would be to survey various universities within the same state. Universities can have different characteristics based on location and other demographics. Research has demonstrated alcohol consumption varies by region in the United States, which calls for a need to assess external validity (Egan & Moreno, 2011). Previous research has largely concentrated on individual college campuses. A multi-campus comparison is needed to establish generalizability of results. This study compared the original campus (large, public, traditional, rural university) where previous surveying was conducted to an additional three campuses across Pennsylvania with varying demographic conditions: a large (approximately 16,000 students), public, urban university located in southwestern Pennsylvania; a medium sized (approximately 8,500 students), public, rural university located near the parent university in southwestern Pennsylvania; a medium sized (approximately 6,000 students), public, rural university with a high minority representation (approximately 34%) located in northeastern Pennsylvania. Based upon the findings, external validity is argued with variations in drinking indicators across campuses. (Bachman & Schutt, 2016). The juxtaposition of college campus drinking patterns can assist with the necessary direction of future alcohol policies and interventions.

The surveys were hand distributed to students in randomly selected criminology courses for comparison purposes, as liberal studies requirements vary by university. Regarding gender interactions, there outwardly seems to be separate pathways in binge drinking behavior when comparing male and female criminology majors based on the previous study. With the gender and major variation, it is viable to limit the sample to criminology majors for this reason, too. The

samples were representative of traditional universities in the same state located in the northeastern region of the United States.

Knowledge of alcohol polices was removed from this survey. All three initial studies found the same results for alcohol polices. Students have an understanding of alcohol policies in place at the university, averaging over four out of five true/false questions regarding policy knowledge being correct. Knowledge of alcohol polices also was never a significant indicator of heavy drinking behaviors in any of the three studies' overall predictive models.

Instead, weekly alcohol consumption averages in previous survey distributions were compared to current results. Recently, the parent university being surveyed increased the underage drinking fine from $150 to $300. In addition, the state where the various campuses are located increased the underage drinking fine from $300 to $500 (Alcohol Policy Information System, 2016). Comparing results from the separate survey distributions determined if an increase in penalty has deterred heavy drinking consumption.

Hypotheses

H1: The descriptive statistics for male and female criminology/criminal justice students' alcohol consumption habits have remained consistent over all three survey periods.

H2: There will be no statistically significant differences between the varying PASSHE universities throughout Pennsylvania, accounting for external validity of the survey instrument.

H3: There will be no significant changes in the coefficients in the data collected previously in survey three compared to the data collected using the new survey.

H4: Even with the addition of impulsivity and recklessness, the survey instrument will account for more variation among male drinkers than female drinkers.

H5: The survey instrument will account for more variation among male binge drinkers than female binge drinkers.

The percentage of students who consume at least one alcoholic drink per week, along with the general average of consumed drinks per week, have remained consistent over the course of the different survey distributions. The new survey distribution is likely to follow suit, regardless of the new sanctions placed. The key addition to the new survey is that of measuring risk taking and impulsivity and how each of these impact gender based decisions about alcohol use, while controlling for other variables related to underage alcohol consumption.

The results were expected to be similar between the varying universities throughout Pennsylvania, accounting for external validity of the survey instrument. Since survey distribution still was within the same state, there would be similar characteristics based on general environmental and demographic conditions. This conclusion was based on alcohol policies in place. All universities sampled are from the same state school system, which would have relatively similar academic standards and student attraction. While campus alcohol policies are variable, the minimum drinking age is a federal guideline under the 1984 National Minimum Drinking Age Act, [23 U.S.C. § 158] (Alcohol Policy Information System, n.d.). A federal regulation indicates similar patterns in regulatory behaviors of alcohol use on a national level. Additionally, as all the universities are under the PASSHE system, legal policies often are generated and/or reviewed at a central location in Harrisburg, adding to the uniformity of policies across the PASSHE system universities.

It was expected that the measurements of risk taking and impulsivity would add more predictive value to the overall model, increasing the overall percentage of variation explained in "drinks consumed per week" than accounted for from study three. Statistically, even if variables

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are added to a model that are later not identified as statistically significant, these variables will account for some variance, unless there is zero correlation between the variable and the dependent variable, which is highly unlikely; thus, simply assessing an increase in the coefficient of determination is not appropriate to assess H3 and H4. Paternoster, Brame, Mazerolle, and Piquero (1998) recommended to assess the change in unstandardized coefficients to determine if slope values have been significantly reduced using $z = [b1-b2]/[sqrt(SEb1^2+SEb2^2)]$ (J. Cooper, personal communication April 6, 2017).

It was expected that male and female criminology and criminal justice majors would have varied model characteristics. Based on the results of study three, it was anticipated that the model would be more predictive of variations in binge drinking behavior among male criminology and criminal justice majors. Female criminology and criminal justice majors were expected to have stronger explanatory power than study three due to the addition of risk taking and impulsivity measures. However, the model for females still was predicted to be lower in explanatory power compared to the male model.

CHAPTER III

METHODOLOGY

This study sought to comprehensively determine the indicators of weekly alcohol use by underage college students by utilizing previously researched variables that have demonstrated a relation to elevated drinking levels in college (high school alcohol consumption, involvement in Greek life, having close female friends who drink, gender, childhood exposure, Criminal Justice major gender interactions, and risk taking and impulsivity measures). Previous research has demonstrated that binge drinking increases to dangerous levels during introductory college years (Ashenhurst et al., 2015; Bachman et al., 1997; Duckworth & Kern, 2011; Hittner & Swickert, 2006; Zuckerman et al., 1993). The main underlying issue with prior research is that it has concentrated on all ages within the college population, while taking an individualistic approach in attempts to pinpoint a key cause of binge drinking. This study sought to concentrate on the college age most susceptible to binge drinking (18-20 years of age), along with a summary approach in attempts to determine the multitude of indicators related to excessive alcohol consumption.

More importantly, this study sought to determine if the indicators outlined through previous research were generalizable across multiple college populations. The primary methodology was a quantitative survey instrument; thus, the external validity of the survey instrument was being assessed. Surveys have been the most widely used technique to determine key indicators associated with underage alcohol consumption and underage binge drinking (Douglas et al., 1997; Johnston et al., 2016; Presley, Meilman, & Cashin, 1996; Straus & Bacon, 1953; Substance Abuse and Mental Health Services Administration, 2014; Wechsler & Nelson, 2001). It also was optimal to use a survey to measure alcohol consumption characteristics, as it was the most efficient way to collect original data for a population that is too large to observe individually (Babbie, 1997).

Since research has established consistently strong student understanding of policy measures, questions regarding understanding of alcohol policies were not be included in the current survey (Creemens et al., 2011; Mitchell et al., 2005; Terry, Garey, & Carey, 2014; Wechsler, Lee, Gledhill-Hoyt, & Nelson, 2001). Instead, weekly alcohol consumption averages in previous survey distributions were compared to current results. Recently, the parent college campus being surveyed increased the underage drinking fines associated with additional sanctions (Indiana University of Pennsylvania Office of Student Conduct, 2016). In addition, the state where the campus is located increased the underage drinking fine from $300 to $500 (Alcohol Policy Information System, 2016). Comparing results from the most recent prior survey distribution (study three) will determine if an increase in penalty has deterred heavy drinking consumption.

Research Design

The quantitative, cross-sectional study surveyed undergraduate students at various universities within the Pennsylvania State System of Higher Education (PASSHE). The parent university is a medium sized (approximately 14,000 students), public, rural university located in western Pennsylvania, which was used in previous survey distributions. The surveys were hand distributed to students in randomly selected introductory criminology courses. The researcher also surveyed undergraduate students at three additional campuses: a large (approximately 16,000 students), public, urban university located in southeastern Pennsylvania; a medium sized (approximately 8,500 students), public, rural university located near the parent university in southwestern Pennsylvania; and a medium sized (approximately 6,000 students), public, rural university with a high minority representation (approximately 34%) located in northeastern Pennsylvania. The surveys were self-administered to students in randomly selected criminology courses for comparison purposes. The samples were representative of traditional universities in the

state located in the northeastern region of the United States and within the state school system (PASSHE). The universities are located in three different regions of the state, with one being in close proximity to the parent university. Comparisons to various universities can provide insight into the generalizability of binge drinking characteristics provided by the survey. The ages of the students generally can be attributed to lower class levels (primarily sophomores and juniors). This is an optimal sample age, as stated above, due to alcohol abuse levels being characteristically higher in students who are below the legal drinking age (Ashenhurst et al., 2015; Huang et al., 2010; Monauti & Bulmer, 2014). Also, it is important to examine class levels other than freshman, as it is possible to have confounding factors associated with the assimilation into the college atmosphere.

A version of the survey has been previously distributed at the parent university. Measures within the survey, excluding the addition of risk taking and impulsivity components, have been tested multiple times over different periods of time with different student samples. The variables maintained in the current survey were consistently significant indicators throughout the various waves of survey distributions. Previous research has indicated high levels of risk taking and impulsivity are related to increased binge drinking among college students (Cyders et al., 2009; Egan & Moreno, 2011; Ferrer & Marks, 2016; Goudriaan et al., 2007; Kazemi et al., 2011; Marczinski et al., 2007; Pratt & Cullen, 2000). These factors have been studied outside of the other variables outlined within the current survey. Questions regarding risk taking and impulsivity were included with the other variables in attempts to obtain a strong predictive model for binge drinking behavior.

The surveys were self-administered during mid-semester and outside of any holiday drinking festivities. This time frame limited any outstanding peak drinking time periods that could

influence results. The start of a semester is generally a peak drinking time, along with holidays like homecoming celebrations, Halloween, Saint Patrick's Day, and Cinco de Mayo. Also, surveys were distributed outside of peak examination times during midterms and finals, as these time frames also may influence binge drinking characteristics.

Students were asked to report alcohol consumption levels. For this study, a drink refers to an alcoholic beverage and is defined as a 12-ounce beer, 6 ounces of wine, or one ounce of distilled spirits (hard alcohol). For example, if a person drinks one 40-ounce Fosters, it actually would be considered $40/12 = 3.33$ drinks; similarly, a 12-ounce Long Island Ice Tea equals two drinks, as do doubles and 12-ounce wine coolers. The definition is stated at the start of the survey. A definition provides a reference for students to consider the proper response, which can account for social variations in the understanding of what constitutes a single alcoholic beverage (Dillman, Smyth, & Christian, 2009).

To determine an adequate sample size, a power analysis was conducted using a 0.05 alpha level and a medium effect size based on an F-test regression of 0.15, which are standards established by Cohen (1992). Using A priori analysis, G*Power software suggested a sample size of 98 students per university. Across four universities, this would bring the total sample population to 392 students. As one assessment relates to stratification by gender, a sample size of 98 males and 98 females at each site is desired. At the parent university, average class sizes range from 25-45 students. A minimum of six classes would need to be surveyed to reach the recommended sample size at University 1, accounting for attendance reductions on survey distribution days. Class sizes ranged from 33-45 students at University 2, 38-51 students at University 3, and 35-48 students at University 4, with at least 4 classrooms surveyed at each university.

One issue with this approach to obtaining a sample was that the programs at two of the universities marginally had programs of sufficient size to obtain 200 undergraduate criminal justice students under the age of 21, especially when focusing on the equal distribution of student gender. Although this limitation was considered, survey dates were determined for sampling at these universities that maximized potential participation in the research.

<div align="center">**Variables**</div>

Dependent Variables

The dependent variables used for analysis was the average weekly consumption of alcoholic drinks and monthly binge drinking events. Students were asked how many drinks they consume on a weekly average and how many times a month they consume four or more alcoholic drinks at one setting (during one party or one event). These are appropriate reference periods, as college students report drinking on a regular basis throughout monthly and weekly periods (American College Health Association, 2016; Evans, Cotter, Rose, & Smokowski, 2016; Park, Scott, Adams, Brindis, & Irwin, 2014). A past weekly average also is appropriate as people easily can recall recent and more memorable behaviors (Dillman et al., 2009). The weekly average drinking consumption was used in comparison to the established heavy drinking measure of 8-15 or more drinks per week for women-men. The definition of binge drinking is the consumption of four or more drinks in a row for women-men (CDC, 2016; Wechsler et al., 2002).

Independent Variables

Independent variables used for analysis were gender, Greek life membership, class start time, five closest male and female drinking friends, childhood exposure to alcohol, average drinks per week as a high school senior, impulsivity, and risk taking. Gender was coded as a dichotomous variable with $0 = $ Female and $1 = $ Male. Students were asked if they are members of a social Greek

sorority or fraternity. Greek life membership was coded as a dichotomous variable with 0 = Not a Greek life member and 1 = Greek life member.

Peer drinking behaviors were asked based upon gender. Students were asked how many of their five closest female friends drink and how many of their five closet male friends drink. The variables were examined as continuous variables ranging from zero to five.

Parental acceptance was measured by a series of dichotomous variables (No = 0, Yes = 1). First, students were asked if they consumed alcohol during their senior year of high school to obtain the percentage of the sample who consumed alcohol (76% survey 1, 78% survey 2, 79% survey 3, all of which were supported by PCCD data for those years). The parental acceptance score was summed using, 1) if their parents approve of underage drinking as long as no one gets in trouble, 2) if the participant had consumed alcohol with their parent's knowledge, and 3) if the participant was allowed to consume alcohol at home. The variable was analyzed as a parental acceptance scale ranging from 0-3, with 0 = low acceptance by parents of alcohol use and 3 = high acceptance by parents of alcohol use. The variables initially were examined separately, but a determination was made to combine the three items into a scale.

Average drinks per week as a high school senior was examined as a continuous variable. Students were asked retrospectively how many drinks they consumed on a weekly average as a high school senior. A weekly average drinking consumption was used in comparison to the established heavy drinking measure of 8-15 or more drinks per week for women-men (CDC, 2016).

Risk taking and impulsivity were measured by using components from a scale created by Grasmick and colleagues (Grasmick, Tittle, Bursik, & Arneklev, 1993). Students were asked the four items from the impulsivity subscale on a scale from 1-10, with 1 being "strongly disagree"

and 10 being "strongly agree". The questions were as follows: (1) I often do what whatever brings me pleasure here and now, even at the cost of some distant goal, (2) I much prefer doing things that pay off right away rather than in the future, (3) I am more concerned about what happens to me in the short run than in the long run, and (4) I do not devote much thought and effort to preparing for the future. Students were asked the four items from the risk seeking subscale on a scale from 1-10, with 1 being "strongly disagree" and 10 being "strongly agree". The questions are as follows: (1) I like to test myself every now and then by doing something a little risky, (2) Sometimes I will take a risk just for the fun of it, (3) Excitement and adventure are more important to me than security, and (4) I sometimes find it exciting to do things for which I might get in trouble. A factor analysis was completed on both of these subscales.

The Grasmick scale has proven to be valid across many studies, including measures of criminal and deviant behaviors, and is a commonly used measure of self-control in the criminology field (Piquero & Rosay, 1998; Piquero & Tibbetts, 1996; Pratt & Cullen, 2000; Walters, 2016). With consideration for only using subscale components in this study, recent research has indicated that subscale scoring is just as accurate, if not more so, than the unidimensional scaling (DeCamp, 2015; Walters, 2016).

Additional questions were included in the survey instrument. Students were asked what they believe the legal drinking age should be, if they believe raising fines will deter underage drinking (as a dichotomous no [0] or yes [1] response), how they most often obtain alcohol, and a described reason for those who choose not to underage drink. While these variables were not included in the statistical analysis, they were used in the descriptive statistics and were beneficial to provide contextual explanations for the statistical model as well as for policy recommendations and the course for future research in this area.

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It was anticipated that average drinks per week as a high school senior would have the strongest predictive power of variations in binge drinking behavior, as demonstrated in all previous survey distributions. Additionally, those involved in social Greek organizations, males, those with high childhood exposure to alcohol, and those with more female friends who drink would be more likely to binge drink. These variables also were demonstrated as related to binge drinking in all previous survey distributions.

It also was expected that high levels of risk taking and impulsivity would be a significant indicator of binge drinking behavior. Risk taking was defined as a need for varied and complex sensation seeking behaviors and experiences (Keyes, Jager, Hamilton, O'Malley, Miech, & Schulenberg; Steinberg, 2004; Zuckerman, 2007). Impulsivity was defined as a lack of planning and acting on novel experiences (Kazemi et al., 2011; Zuckerman et al., 1993). Previous research has linked risky behaviors, like engaging in violence and not wearing a seat belt, to a tendency to binge drink more often (Egan & Moreno, 2011; Fernie et al., 2010; Field et al., 2001; O'Brien et al., 2006). Underage drinkers also tend to have more high risk drinking behaviors (Egan & Moreno, 2011). Other research has linked impulsivity to increased alcohol use among college students (Camatta & Nagoshi, 1995; Jackson & Matthews, 1988; Marczinski et al., 2007; Simons, Carey, & Raluca, 2004).

Prior research is relatively limited and has largely analyzed risk taking and impulsivity separately. The studies also have relied on subjectively defined risky and impulsive situations like getting into arguments and raising of hand to answer questions in class (Fernie et al., 2010; Fernie et al., 2013; Harris et al., 2006). Additionally, previous studies have used psychologically based testing methods like the Balloon Analogue Risk Task (BART), BIS-11, and RT-18 (Cyders et al.,

2009; de Haan, Egberts, & Heerdink, 2015; Fernie et al., 2013; Goudriaan et al., 2007; Kazemi et al., 2011; Patton, Stanford, & Barratt, 1995).

For the current study, it was important to analyze risk taking and impulsivity using a criminological scale, especially considering the illegal nature of underage drinking. Also, Grasmick's scale analyzes more general questions regarding risk taking and impulsive behaviors, which would prove more useful than asking about specific behavioral situations. It is important to include both risk taking and impulsivity measures since both have individually demonstrated relations to binge drinking given the comprehensive nature of this study.

Analyzing gender differences in predictive models for binge drinking may hold additional useful information. Research has supported differences between males and females regarding risk taking and impulsive behaviors. The likelihood to drink between males and females is beginning to equalize, but there are behavioral differences (Cheng et al., 2016; Kuntsche et al., 2015; Seedall & Anthony, 2013). Males perceive excessive drinking behaviors as less risky than females and downplay associated health issues (Bewick et al., 2008; Egan & Moreno, 2011). Males also are more likely to drink for reasons of socialization enhancement (Kuntsche et al., 2015). Females have been identified to modify drinking patterns and behaviors due to a perceived masculinity association with excessive drinking (de Visser & McDonnell, 2012). Overall, the association of risk taking and impulsivity with binge drinking behaviors has been consistent regarding males, but not females, while impulsivity has been associated with female underage drinking (Cheng et al., 2016; de Haan, et al., 2015). This study attempted to localize gendered pathways to underage and binge drinking behaviors, and the potential associations with risk taking and impulsivity characteristics. Gendered pathways of underage and binge drinking indicate the need to provide more individualized preventative alcohol techniques on college campuses.

Validity

It is important to conduct research that leads to valid results. There are three types of validity to consider in providing the most conclusive research: measurement (construct) validity, generalizability, and internal validity (Bachman & Schutt, 2015; Withrow, 2014). Measurement validity is established within this study. The survey design has been tested and retested multiple times, with consistently reliable results. Additions of variables throughout the various survey waves were established by prior research studies. For created scales within the study, such as the childhood exposure variable, Cronbach's Alpha is used to establish internal consistency. The addition of risk taking and impulsivity measures do not provide concern, as Grasmick's scale is widely used in the criminal justice field, and has proven to be an accurate measure of self-control characteristics (Walters, 2016).

Generalizability refers to the extent to which we can apply information obtained from a study to people and places not studied (Bachman & Schutt, 2015). There are two aspects to generalizability: sample generalizability and external validity (cross-population generalizability). For this study, sample generalizability refers whether each individual university sample results can be generalized to the broader overall university populations. Since the study is specifically analyzing criminology and criminal justice majors, it may not be generalizable to the overall university populations. Although, with the random selection of criminology and criminal justice classrooms on each campus, the study is generalized within the major, at minimum.

External validity refers to the ability to generalize findings from a sample to other groups, populations, or settings (Bachman & Schutt, 2015). This study aimed to assess the external validity of the survey instrument by distributing the survey at three additional universities and comparing the results to the parent university used in all survey distributions. If the models characteristically

are similar between the universities, this is an indication of strong external validity for the survey instrument. More broadly, this would provide evidence that similar alcohol policies structures could continue being applied widespread across all college campuses. If there are variations in binge drinking behaviors, and thus the predictive model, at each university, then there will be a lack of external validity. This finding would indicate a need for more regionalized directions regarding alcohol policies and prevention techniques.

Internal validity refers to the ability to provide a causal relationship between independent and dependent variables (Bachman & Schutt, 2015). Essentially, internal validity demonstrates that a variable X causes Y, X precedes Y, and there are no other explanations or outside factors influencing the relationship between X and Y (Shadish, Cook, & Campbell, 2002). There are nine reasons for potential threats to internal validity: ambiguous temporal precedence, selection, history, maturation, regression, attrition, testing, instrumentation, and additive and interactive effects of threats to internal validity (Shadish et al., 2002).

The current study is cross sectional, which is considered a nonexperimental design. The nature of nonexperimental methods often inhibits one in making internal validity a priority (Bachman & Schutt, 2015; Shadish et al., 2002). Surveys were developed in part to assess reported behaviors, which is desired for this study.

The assessment of underage drinking behaviors for this study was not a candidate for a manipulation that is required of experimental research. It would be deemed unethical and illegal, as well as dangerous to introduce underage students into a binge-drinking situation (even if they volunteered) to observe variations in behavior compared to a control group who does not binge drink or drink at all. The research design used here makes it difficult to control for some threats to internal validity (e.g., history and regression), while permitting others to be cautiously dismissed

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(e.g., ambiguous temporal precedence, selection, maturation, attrition, testing, instrumentation, and additive and interactive effects). The use of multiple sites assists in controlling for local historical events, although there could be state and national events that impact how participants respond to various survey questions. Additionally, there always is the fear of over-reporting and under-reporting alcohol use, but with a cross sectional alcohol study, with a large sample, and avoiding key alcohol drinking-related events, regression from or to a mean is less likely.

For one to infer cause and effect there are three recognized criteria: association, temporal precedence, and elimination of all other explanations. Association is relatively easy to establish in this study. The variables being studied have been established by prior research, along with test-retest reliability shown in consistent results of the multiple waves of survey distribution. Ambiguous temporal precedence is a potential threat to one variable in this study, due to the possible bidirectional relationship of the socialization of drinking behaviors to social Greek membership. For this research, as the survey is designed, it is difficult to determine if initiation into a social Greek organization causes one to binge drink, or if those who binge drink are drawn to membership within a social Greek organization. It is difficult to determine if people have underlying characteristics that draw them to certain binge drinking behaviors, or if the binge drinking behaviors establish the associated characteristics. With the cross sectional and retroactive nature of the study, time order can be established for the majority of the independent variables in relation to the dependent variable.

Also, it is difficult to control for or identify all other explanations that could account for underage alcohol consumption or binge drinking. For example, the results from the last survey initiated indicated the potential of a gendered pathway model for heavy drinking characteristics among criminology majors, as there was a substantial loss of explanatory power when the sample

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was stratified by criminology major and gender. The overall model accounted for 57.9% of the total variance in the sample and when separated by non-crim males and non-crim females accounted for 54.9% and 53.6%, respectively. Thus, for the social sciences the three models' explained variance was strong and relatively close, losing little explanatory power when restricted by gender to non-crim participants. The model had even greater explanatory power for crim males than the overall model, where 71% of the variance was accounted for by the independent variables in the model. The issue is that the same model that had accounted for large amounts of the variance related to weekly alcohol consumption in non-crim females, crim males and non-crim males; lost much of its explanatory power when restricted to crim females ($r^2 = 0.334$).

Identifying causal mechanisms (intervening variables) also can assist in establishing internal validity (Bachman & Schutt, 2015). Different variables have been added and deleted from the survey instrument based on the results from each wave of survey distribution. Also, additional research was examined to determine any outlying factors that were yet to be analyzed within the survey instrument. Each survey analysis yielded a stronger coefficient of determination. Study one had a coefficient of determination of 0.302, adjusted to 0.290. Study two had a coefficient of determination of 0.579, adjusted to 0.572. Study three had a coefficient of determination of 0.587, adjusted to 0.579. This study does not likely end the possibilities of causal mechanisms, but the continuation and reworking of survey distributions has created a stronger sense of internal validity in this aspect. Each survey analysis provided results that allowed for identification of mechanisms for links that emerged. For example, the gendered pathways within criminology majors in the study three determined the addition of risk taking and impulsivity measures for the current study.

Also of importance is surveying error. In survey research, there are four sources of survey error: coverage error, sampling error, nonresponse error, and measurement error (Dillman, et al.,

2009; Mosher, Miethe, & Hart, 2011). Coverage error is selecting individuals from a list that does not include everyone in the target population. Sampling error is related to only analyzing a subset of a population instead of providing a census. Random sampling of criminology and criminal justice classrooms within each university will limit the issue of coverage error within this study. The only issue would be the potential for criminology or criminal justice majors not to be enrolled in a major course for the semester; thus, not being included in the sampling frame. Sampling error will be controlled for by analyzing results at the 95% confidence level and obtaining a large enough sample size. Power analysis is an assistant to ensure the proper amounts of students are reached for the purposes of this survey analysis.

Nonresponse error occurs when too many people do not respond to the survey and those non-respondents differ from respondents in ways that would be important in survey analysis. For this study, the survey will be self-administered within classroom settings. This increases the likelihood of survey completion, as start of class time will be devoted to the survey completion. Students not in class attendance on the survey date, along with those choosing not to participate will be the most likely sources of nonresponse error. Enrollment numbers were compared with completed surveys within each classroom to account for issues within this area, which is further addressed in the analysis section of this study. Measurement error already was discussed within issues of validity and reliability above.

In summary, nonexperimental cross sectional survey research is considered a useful tool for establishing causal effects in binge drinking behavior. Within this particular study, administering surveys to multiple settings and various individuals is more feasible than conducting experiments in the same context. Difficulties in establishing elements of internal validity do not inhibit this

study from establishing causality. Potential issues, like establishing temporal precedence and non-spuriousness, have been taken into account and were considered when analyzing the survey results.

<p style="text-align:center">Human Subject Protection</p>

For this research, human subjects (undergraduate college students) were surveyed regarding underage drinking behavior and additional social characteristics. This study was designed to safeguard the participants. Institutional Review Board approval was granted through IUP's Institutional Review Board (IRB) as that is the University associated with the researcher. A minimal risk category for participants was identified, as the research was designed to ensure the sample did not contain any protected populations. The survey design and survey procedures were established to ensure the anonymity of participants, in that once the survey was completed even the researcher was not able to match the survey to the respondent.

As IUP's IRB was used to gain research approval, all sites were notified that the research project has been approved by IUP's IRB. The additional sites were notified of IUP's IRB and an additional internal IRB application was reviewed and accepted at each university, respectively. All sites have verified that they will accept IUP's IRB for approval at their location as all the survey sites are members of PASSHE. Also, a letter of acknowledgement (or email) was required by the researcher from each site's IRB Chair approving IUP's IRB approval as sufficient prior to surveys being distributed at that site. Upon acquirement of IUP's IRB acknowledgement, additional steps were requested from each university. An external researcher application was approved by university 2. An internal IRB application and major guidelines were approved by university 3. An internal IRB application, along with a chair acknowledgement was completed and approved at university 4.

As noted, the researcher enacted a number of steps to ensure the survey responses for those who participated in this research could not be assigned to a particular respondent. First, all data obtained was reported only at the aggregate level. The surveys contained no identifying information (e.g., name or personal information) about the respondents or their home institution. Classes were selected that are most likely to contain sophomores and juniors (under the age of 21, but not new to the campus drinking environment). Students under the age of 18 were not permitted to complete the survey, which was highlighted in both the survey cover letter and was related verbally by the individual distributing the classroom surveys.

Once the classes were identified at each university that met this criteria, the classes were rank ordered by class number and a random class table was developed. The number of classes from each university was identified and a random selection from the class roster was completed selecting every n^{th} class, with the starting point on the list being selected using a random number from 1 to 6. As the class sections available from each of the four universities differ, a separate table was compiled for each site (See Appendix A).

The researcher contacted faculty members in selected criminology or criminal justice classes at the four selected sites for permission to distribute surveys to their students after IRB approval had been granted and documented (See Appendix B). The researcher distributed surveys at the parent university and university 3, while a single faculty contact distributed the surveys at the other universities. The surveys from the additional universities were mailed directly to the researcher for analysis and storage. Students were provided with an introductory letter, which was read aloud prior to the start of survey completion (See Appendix C). The reasons for completing the study were outlined in the letter, along with acknowledgement of voluntary participation in the research and age criteria. Students clearly could opt out of participation if they desire. Also

outlined was the potential for risk, which has been labeled as "no known risk" within the introductory letter. The survey involved recalled experiences and characteristics, which involves no known risk acknowledged by the researcher. The contact information for the researcher also was present on the letter should the student have any questions related to the study after the survey was completed.

The letter also outlined confidentiality and anonymity. Students were informed to not put any identifying information (i.e. name, student numbers, addresses, etc.) on the survey instrument. Additionally, they were informed that the surveys would be pulled together with all additional classrooms surveyed and entered and analyzed as a unit. It was stressed that researchers involved in the study would not be able to identify individual answers and there would be no identified associations to individuals or classrooms. Additionally, the students were informed that the researcher, by law, had to maintain the surveys for three years. They were informed that once the data were extracted from the surveys, only the researcher would have access to the secured surveys until there destruction.

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Strengths and Limitations

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Strengths

The concentration on external validity through surveying additional universities is one of the primary strengths of this research. Previous research has focused on examining one university setting, which is limiting in how far results can be generalized. Due to variations in behavioral and environmental characteristics, it is difficult to generalize results from one university to all universities within a state, and even more so to generalize to the entire United States underage college student population. Surveying universities across all regions within the state of

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Pennsylvania can, at a minimum, provide generalizations for the broader population of all Pennsylvania underage undergraduate college students studying criminology and criminal justice.

A second strength of this research is in providing a comprehensive model for determining indicators of variations within binge drinking behavior. Previous research has tended to concentrate on certain behavioral characteristics, in search of a primary cause of binge drinking behavior. Partying, which usually involves alcohol consumption, is a highly used method of socialization in the college atmosphere. It is demonstrated by the wide variety of causes established through previous research that there is not a strong, singular characteristic to explain heavy alcohol use or binge drinking. It is important to take a multi-dimensional approach, as human behavior does not exist without a variety of influences.

A third strength is the examination of gendered pathways within underage and binge drinking behaviors. Previous studies have determined there are differences in male and female alcohol consumption habits. The likelihood to drink is similar between males and females, but they do not consume alcohol at the same rates. Although studies have noticed this, none have concentrated on differences in behaviors between males and females surrounding weekly alcohol use and binge drinking. Risk taking and impulsivity could provide an interesting dynamic, as the concentration within criminology and criminal justice may provide a heightened sense of these behaviors given the nature of the field.

Another strength is the consistency in results over the course of multiple survey distributions at the parent university. Variables have been removed, while others have been added from previous survey designs. There are a core number of variables (average drinks per week as a high school senior, gender, social Greek life membership, having close female friends who drink, and childhood exposure to alcohol) that have remained consistent indicators over all survey waves.

This continual measure and inclusion assists with establishing reliability within the survey instrument, while additionally assisting with establishing internal validity.

Limitations

The study's primary limitation was the cross sectional design. The study examined a snap shot within a certain time and place in the college experience. The survey required reliance on student memories to obtain accurate information. This limitation generally is unavoidable when studying underage drinking habits within this population. Since underage drinking is an illegal activity, it is unlikely that students would be as honest using another form of data collection (direct observations, interviews, etc.). Also, the underage, undergraduate time frame is a very small window to examine the relationship longitudinally. Generally, undergraduate students come of legal drinking age by their mid-junior to senior year of college. Additionally, students are a bit nomadic during college, moving to multiple locations and leaving the college area over breaks, holidays, and weekends; which would make tracking difficult for a longitudinal study.

An additional limitation was the measure of what constitutes binge drinking in comparison with the average weekly consumption used for this study. The weekly average yields wide variations in numbers of drinks consumed. It also is not necessarily indicative of consuming those drinks within a certain day or time within a week. For example, a student could report consuming 10 drinks per week on average meaning they have 1-2 drinks per day, which by definition would not indicate binge drinking behavior. In the same respect, a student could report consuming 10 drinks per week on average meaning they have 5-6 drinks per weekend night, which by definition would be indicative of binge drinking behavior.

For determining binge drinking, there are problems within the definition itself, because there is no specified time for 4-5 drinks to be consumed (female-male, respectively). For example,

a male student could consume 5 drinks over the course of an afternoon outing on a Saturday, having one drink per hour over the course of five hours. This student would never be considered legally intoxicated under state law, but would be considered to have an episode of binge drinking behavior under the CDC definition. In essence, this limitation also is unavoidable. Since there is not a scientific standard of exact measurements of binge drinking, the weekly average is a good, short-term measurement. To assist with this specific limitation a survey item has been added as question #14: In general over a 30 day period, how many times will you consume four or more alcoholic drinks at one setting (during one party or one event).

Another limitation was the concentration on criminology and criminal justice majors specifically. While there have been mentioned reasons of consistency between the universities as a reason for the focus, it is recognized that future studies would need to be broadened to additional college majors and universities. Criminology and criminal justice majors may be a unique population, as the previous study displayed more gendered effects within this major compared to other majors, which was a primary reason for restricting this study to that specific sub population. This study could provide a basis for comparison for additional future studies.

A final limitation was the sample populations obtained at each university. Due to restrictions from departments and the internal IRBs at each university, only certain classrooms were accessible. This reduced the available sample size prior to survey distribution. Additionally, other logistics arose that made obtaining a larger sample population difficult. At university 3, the chair of the department required the primary researcher to be available to distribute surveys rather than a representative who already worked at the university. The university is approximately 250 miles away from the researcher's university, which made it difficult to travel to the university multiple times. Additionally, a few courses were cancelled the scheduled day of survey distribution

at the same university, which limited the sample size even more. Hopefully a larger population can be obtained for future research.

Summary

In this chapter the necessity for the assessment of external validity of a previously designed survey that has been used multiple times at a single site were discussed. The internal validity, construct validity, and statistical conclusion validity of the survey instrument have been assessed on three separate occasions at a single site with adjustments to the instrument after each fielding to better determine the significant factors related to underage drinking at a specific university campus. Although the survey instrument could capture over 50% of the variance related to underage drinking, the survey instrument predicted male criminal justice student drinking with much greater accuracy than female criminal justice student drinking. A risk taking measurement and an impulsive measurement were added, based on underage drinking literature, in an attempt to better distinguish gender differences in weekly alcohol consumption and binge drinking among criminal justice/criminology students. In addition, three additional sites were added to enlarge the sample and to assess the external validity of the survey instrument.

The research sites were identified and the strengths and limitations of the intended sampling procedures were detailed, along with the strengths and limitations for the study in general. The nature of the research design, requiring four sites, enhances the external validity of the instrument and as all sites are located in Pennsylvania and part of the PASSHE system, most internal validity threats can be cautiously dismissed. The dependent and independent variables were conceptualized and operationalized clearly to include how each variable would be coded, along with the justification for their inclusion in this study.

The protection of human subjects was addressed along with how IRB approval was garnered from the other sites. The survey distribution procedures were identified once the IRB approval was obtained for each site. The chapter concluded with the strengths and limitations of the study as identified by the researcher. The strengths of the research are related primarily to previous research related to underage drinking and binge drinking, and prior assessment of the survey instrument. The limitations are related to the necessity to use a cross-sectional research design and the difficulty related to accurately measuring binge drinking as defined by the CDC

Chapter IV introduces the analysis to include: the results of the factor analysis and Cronbach's α tests conducted on the risk taking and impulsive variables, independent sample t tests, and model and predictor weight comparisons using methods introduced by Brame et al. (1998) that were used to assess differences in the four sites, along with descriptive statistics, correlation matrix, and inferential statistics (Ordinary Least Squares regression – OLS) that were applied to the collected data from the four sites.

CHAPTER IV

FINDINGS

Chapter IV presents the results of the current study. A brief discussion about the descriptive statistics and bivariate correlations are presented, along with Cronbach's alpha scores and factor analyses for the risk taking and impulsivity components. The majority of the discussion focuses on the inferential statistics (Ordinary Least Squares [OLS] Regression) of the various campus models, variables of interest, and their impact on the five hypotheses. The correlation matrices and the regression tables are presented as they relate to each hypothesis being tested, the descriptive statistics for each variable is presented in a consolidated tables.

The results of this study were based on two sampling structures. First, the parent university sample was obtained, which included all students regardless of major who attended the selected criminology and criminal justice classes. Courses randomly were selected from the university's criminology and criminal justice courses offered during the spring and fall semesters of 2017. A total of 456 surveys were distributed at the parent university of which 8 were partially completed (1.7%) and 101 consisted of students of legal drinking age who were outside the scope of this study (22.1%). The omission of these surveys result in a sample size of 347.

The second sampling structure was based on a sample of 428 underage undergraduate criminology and criminal justice students across four universities in Pennsylvania. The parent university sample of 347 students was reduced to 250 students from the first sampling structure due to removing those majoring outside of criminology and criminal justice. From the additional universities, a total of 724 surveys were distributed during the fall 2017 semester. Of those 724 surveys, 26 were partially completed (3.6%) and 270 consisted of students of legal drinking age that is outside the scope of the study (37.3%). The omission of these surveys result in a sample size

of 428. The breakdown of the universities represented is as follows: 1) parent university = 250 students [58%]; 2) university 2 (medium sized, public, rural university located near the parent university in southwestern Pennsylvania) = 83 students [20%]; 3) university 3 (medium sized, public, rural university with a high minority representation located in northeastern Pennsylvania) = 51 students [12%]; 4) university 4 (large, public, urban university located in southeastern Pennsylvania) = 44 students [10%].

Analysis One: Parent University Model Differences

Analysis one examined the parent university's undergraduate students who consumed alcohol underage. The sample consisted of both criminology and criminal justice majors (coded as 0) and other majors (coded as 1). The first analysis assessed the differences between students who reported they are underage drinkers while attending college and those students who reported that they are not underage drinkers while attending college. The variable used for non-underage drinkers was no alcohol consumed in the last 30 days.

The second analysis assessed the differences between those who reported sporadic episodes of binge drinking compared to those who reported multiple episodes of binge drinking. The comparison originally was intended to be non-binge drinkers and binge drinkers, but the definition of binge drinking by the CDC (4 drinks per event for females and five drinks per event for males) placed almost all those who reported underage drinking as binge drinkers (90%).

The third analysis assessed if there were significant changes in the coefficients in the data collected previously in survey three at the parent university compared to the data collected using the new survey, which included the updated risk taking and impulsivity components. Additionally, the comparison provided an indication of policy effectiveness due to the increased underage drinking fines between survey three and the current survey.

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As the sample varied based on the assessment of the three models (Model 1 – drinkers/non-drinkers, Model 2 – light binge drinkers/heavy binge drinkers, Model 3 – drinkers only); descriptive statistics, bivariate correlations, and regression tables were generated for each model. Model 1 uses Tables 2-4, Model 2 Tables 5-7, and Model 3 Tables 8-10. Discussions about each table was restricted to significant findings and perceived anomalies in the data.

In summary, a descriptive statistics table, a correlation matrix, and a regression analysis table was generated for each of the three models as the participants being assessed in the various models changed to capture the hypothesis. Models 1 and 2 are logistic regressions, the first comparing university 1 non-drinkers to drinkers (model 1) and the second comparing university 1 light binge drinkers (3 or fewer episodes per month) compared to heavier binge drinkers (4 or more episode per month). The break down was made from light to heavy binge drinkers, rather than the original non-binge drinkers to binge drinkers as 90% of the students who reported drinking in the last 30 days also reported at least on binge drinking episode. Model 3 is an ordinary least squares regression assessing the indicators for those students from university 1 who reported drinking (drinks per week in college).

Model One for Underage Drinking

A total of 347 surveys were completed with a minimum age of 18 and a maximum age of 20 with a mean age of 19.08 years ($SD = 0.834$). This is representative of a traditional university, and the ages of the students generally can be attributed to lower class levels (primarily sophomores).

Students were asked to report alcohol consumption levels. For this study, a drink referred to an alcoholic beverage and was defined as a 12-ounce beer, 6 ounces of wine, or one ounce of distilled spirits (hard alcohol). For example, if a person drank one 40-ounce Fosters, it actually

would be considered 40/12 = 3.33 drinks; similarly, a 12-ounce Long Island Ice Tea equals two drinks, as do doubles and 12-ounce wine coolers. The definition was stated at the start of the survey.

Model One Frequencies and Descriptive Statistics

Model one dependent variable. Model 1 is a logistic regression comparing those who underage drink compared to those who do not underage drink. The dependent variable used for analysis was whether a student reported "drinking in the past 30 days". A determination was made to use this variable instead of "never drank alcohol" as a student could have had one beer at age 16 and would have been placed in the underage drinker category. Students were asked if they had consumed alcohol in the past 30 days (0 = no, 1 = yes). Approximately 69% of the sample reported consuming at least one alcoholic drink in the last 30 days (n = 239).

Model one independent variables. Independent variables used for analysis were gender, major, Greek life membership, five closest female drinking friends, five closest male drinking friends, average drinks per week in high school, risk taking, impulsivity, and parental attitudes. The demographic variables were coded as: 1) Gender 0 = female and 1 = male, 2) Major 0 = criminology and criminal justice major and 1 = other majors, 3) Greek Social member 0 = not a Greek Social life member and 1 = Greek Social life member.

The variables related to personal and peer alcohol use were coded accordingly. Peer drinking behaviors were asked based upon gender. Students were asked how many of their five closest female friends drink. The variable was examined as a continuous variable ranging from zero to five. Students also were asked how many of their five closet male friends drink. The variable was examined as a continuous variable ranging from zero to five. Average drinks per

week as a high school senior was examined as a continuous variable. High school alcohol use was coded as 0 = no, 1 = yes.

Risk taking was a scale created by combining responses provided by Grasmick's subscale (Grasmick et al., 1993). Students were asked these questions on an interval scale that ranged from 1 to 10, 1 = Strongly Disagree to 10 = Strongly Agree. Students were asked if they like to test themselves every now and then by doing something a little risky, sometimes taking a risk just for the fun of it, believe excitement and adventure are more important than security, and if they find it exciting to do things for which they might get in trouble. Response range was 4 – 40.

Impulsivity was a scale created by combining responses provided by Grasmick's subscale (Grasmick et al., 1993). Students were asked these questions on an interval scaling of 1 to 10, 1 = Strongly Disagree to 10 = Strongly Agree. Students were asked if they often do whatever brings them pleasure here and now, if they prefer doing things that pay off right away rather than in the future, if they are more concerned about what happens to them in the short run than in the long run, and if they do not devote much thought and effort to preparing for the future. Response range was 4 – 40.

A factor analysis identified two components with eigenvalues over 1.00 when the eight questions related to self-control subcomponents were assessed. The four questions assessing risk taking held together as a unitary construct (eigenvalue 3.596). The four questions assessing impulsivity held together as a unitary construct (eigenvalue 1.108). A reliability analysis was conducted on the risk taking construct and the impulsivity construct. The Cronbach's alpha for the risk taking scale was .746, with an increase to .770 if the question related to doing things that pay off right away rather than in the future was omitted. As the gain in the value was not dramatic, a

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decision was made to leave all four questions in the scale. The Cronbach's alpha for the impulsive scale was .743 and did not increase if any of the items were omitted.

The bivariate correlation for risk taking and impulsivity is .632, with a Cronbach's alpha of .822, which did not increase if any items were omitted. The necessity to assess the independent values of these two variables relates to their use in the OLS regression models. Multiple models were generated to determine the impact of combining these two variables compared to leaving both in the regression model, and omitting one or the other from the regression model. A determination was made independently for each model and the logic for the decision is explained when discussing that particular model.

Parental Approval (PA) was a scale created by combining responses related to parental approval of underage drinking. Students answered these questions with a dichotomous choice of "yes" or "no". Students were asked if their parents approved of underage drinking as long as no one got into trouble, if they have consumed alcohol underage with their parent's knowledge, and if they were allowed to consume alcohol at home underage. A factor analysis determined there was one unitary construct with an eigenvalue of 1.926. These responses were combined to create a continuous PA variable of 0 to 3, 0 = Low Levels of PA to 3 = High Levels of PA. For the sample, parental attitude scores ranged from 0 to 3 with an average of 1.65. The Cronbach's alpha for the scale was 0.737, which indicates a moderate level of internal consistency.

Model one descriptive statistics. Table 2 displays the descriptive statistics for all the independent variables used in the OLS regression analysis. When examining the dichotomous variables, descriptive statistics indicate that the sample was mostly female (52%), which is consistent with the demographics of the university. About 14% of the sample reported Greek Social Life membership and criminology and criminal justice students made up 72% of the sample.

Table 2

Descriptive Statistics for Independent Variables (Analysis One)

Variable	Total (n=347)	CRIM (n=250)	Non CRIM (n=97)	Female (n=182)	Male (n=165)
Consume alcohol past 30 days	239 (69%)	173 (69%)	66 (68%)	120 (66%)	119 (72%)
Consumed alcohol during senior year of High School	250 (72%)	186 (74%)	64 (66%)	132 (73%)	118 (72%)
Average drinks per week in College	5.18	5.44	4.51	3.53	6.99
(drinkers only)	7.42	7.73	6.79	5.25	9.61
Average drinks per week in High School	2.59	2.79	2.09	1.94	3.32
(drinkers only)	3.29	3.40	3.00	2.23	4.37
Binge drinking last 30 days (drinkers only)	215 (90%)	153 (88%)	62 (94%)	107 (89%)	108 (91%)
Male friends who drink	3.84	3.88	3.72	3.65	4.04
(drinkers only)		4.36	4.52	4.26	4.55
(non-drinkers only)		2.81	2.03	2.47	2.74
Female friends who drink	3.82	3.92	3.56	3.76	3.88
(drinkers only)		4.47	4.32	4.42	4.44
(non-drinkers only)		2.70	1.94	2.50	2.46
New Fine is a deterrence (yes)	39 (11%)	25 (10%)	14 (14%)	24 (13%)	15 (9.1%)
Greek Social member	50 (14%)	39 (16%)	11 (11%)	18 (10%)	32 (19%)
Gender					
Female	182 (52%)	139 (56%)	43 (44%)	N/A	N/A
Male	165 (48%)	111 (44%)	54 (56%)	N/A	N/A
Major	347	250 (72%)	97 (28%)	N/A	N/A
Parent Approval	1.65	1.71	1.47	1.64	1.65
(drinkers only)		1.88	1.64	1.80	1.83
(non-drinkers only)		1.32	1.13	1.34	1.17
Risk Taking	16.69	16.30	17.68	15.71	17.76
(drinkers only)		17.42	18.95	16.48	19.21
(non-drinkers only)		13.81	14.97	14.23	14.02
Impulsivity	14.42	14.25	14.85	14.01	14.87
(drinkers only)		14.51	15.50	14.07	15.50
(non-drinkers only)		13.67	13.45	13.89	13.24
Risk Taking + Impulse	31.13	30.59	32.53	29.76	32.64
(drinkers only)		31.92	34.45	30.55	34.71
(non-drinkers only)		25.55	28.42	28.21	27.26

Of interest is the percentage of students who reported binge drink episodes. For this

sample, 90% of the students who reported drinking in the past 30 days, also reported at least one

binge drinking episode during that 30 day period (the number of times they consumed four or more

alcoholic drinks at one setting [during one party or one event]. These findings held consistent

regardless of major or gender. This issue was discussed previously as the CDC's definition of

binge drinking is based on episode and not time, suggesting that a person who had five drinks over

an eight hour family reunion was identified as a binge drinker, similar to the person who consumed five shots of tequila in a fifteen second time span.

Parental approval scores, risk taking scores, and impulsivity scores were as anticipated, with the non-drinkers displaying less risk-taking and impulsive behavior, and reporting less parental support for drinking underage. Also noteworthy is the number of friends reported who consumed alcohol. Those who did not drink had close friends who also did not drink, while those who drink underage had a majority of their closest friends who also consumed alcohol.

Model One Bivariate Analysis

Three analyzes were conducted to assess, in part, hypotheses 1, 3, 4, and 5.

H1: The descriptive statistics for male and female criminology/criminal justice students' alcohol consumption habits have remained consistent over all three survey periods.

H3: There will be no significant changes in the coefficients in the data collected previously in survey three compared to the data collected using the new survey.

H4: Even with the addition of impulsivity and recklessness, the survey instrument will account for more variation among male drinkers than female drinkers.

H5: The survey instrument will account for more variation among male binge drinkers than female binge drinkers.

 Table 3 suggests that there is a high correlation between two sets of independent variables. The highest correlation was 0.694 between male and female drinking friends, followed by 0.632 between risk taking and impulsivity. The two sets of variables fall under the standard threshold Pearson's r-value of 0.70, so if desired they could remain independently in the model and be analyzed separately (Berry, 1993; Lewis-Beck, 1980).

Table 3

Bivariate Analysis One – Non-drinkers/Drinker Assessment (n=374)

Pearson Correlation Coefficients	Drink past 30 days (DV)	Avg. drinks per wk HS	Male drinking friends	Female drinking friends	Risk Taking	Impulse	Parent Approve	Gender	Major	Greek Life
Drink past 30 days	1									
Avg. HS	.204**	1								
Male Friends	.506**	.232**	1							
Female Friends	.545**	.187**	.694**	1						
Risk Taking	.215**	.202**	.178**	.150**	1					
Impulse	.085	.144**	.067	.071	.632**	1				
Parent Approve	.217**	.135*	.190**	.193**	.088	.178**	1			
Gender	.067	.135*	.118*	.037	.128*	.068	.002	1		
Major	-.011	-.061	-.043	-.100	.077	.042	-.092	-.101	1	
Greek Life	.205**	.086	.208**	.233**	.022	-.005	.181**	.135*	-.054	1

**. Correlation is significant at the 0.01 level (2-tailed).
 *. Correlation is significant at the 0.05 level (2-tailed).

Multiple models were assessed based on these correlations and a final determination was

made that the best model (Cox and Snell R Square .356 and Nagelkerke R Square .502) was to

leave risk taking and impulsivity as separate dimensions. Although these two concepts are

measuring different dimensions of self-control, their correlation is understandable as they often are

combined into an index. For this study, to assess their association with the variable "gender" it was

necessary to maintain them in the model separately. The five closest male friends was combined

for this model with the five closest female friends (total friends who consume alcohol, with a range

of 0 – 10). Overall, a visual inspection of the correlation matrix does not display any other

anomalies other than major, gender, and impulsivity are not significantly associated with the

dependent variable (alcohol consumption) at the bivariate level.

Model One Regression Analysis

Table 4 highlights the logistic regression output for Model 1. The Exp (B) for the model

offers a likelihood estimate of an event occurring, which is associated with a specific independent

variable (Pohlmann & Leitner, 2003). Examining the student's decision as whether to underage

drink or refrain from underage drinking, required logistic regression as the dependent variable was

dichotomous (0 for non-drinkers and 1 for drinkers). A similar model is used for Model 2 where

binge drinking has been dichotomized.

Table 4

Logistic Regression Results Non-drinkers/Drinker Assessment (n=374)

Variable	B	SE	Wald	Exp (B)
Consumed alcohol in HS	1.576	.334	22.279***	4.835
Total friends who drink	.390	.055	50.518***	1.477
Risk Taking	.063	.026	5.910*	1.065
Impulsivity	-.037	.030	1.506	0.963
Parental Approval	.107	.136	0.623	1.113
Gender	.035	.317	0.012	1.036
Major (CRIM to Non Crim)	.345	.361	0.915	1.412
Greek Social Life	1.247	.608	4.207*	3.481
Constant	-3.950	.616	41.105***	0.019

* $p < .05$, *** $p < .001$, Cox and Snell R Squared = .356   Nagelkerke R Squared = .502

The slope (B) in a logistic regression offers insight about the strength and direction of the

variable with the dependent variable. Similar to the R square interpretation difference used in OLS

regression compared to the Pseudo R squared used in logistic regression, the slope cannot be

interpreted as a one unit increase in the independent variable would result in a specific increase

(slope value) in the dependent variable. This interpretation is not possible as the dependent

variable in the logistic regression is not continuous, but is restricted to either 0 or 1; thus, the slope

interpretation becomes for each one unit increase in the independent variable there is the "slope

value" for that variable increase in the log-odds of drinking underage. For example, the slope value

for "total friends who drink" is 0.390. The interpretation for the slope would be for each friend a student has who consumes alcohol, there is a 0.390 increase in the log-odds of that student underage drinking in college, holding all other independent variables constant. This interpretation offers little to policy makers, so the Exponential (B) often is used to explain variable impact.

The Wald test is used similar to the t test in OLS to determine if the independent variables in the model are significant. The assumption for Wald is that the variable observed should have a value within a defined range, similar to zero. Variables that are not within this range are identified as significant or good indicators of having a statistically significant relationship with the dependent variable. The closer the Wald value for a variable is to zero, the less chance the variable will have a significant relationship with the dependent variable.

Although the slope value and the Exp (B) are interpreted differently, statistically the results are the same. For the variable consumed alcohol in high school the slope weight is 1.576 and the Exp (B) is 4.835. An interpretation of the slope weight would be as a person moved from not drinking in high school to drinking in high school, there was a 1.576 increase in the log-odds of that student underage drinking in college, holding all other independent variables constant. Using the Exponential B for interpretation, there is a 384% increase in the odds of underage drinking in college if a person reported drinking underage in high school, holding all other independent variables constant.

Model 1 suggests that multiple independent variables are associated with an individual's decision as whether to underage drink in college or refrain from underage drinking in college. Basically, as relevant variables increase in value, (i.e., consumed alcohol in high school, friends who drink, risk taking, membership in Greek Social Life) the likelihood of an underage person moving from not consuming alcohol to consuming alcohol increases.

The model summary or Pseudo R Squared values indicate several important variables remained unidentified and were omitted from the model. Additionally, the Pseudo R Squared values for this model, .356 for the Cox and Snell R Squared and .502 for the Nagelkerke R Squared, suggest that the model strength is better than when the friends who drink variables, correlated at .694, were treated independently as opposed to combined (Cox and Snell R Squared .236 and Nagelkerke R Squared .332). Similarly, when risk taking and impulsivity were combined the Pseudo R squared values were lower (Cox and Snell R Squared .309 and Nagelkerke R Squared .435). Unlike OLS regression where the R-squared statistic is used to determine variance explained, the Pseudo R-squared assesses model strength when compared to similar models. The model displayed in Table 4 appears to be the best fit model for this data.

Table 4 indicates that whether a person drank in high school, friends who drink, risk taking, and membership in a Greek Social Organization are related significantly to the decision to underage drink in college. For this sample, impulsivity, parental approval of underage drinking, gender, and a student's major were not significantly associated with the decision to underage drink. Each of the significant variables are discussed separately after a brief discussion of the y-intercept.

The y-intercept, or constant, for this model is -3.950, which is the predicted value of y when all the independent variables are equal to zero. The constant would be defined as the log odds of an individual being a drinker of alcohol if all the independent variables could be set at zero. As some of the variables cannot have a value of zero (i.e., risk taking and impulsivity), the interpretive value of the constant, for this model, is diminished.

For this sample, as a student moved from not consuming alcohol in high school to consuming alcohol in high school, there was a 1.576 increase in the log-odds of the student

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underage drinking in college, while controlling for the other independent variables. For the variable "consumed alcohol in HS", the Wald test score is 22.279; thus, the null hypothesis associated with the Wald test that the coefficient equals 0 is rejected. The Exponential B offers a second interpretation of the impact of the variable "consumed alcohol in HS" and its relation to underage drinking in college. For a student who reported alcohol consumption while in high school, there is a 384% increase in the odds of underage drinking in college compared to a student who did not consume alcohol in high school.

For this sample, for each friend in college (top five male friends and top five female friends) who consumed alcohol, there was a 0.390 increase in the log-odds of the student underage drinking in college, while controlling for the other independent variables. For the variable "total friends who drink", the Wald test score is 50.518; thus, the null hypothesis associated with the Wald test that the coefficient equals 0 is rejected. The Exponential B offers a second interpretation of the impact of the variable "total friends who drink" and its relation to underage drinking in college. For each close friend who consumed alcohol there is a 48% increase in the odds of underage drinking in college.

For this sample, for each one point increase in a student's risk taking score (4 – 40) there was a 0.063 increase in the log-odds of the student underage drinking in college, while controlling for the other independent variables. For the variable "risk taking", the Wald test score is 5.910; thus, the null hypothesis associated with the Wald test that the coefficient equals 0 is rejected. The Exponential B offers a second interpretation of the impact of the variable "risk taking" and its relation to underage drinking in college. For each one unit increase in a student's risk taking score, there is a 7% increase in the odds of underage drinking in college.

For this sample, as a student moved from non-Greek Social Life membership to Greek Social Life membership, there was a 1.247 increase in the log-odds of the student underage drinking in college, while controlling for the other independent variables. For the variable "Greek Social Life", the Wald test score is 4.207; thus, the null hypothesis associated with the Wald test that the coefficient equals 0 is rejected. The Exponential B offers a second interpretation of the impact of the variable "Greek Social Life" and its relation to underage drinking in college. For a student who reported being a member of a Greek Social fraternity or sorority, there was a 248% increase in the odds of underage drinking in college compared to a student who was not a member of a Greek Social fraternity or sorority.

As noted in previous research both in general and over the years at University 1, alcohol use in high school, close friends who consume alcohol, and membership in a Greek Social organization are continual indicators of underage drinking on college campuses. The addition of risk taking added to the model's explanatory power about who did and did not consume alcohol on campus. The discussion section will detail more about the possible temporal ordering issues associated with close friends who consume alcohol and Greek Social membership, as another question arises: Are students who already consume alcohol in high school lured to friends who drink and Greek Social organizations, or do these friends and organizations introduce nondrinking high school students to alcohol through socialization?

Model Two for Binge Drinking

A total of 239 students participated in binge drinking, as defined by the Center for Disease Control (CDC), over the past 30 days. Table 2 indicates that this is 90% of the students who reported drinking in the past 30 days (215 of 239). Of these students, 113 (47%) reported three or fewer episodes of binge drinking over the past 30 days, while 126 (53%) reported four or more

episodes of binge drinking over the past 30 days. How each variable was conceptualized and operationalized will not be repeated (see p. 71-73) as this model uses the same variables as used in Model 1 with the exception of changing "drank in high school" (0 = no, 1 = yes) to "amount of alcoholic drinks consumed weekly in high school" (continuous).

Binge Drinking Frequencies and Descriptive Statistics

A factor analysis identified two components with eigenvalues over 1.00 when the eight questions related to self- control subcomponents were assessed. The four questions assessing risk taking held together as a unitary construct (eigenvalue 3.596). The four questions assessing impulsivity held together as a unitary construct (eigenvalue 1.108). A reliability analysis was conducted on the risk taking construct and the impulsivity construct. The Cronbach's alpha for the risk taking scale was .746, with an increase to .770 if the question related to doing things that pay off right away rather than in the future was omitted. As the gain in the value was not dramatic, a decision was made to leave all four questions in the scale. The Cronbach's alpha for the impulsive scale was .743 and did not increase if any of the items were omitted.

The bivariate correlation for risk taking and impulsivity is .632, with a Cronbach's alpha of .822, which did not increase if any items were omitted. The necessity to assess the independent values of these two variables relates to their use in the OLS regression models. Multiple models were generated to determine the impact of combining these two variables compared to leaving both in the regression model, and omitting one or the other from the regression model. A determination was made independently for each model and the logic for the decision is explained when discussing that particular model.

Binge drinking descriptive statistics. Table 5 displays the descriptive statistics for all the independent variables used in the OLS regression analysis.

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Table 5

Descriptive Statistics for Independent Variables (Model Two)

Variable	Total Binge (n=239)	Light Binge (n=113)	Heavy Binge (n=126)	Heavy Binge Female (n=53)	Heavy Binge Male (n=73)
Average drinks per week in College	7.42	2.49	11.84	8.91	13.97
Average drinks per week in HS	3.29	1.56	4.85	3.40	5.90
Male friends who drink	4.40	4.03	4.74	4.58	4.85
Female friends who drink	4.43	4.16	4.67	4.60	4.71
New Fine is a deterrence (yes)	17 (7%)	12 (10%)	5 (4%)	3 (6%)	2 (3%)
Greek Social member (yes)	46 (19%)	14 (12%)	32 (25%)	10 (19%)	22 (30%)
Gender					
Female	120	67 (59%)	53 (42%)	N/A	N/A
Male	119	46 (41%)	73 (58%)		
Major					
CRIM	173 (72%)	78 (69%)	95 (75%)	41 (77%)	54 (74%)
Non CRIM	66 (28%)	35 (31%)	31 (25%)	12 (23%)	19 (26%)
Parent Approval	1.82	1.63	1.98	1.98	1.99
Risk Taking	17.84	15.04	20.35	20.25	20.42
Impulsivity	14.78	12.88	16.48	16.40	16.55
Risk Taking + Impulse	32.62	27.93	36.83	36.64	36.97

When examining the dichotomous variables, descriptive statistics indicate that the sample was mostly female (52%), which is consistent with the demographics of the university. About 14% of the sample reported Greek Social Life membership and criminology and criminal justice students made up 72% of the sample.

Of interest is the percentage of students who reported binge drink episodes. For this sample, 90% of the students who reported drinking in the past 30 days, also reported at least one binge drinking episode during that 30 day period (the number of times they consumed four or more alcoholic drinks at one setting [during one party or one event]. These findings held consistent regardless of major or gender. This issue was discussed previously as the CDC's definition of binge drinking is based on episode and not time, suggesting that a person who had five drinks over

an eight hour family reunion was identified as a binge drinker, similar to the person who consumed five shots of tequila in a fifteen second time span.

Parental approval scores, risk taking scores, and impulsivity scores were as anticipated, with the light binge drinkers displaying less risk-taking and impulsive behavior, and reporting less parental support for binge drinking. Also noteworthy is the number of friends reported who consumed alcohol. Those who had less binge drinking episodes, also reported having fewer friends who consumed alcohol compared to those who reported more monthly binge drinking episodes.

Binge Drinking Bivariate Analysis

Table 6 suggests that there is a moderate to high correlation between two sets of independent variables. The highest correlation was 0.617 between risk taking and impulsivity. The second highest correlation is 0.528 between college alcohol use and high school alcohol use. The two sets of variables fall under the standard threshold Pearson's r-value of 0.70, so they are able to stay in the model and be analyzed separately (Berry, 1993; Lewis-Beck, 1980). As noted for Model 1, the risk taking and impulsivity variables were retained separately to determine their impact on gender as males were anticipated to have higher risk taking scores associated with underage drinking and females were anticipated to have higher impulsivity scores associated with drinking. The moderate association (.528) was anticipated between high school drinks per week and college drinks per week, as previous studies have identified that a person's drinking habits in high school transfer to college.

Multiple models were assessed based on these correlations and a final determination was made that the best model fit (Cox and Snell R Square .466 and Nagelkerke R Square .621) was not necessarily the best explanatory model. When college drinks per week was incorporated in the

Table 6

Bivariate Analysis Two – Binge Drinking Assessment (n=239)

Pearson Correlation Coefficients	Binge (DV)	Avg. drinks per wk College	Avg drinks per wk HS	Friends who drink	Greek Life	Gender	Major	PA	Risk	Impulsive
Binge	1									
College	.584**	1								
High school	.330**	.528**	1							
Friends	.298**	.317**	.162*	1						
Greek Life	.165*	.310**	.067	.191**	1					
Gender	.172**	.272**	.215**	.075	.151*	1				
Major	-.071	-.064	-.036	.001	-.040	.077	1			
Parental Approval	.160*	.169**	.075	.107	.167**	.014	-.100	1		
Risk Taking	.332**	.224**	.225**	.101	-.014	.171**	.086	.042	1	
Impulsive	.281**	.141*	.146*	-.001	-.012	.113	.069	.180**	.617**	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

model, it was the only variable that was statistically significant (slope: .392, Wald: 37.247, EXP B 1.480), but this variable also is a summary variable for several other variables based on the correlation matrix (correlation of .528** with high school drinks per week, .317** with friends who drink, .310** with Greek Social Life, .272** with gender, .224** with risk taking, etc.). A decisions was made to remove college drinks per week from the model based on it being a plausible proxy for binge drinking, in that the more a person drank in college per week, the more binge episodes that likely would occur.

The five closest male friends was combined for this model with the five closest female friends (total friends who consume alcohol, with a range of 0 – 10) based on Model 1 results. For Model 2, a stronger model was obtained for binge drinking by separating friends by gender (Cox and Snell R Square .275 and Nagelkerke R Square .367 when combined and a Cox and Snell R

Square .282 and Nagelkerke R Square .376 when separated). Whether risk taking and impulsivity were maintained separately or combined did not impact the model, so each variable remained separately in the model. Overall, a visual inspection of the correlation matrix does not display any other anomalies other than major is not significantly associated with the dependent variable (binge drinking) at the bivariate level.

Binge Drinking Regression Analysis

Table 7 highlights the logistic regression output for Model 2. The Exp (B) for the model offers a likelihood estimate of an event occurring, which is associated with a specific independent variable (Pohlmann & Leitner, 2003). Examining the student's decision as to whether to sporadically binge drink or constantly binge drink required logistic regression as the dependent variable was dichotomous (0 for 0 – 3 binge drinking episodes per month and 1 for 4 or more binge drinking episodes per month).

Model 2 suggests that multiple independent variables are associated with an individual's decision as whether to sporadically binge drink or constantly binge drink in college. Basically, as relevant variables increase in value, (i.e., consumed alcohol in high school, friends who drink, risk

Table 7

Logistic Regression Results for Binge Drinking (n=239)

Variable	B	SE	Wald	Exp (B)
Drink per week HS	.160	.050	10.404**	1.174
Male friends who drink	.511	.177	8.342**	1.667
Female friends who drink	.085	.172	0.243	1.088
Greek Social Life	.595	.416	2.043	1.812
Gender	.180	.317	0.322	1.197
Major	-.047	.035	1.776	0.954
Parental approval	.114	.149	0.584	1.121
Risk taking	.060	.026	5.281*	1.062
Impulsivity	.058	.032	3.251	1.059
Constant	-5.157	.999	26.675***	0.006

$* p < .05, ** p < .01, *** p < .001$
Cox and Snell R Squared = .282 Nagelkerke R Squared = .376

taking, membership in Greek Social Life) the likelihood of an underage person moving from sporadically binge drinking to constantly binge drinking increases.

Table 7 indicates that the amount of alcohol per week a person consumed in high school, male college friends drinking habits, and risk taking are related significantly to the decision to habitually binge drink as defined by the CDC. These variables also were the significant indicators in Model 1, which assessed underage drink in college. The fourth variable that was significant in Model 1, Greek Social Life, was not a significant indicator for binge drinking. For this sample, female college friends drinking habits, Greek Social Life, gender, major, parental approval and impulsivity were not significantly associated with the decision to habitually binge drink. Each of the significant variables are discussed separately after a brief discussion of the y-intercept.

The y-intercept, or constant, for this model is -5.157, which is the predicted value of y when all the independent variables are equal to zero. The constant would be defined as the log odds of an individual being a habitual binge drinker if all the independent variables could be set at zero. As some of the variables cannot have a value of zero (i.e., risk taking and impulsivity), the interpretive value of the constant, for this model, is diminished.

For this sample, for each drink per week (on average) a student reported drinking in high school, there is a 0.160 increase in the log-odds of the student being a habitual binge drinker in college, while controlling for the other independent variables. For the variable "average drinks per week in high school HS", the Wald test score is 10.404; thus, the null hypothesis associated with the Wald test that the coefficient equals 0 is rejected. The Exponential B offers a second interpretation of the impact of the variable "average drinks per week in high school HS" and its relation to habitual binge drinking. For each drink per week (one average) a student reported

drinking in high school, there is a 17% increase in the odds of habitually binge drinking in college compared to a student who reported drinking one less drink per week (on average) in high school.

For this sample, for each male friend in college who consumed alcohol, there is a 0.511 increase in the log-odds of the student being a habitual binge drinker in college, while controlling for the other independent variables. For the variable "male friends who drink", the Wald test score is 8.342; thus, the null hypothesis associated with the Wald test that the coefficient equals 0 is rejected. The Exponential B offers a second interpretation of the impact of the variable "male friends who drink" and its relation to habitual binge drinking in college. For each close male friend who consumed alcohol there is a 67% increase in the odds of becoming a habitual binge drinker in college.

For this sample, for each one point increase in a student's risk taking score (4 – 40) there was a 0.060 increase in the log-odds of the student being a habitual binge drinker, while controlling for the other independent variables. For the variable "risk taking", the Wald test score is 5.281; thus, the null hypothesis associated with the Wald test that the coefficient equals 0 is rejected. The Exponential B offers a second interpretation of the impact of the variable "risk taking" and its relation to habitual binge drinking in college. For each one unit increase in a student's risk taking score, there is a 6% increase in the odds of becoming an habitual binge drinker in college.

As noted in previous research both in general and over the years at University 1, alcohol use in high school, close friends who consume alcohol, and membership in a Greek Social organization are continual indicators of underage drinking on college campuses; thus it is not surprising that several of these variables also are associated with habitual binge drinking. Although there is limited data about binge drinking on college campuses, especially as conceptualized by the

CDC, Model 2 suggests that the same variables are in play for developing smart alcohol use policies, which are addressed in Chapter V.

Model Three Drinking Indicators

Model 3 is designed to assess the strength of two variables (risk taking and impulsivity) to determine if their inclusion in the survey offers a better understanding about college students' underage drinking. Additionally, an assessment was made about the impact of the two new variables as they relate to a student's gender. Early research findings from assessments about levels of self-control often suggest that males were impacted by risk taking factors and females were more impacted by impulsivity. More recent studies have suggested that based on the family structure, risk taking may be a stronger variable in predicting male and female underage drinking behaviors than impulsivity, especially in college disciplines where further employment is associated with risk taking (ROTC, criminology, criminal justice, etc.). Table 8 offers descriptive statistics for the sample, Table 9 displays the bivariate correlation of the variables used in the model, and Table 10 presents the regression analysis. A brief discussion follows each of the tables to highlight anomalies and significant variables related to underage drinking as it relates to average drinks consumed per week in college. How the variables for this model were conceptualized and operationalized was offered earlier during the discussion about Model 1. Any changes to variable composition in this model is highlighted and the logic for the change or modification is addressed in the discussion for that specific table.

Model Three Frequencies and Descriptive Statistics

Sample one dependent variable OLS. The dependent variable used for analysis was the average weekly consumption of alcoholic drinks in college. Students were asked how many drinks

they consume on a weekly average in college. Approximately 69% of the sample reported

consuming at least one alcoholic drink in the last 30 days (n = 239).

Table 8

Descriptive Statistics for Independent Variables (Model Three)

Variable	All Students (n=239)	CRIM Males (n=82)	CRIM Females (n=91)	Non-CRIM Males (n=37)	Non CRIM Females (n=29)
Average drinks per week in College	7.42	10.46	5.27	7.70	5.17
Average drinks per week in HS	3.29	4.74	2.20	3.54	2.31
Male friends who drink (0-5)	4.40	4.62	4.12	4.38	4.69
Female friends who drink (0-5)	4.43	4.55	4.40	4.19	4.48
Total Friends who drink (0-10)	8.83	9.17	8.52	8.57	9.17
Greek Social member (yes)	46 (19%)	24 (29%)	11 (12%)	6 (16%)	5 (17%)
New Fine is a deterrence (yes)	17 (7%)	2 (2%)	11 (12%)	4 (11%)	0 (0%)
Parent Approval	1.82	1.99	1.79	1.49	1.83
Risk Taking	17.84	18.82	16.15	20.08	17.52
Impulsivity	14.78	14.96	14.10	16.70	13.97
Risk Taking + Impulse	32.62	33.78	30.25	36.78	31.48

The estimate from the current study is a decrease from the previous study, which reported

approximately 79% of the students reported consuming at least one alcoholic drink per month.

Average drinks per week ranged from 0 to 31 drinks with a mean of 7.42 drinks (SD = 8.020).

Those who reported not consuming any alcohol in the past 30 days were omitted from the data set

(n= 108) as the model was intended to assess the difference in drinks consumed per week based on

multiple independent variables. As almost 31% of the participants did not consume alcohol,

leaving them in the study (DV score of zero) would have negatively impacted the model.

Additionally, the study conducted earlier for model comparison also excluded all non-drinkers. For

the comparison to be accurate, the samples were restricted similarly.

Of interest is that the drinks consumed in high school and college by females are similar regardless of major, which is not the case for males. Additionally, male criminology students reported more Greek Social membership than the other three categories. In relation to the new fine being a deterrent for those who report underage drinking, only 7% identified it as such and none of female non criminology members deemed it a deterrent for reduction of underage drinking.

Parental approval scores and risk taking scores were as anticipated, with males being slightly higher than females. Of interest is that the impulsivity scores for males also were on average higher than those of females, suggesting for this sample that females underage drinking is not governed by impulsivity as opposed to risk taking.

Model Three Bivariate Analysis

Table 9 indicates that there are statistically significant bivariate correlations between each of the independent variables and the dependent variable (drinks consumed on average per week in college), with the exception of student's major (-.064). From a criminological theory perspective, of interest is that the variables "risk taking" and "impulsivity" have similar correlations with both the variables "drinks per week in college" and drinks per week in high school" supporting the General Theory of Crimes assertion that self-control does not change over time, what changes is the individual's activities. Similar to Model 1 and Model 2, the highest correlation between two independent variables is 0.617 between "risk taking" and "impulsivity". The second highest correlation is 0.534 between "male friends who drink" and "female friends who drink". The two sets of variables fall under the standard threshold Pearson's r-value of 0.70, so they are able to stay in the model and be analyzed separately (Berry, 1993; Lewis-Beck, 1980).

Table 9

Bivariate Analysis Three – Underage Drinking (n=239)

Pearson Correlation Coefficients	College drinks per week (DV)	Avg drinks per wk HS	Male friends who drink	Female friends who drink	Greek Life	Gender	Major	PA	Risk	Impulsive
College	1									
High school	.528**	1								
Male friends	.323**	.166**	1							
Female friends	.232**	.118	.534**	1						
Greek Life	.310**	.067	.167**	.168**	1					
Gender	.272**	.215**	.123	.009	.151*	1				
Major	-.064	-.036	.060	-.058	-.040	.077	1			
Parental Approval	.169**	.075	.098	.090	.167**	.014	-.100	1		
Risk Taking	.224**	.225**	.081	.097	-.014	.171**	.086	.042	1	
Impulsive	.141*	.146*	-.017	.015	-.012	.113	.069	.180**	.617**	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

As noted for Model 1 and Model 2, "risk taking" and "impulsivity" were retained separately to determine their impact on gender as males were anticipated to have higher risk taking scores associated with underage drinking and females were anticipated to have higher impulsivity scores associated with underage drinking. The moderate association (.534) was anticipated between 'male friends who drink" and "female friends who drink". Regression models were generated exchanging the "friends" variable, with the best fit model being retained.

Model Three Regression Analysis

Table 10 highlights the Ordinary Least Squares (OLS) regression output for Model 3. The R^2 for the model is .424, indicating that the variables in the model can account for 42% of the explained variance associated with alcohol consumption levels among college students. All Variance Inflation Factor values (VIF) are less than 1.726 suggesting multicollinearity is not an

issue for this model, using a conservative VIF factor of 2.5 for an area of concern. The Durbin Watson statistic (1.722) indicates a slight positive autocorrelation (less than 2.0), but well within the range of 1.5 – 2.5; thus, autocorrelation concerns are cautiously dismissed.

Table 10

Model Three OLS Regression Results for Weekly College Alcohol Use (n=239)

Variable	B	SE	Beta	t
Constant	-5.179	2.078		-2.492*
Drinks per wk high school	.685	.085	.427	8.045***
Male friends	1.181	.416	.173	2.842**
Female friends	.230	.416	.033	.554
Greek Social Life	4.411	1.063	.217	4.151***
Gender (Female = 0)	1.809	.846	.113	2.139*
Major (CRIM =0)	-1.044	.918	-.058	-1.137
Parental approval	.493	.378	.069	1.305
Risk Taking	.094	.066	.093	1.414
Impulsivity	.006	.082	.005	.078

R^2 = .424 (adjusted .402), F = 18.741 (p < .001)
    * p < .05, ** p < .01, *** p < .001

For this sample, the variables significantly associated with how many drinks per week on average a student consumes at university 1 are in descending order: 1) "average drinks per week consumed in high school", 2) "Greek Social Life", 3) "male friends who drank", and 4) "gender". Multiple models were evaluated based on the correlation between male and female friends' drinking habits (.534) and the variables "risk taking" and "impulsivity" (.617). When either "risk taking" or "impulsivity" was removed from the model, the remaining variable gained marginal power but did not achieve significance [+ 1.960 or -1.960]. The "risk taking" *t* value increased from 1.414 to 1.769 when impulsivity was removed and the *t* value for impulsivity increased from .078 to 1.090 when "risk taking" was removed. When the variables were combined and the composite variable included, the *t* value was 1.633. Regardless of the model generated, the variables with a significant association with how many drinks per week on average a student consumed at university 1 did not change in order and only minimally in strength, with the exception of "total friends who drink" which had a t value of 3.449, p=.001 (unstandardized

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coefficient of .706) compared to "males friends who drink", which had a *t* value of .2.842, p=.005 (unstandardized coefficient of 1.181) and female friends who drink, which had a *t* value of .554, p=.580 (unstandardized coefficient of .230).

For this sample, the amount of alcohol consumed in high school per an average week was the best indicator of the amount of alcohol consumed in college per an average week. For each drink a student reported consuming per week in high school, there was a .7 drink increase in college. A student who drank five drinks a week in high school would be predicted to increase to 8.5 drinks per week in college, if all other variables were held at zero.

Similarly, if students reported Greek Life membership, their alcohol consumption increased by approximately 4.5 drinks per week. An increase of just over one drink per week is associated with each male friend a student reported as having who consumed alcohol. For example, a student who reported having two close male friends who drank, would drink approximately 2.3 less drinks per week than a student who reported having four close male friends who drink. Finally, males in this sample drank approximately 1.8 more drinks per week on average than did females.

Table 11

Model Three Previous Study OLS Regression Results for Weekly College Alcohol Use (n=421)

Variable	B	SE	Beta	*t*
Constant	-8.189	2.117		-3.868***
Drinks per wk high school	1.016	.065	.566	15.598***
Male friends	.831	.439	.073	1.893
Female friends	1.332	.390	.134	3.418**
Greek Social Life	3.743	.821	.154	4.558***
Gender (Female = 0)	2.953	.650	.161	4.543***
Major (CRIM =0)	1.000	.662	.051	1.510
Parental approval	.607	.399	.052	1.523

R^2 = .541 (adjusted .533), F = 69.597 (p < .001)
    ** p < .01, *** p < .001

Model Three Regression Comparison

Table 11 displays the Ordinary Least Squares regression results for the previous study conducted at University 1 in 2016 excluding the variables "risk taking" and "impulsivity" as these two variables were added to the survey after the completion of this study.

Descriptive statistics suggest that over the past two years, students' alcohol consumption per week on average in college has declined from 9.6 drinks per week to 7.4 drinks per week. Reported high school alcohol use as measured in average drinks per week also declined from 4.16 weekly average to 3.29 weekly average. Male friends in college who drink and female friends in college who drink remained relatively the same (male 4.72 to 4.40, female 4.57 to 4.43). Greek Social Life membership for the samples increased from 17% to 19%. Parental attitudes towards underage drinking increased slightly from 1.77 to 1.82.

For the two studies, three of the variables assessed remained significant (high school drinks per week, Greek Social Life, and gender) for both models. Although "female friends who drink" was a significant indicator in the previous study, the variable is not significant in the current study, being replaced by "male friends who drink" which was not significant in the first study. Supporting the diminished use of alcohol is the change in unstandardized coefficients for high school drinking 1.016 to .685, and gender from 2.953 to 1.809. The transition from female friends being a significant indicator to male friends being a significant indicator remained relatively similar when assessing unstandardized coefficients changes (1.332 to 1.181). Of interest is Greek Social Life, where the unstandardized coefficient increased from 3.743 from the previous study to 4.411 in the current study, suggesting that those in Greek Social organizations are consuming on average about .7 drinks more per week than those in the prior study.

Predictive Value Comparison of Old and New Models

The formula $z = [b_1-b_2]/[sqrt(SEb_1^2+SEb_2^2)]$ recommended by Paternoster and colleagues (1998) was used to determine if there was a significant difference between the unstandardized coefficient values from study three at the parent university to the current study. Study three variables were identified as b_1 and the current study's variables were identified as b_2. The critical zone for $[b_1-b_2]/[sqrt(SEb_1^2+SEb_2^2)]$ is the area located outside of -1.96 and 1.96, meaning variables with a lower score than -1.96 or higher than 1.96 were statistically different between the two models. Table 12 displays these results.

Table 12

Model Three Unstandardized Coefficient Assessment

Variable	b_1-b_2	$SEb1^2$	$SEb2^2$	SEb_1^2+ SEb_2^2	Sqrt Sb_1^2+ SEb_2^2	$\dfrac{b_1+b_2}{Sqrt\ SEb_1^2 +SEb_2^2}$
HS drink per week	.331	.0042	.0072	.01145	.1070	3.093
Male friends	-.350	.1927	.1731	.36578	.6048	-.5787
Female friends	1.102.	.1521	.1731	.32516	.5702	1.9326
Greek Social Life	-.668.	.6740	1.1300	1.80401	1.3431	-.4974
Gender	1.144	.4225	.7157	1.13822	1.0669	1.0723
Major	-.044	.4382	.8427	1.28097	1.1318	-.0389
Parental approval	.114	.1592	.1429	.30209	.5496	.2074

Only one variable was identified in the critical region. The overall percentage of variation explained in "HS drinks consumed per week" in the current study is significantly different (lower) than the variation explained in "HS drinks consumed per week" from the previous study ($z = 3.093$) based on a two-tailed test with non-critical scores ranging between $z = -1.96$ and $z = 1.96$). Similarly, the variable "female friends", which was significant in the previous model but not the current model has a Z score of 1.93, which is approaching the critical zone of being greater than 1.96. The current model does not hold similar predictive value in variation of "drinks consumed per week in college" as the previous model, with R^2 values of 0.424 and 0.541, respectively.

In summary, three variables continuously have remained as significant indicators of how many drinks per week a student consumes in college. Those indicators are: 1) average drinks per week in high school, 2) Greek life involvement, and 3) gender, which were significant indicators in both models. There was a switch from indicators of female drinking friend influences to male drinking friend influences in the new model.

Of importance for Model 3 is that the variables "risk taking" and "impulsivity". These variables held together as unitary constructs, had moderate alpha levels, and were significantly correlated with the dependent variable "college drinks per week" at the bivariate level. When entered into a regression equation neither were significant indicators of a student's weekly alcohol consumption in college even though they were not moderately or strongly correlated with any other variables in the model. Even when the two variables were combined into an index, with a moderate to strong Cronbach's alpha, the variable still had no significant relationship with the dependent variable. These results suggest that, for this sample, the addition of these two variables to the survey offered minimal additional explanatory power to the model.

Analysis Two: Comparisons of Criminology and Criminal Justice Majors Across Different Campuses

Analysis two examines the parent university underage undergraduate sample consisting of criminology and criminal justice majors in comparison to other criminology and criminal justice majors at different universities across Pennsylvania. This analysis is examining if the updated risk taking and impulsivity components have an influence of predictive quality in regards to criminology and criminal justice majors specifically. More importantly, the analysis examines if there are model variations between the different university samples.

Sample Two

A total of 428 surveys were completed with a minimum age of 18 and a maximum age of 20 with a mean age of 19.13 years (*SD* = 0.848). This is representative of a traditional university, and the ages of the students can be generally attributed to lower class levels (primarily sophomores). The majority of the sample was from the parent university (n=250, 58.4%), with 19.4% from university 2 (n=83), 11.9% from university 3 (n=51), and 10.3% from university 4 (n=44).

Students were asked to report alcohol consumption levels. For this study, a drink referred to an alcoholic beverage and was defined as a 12-ounce beer, 6 ounces of wine, or one ounce of distilled spirits (hard alcohol). For example, if a person drank one 40-ounce Fosters, it actually would be considered 40/12 = 3.33 drinks; similarly, a 12-ounce Long Island Ice Tea equals two drinks, as do doubles and 12-ounce wine coolers. The definition was stated at the start of the survey.

Sample Two Frequencies and Descriptive Statistics

Sample two dependent variable. Table 13 displays the descriptive statistics for the entire sample (drinkers and non-drinkers), as well as a breakdown of the variables of interest by university. The dependent variable used for analysis was the average weekly consumption of alcoholic drinks in college. The data were restricted to only those students who reported "drinking in the past 30 days". A determination was made to use this variable instead of "never drank alcohol" as a student could have had one beer at age 16 and would have been placed in the underage drinker category. Students were asked if they had consumed alcohol in the past 30 days (0 = no, 1 = yes). Approximately 73% of the sample reported consuming at least one alcoholic drink in the last 30 days (n = 314).

Sample two independent variables. The independent variables used in sample two mirrored those used in sample one (average drinks per week in high school, drink habits of five closest male and female friends, Greek Social Life membership, gender, parent approval, risk taking, and impulsivity). Parental approval, risk taking, and impulsivity were scaled items that required a reassessment with the new sample.

A factor analysis identified two components with eigenvalues over 1.00 when the eight questions related to self-control subcomponents were assessed. The four questions assessing risk taking held together as a unitary construct (eigenvalue 2.356). The four questions assessing impulsivity held together as a unitary construct (eigenvalue 2.354). A reliability analysis was conducted on the risk taking construct and the impulsivity construct. The Cronbach's alpha for the risk taking scale was .759, with an increase to .819 if the question related to doing things that pay off right away rather than in the future was omitted. As the gain in the value was not dramatic, a decision was made to leave all four questions in the scale. The Cronbach's alpha for the impulsive scale was .763 and did not increase if any of the items were omitted.

The bivariate correlation for risk taking and impulsivity is .619 for this sample. When the two variables were combined, the Cronbach's alpha was .830, with an increase to .832 if the question related to doing things that pay off right away rather than in the future was omitted. As the gain in the value was not dramatic, a decision was made to leave all eight questions in the scale. The necessity to assess the independent values of these two variables relates to their use in the OLS regression models. Multiple models were generated to determine the impact of combining these two variables compared to leaving both in the regression model, and omitting one or the other from the regression model. A determination was made to assess the two variables independently as they were anticipated to impact male students and female students differently.

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Parental Approval (PA) was a scale created by combining responses related to parental approval of underage drinking, identical to the three questions used in analysis 1. These responses were combined to create a continuous PA variable of 0 to 3, 0 = Low Levels of PA to 3 = High Levels of PA. For the sample, parental attitude scores ranged from 0 to 3 with an average of 1.92. A factor analysis determined there was one unitary construct with an eigenvalue of 1.899. The Cronbach's alpha for the scale was .706, which indicates a moderate level of internal consistency.

Table 13 displays the descriptive statistics for the entire sample (drinkers and non-drinkers), as well as a breakdown of the variables of interest by university. Of interest in Table 13 is the percentage of students at university 4 who reported consuming alcohol underage in the past 30 days (91%). A large difference is noted in male and female friends who consume alcohol when comparing non-drinkers to drinkers.

From the descriptive statistics it is clear that those who report underage drinking have close friends who also are drinkers, while those who do not report underage drinking have the majority of their close friends reported as non-drinkers also. Of note, only 9% of the sample (40 of 314) reported the increase in state fines and institutional fines as a deterrent for underage drinking. For parental approval, university 1 and university 2 have identical mean scores for all students [1.71] (drinkers and non-drinkers) as well as for drinkers [1.88].

Sample Two Bivariate Analysis

Table 14 through Table 17 are the bivariate correlation matrices for university 1 through university 4, respectively. As there are four independent samples when assessing each university, a single bivariate regression table for the entire sample was not deemed appropriate. Each Table is addressed separately, with a summary of the Tables offered before moving to the Ordinary Least Squares regression analysis for each university.

Table 13

Descriptive Statistics for Sample Two Independent Variables

Variable	Total (n=428)	UNIV 1 (n=250)	UNIV 2 (n=83)	UNIV 3 (n=51)	UNIV 4 (n=44)
Consumed alcohol past 30 days	314 (73%)	173 (69%)	66 (80%)	35 (69%)	40 (91%)
Consumed alcohol during senior year of High School	316 (74%)	186 (74%)	61 (74%)	34 (67%)	35 (80%)
Average drinks per week in College	7.35	5.44	4.93	3.43	8.91
(drinkers only)		7.73	6.17	4.94	9.78
Average drinks per week in High School	3.32	2.79	2.57	2.45	2.89
(drinkers only)		3.40	3.15	3.43	3.18
Binge drinking last 30 days (drinkers only)	279 (89%)	153 (88%)	59 (71%)	31 (61%)	36 (82%)
Male friends who drink	3.89	3.88	4.00	3.39	4.27
(drinkers only)	4.40	4.36	4.52	4.26	4.50
(non-drinkers only)	2.47	2.81	2.00	1.50	2.00
Female friends who drink	3.99	3.92	4.08	3.88	4.30
(drinkers only)	4.48	4.47	4.45	4.49	4.58
(non-drinkers only)	2.63	2.70	2.65	2.56	1.50
New Fine is a deterrence (yes)	40 (9%)	25 (10%)	5 (6%)	6 (12%)	4 (9%)
Greek Social member	52 (12%)	39 (16%)	3 (4%)	3 (6%)	7 (16%)
Gender (drinkers only)					
Female	157 (50%)	91 (53%)	33 (50%)	13 (37%)	20 (50%)
Male	157 (50%)	82 (47%)	33 (50%)	22 (63%)	20 (50%)
Parent Approval	1.75	1.71	1.71	1.73	2.02
(drinkers only)	1.92	1.88	1.88	1.94	2.10
(non-drinkers only)	1.27	1.32	1.06	1.25	1.25
Risk Taking	16.31	16.30	15.72	16.27	17.48
(drinkers only)	17.39	17.42	16.89	17.91	17.63
(non-drinkers only)	13.35	13.81	11.18	12.69	16.00
Impulsivity	14.01	14.25	12.17	15.53	14.36
(drinkers only)	14.35	14.51	12.73	16.40	14.50
(non-drinkers only)	13.06	13.67	10.00	13.63	13.00
Risk Taking + Impulse	30.35	30.59	27.89	31.80	31.84
(drinkers only)	31.74	31.92	29.62	34.31	32.13
(non-drinkers only)	26.48	25.55	21.18	26.31	29.00

Bivariate analysis for university 1. Table 14 indicates that there are statistically

significant bivariate correlations between each of the independent variables and the dependent

variable (drinks consumed on average per week in college), with the exception of "impulse"

(.145). The highest correlation between two independent variables is 0.592 between "risk taking"

and "impulsivity". The second highest correlation is .584 between "male friends who drink" and

Table 14

Bivariate Analysis University 1 (n=173)

Pearson Correlation Coefficients	Avg. Drinks per wk College (DV)	Avg. drinks per wk HS	Male drinking friends	Female drinking friends	Greek Life	Gender	Parent Approve	Risk Taking	Impulse	Risk Taking and Impulse
Avg. College	1									
Avg. HS	.460**	1								
Male Friends	.339**	.149	1							
Female Friends	.253**	.090	.584**	1						
Greek Life	.234**	-.028	.182*	.154*	1					
Gender	.323**	.245**	.205**	.065	.214**	1				
Parent Approve	.213**	.098	.111	.090	.168*	.088	1			
Risk Taking	.251**	.236**	.112	.126	-.086	.170*	.114	1		
Impulse	.145	.133	-.026	.029	-.028	.070	.259**	.592**	1	
Risk & Impulse	.228**	.213**	.058	.093	-.068	.141	.199**	.917**	.864**	1

**. Correlation is significant at the 0.01 level (2-tailed).
 *. Correlation is significant at the 0.05 level (2-tailed).

 "female friends who drink". The two sets of variables fall under the standard threshold Pearson's r-value of 0.70, so they are able to stay in the model and be analyzed separately (Berry, 1993; Lewis-Beck, 1980). The variables "risk taking" and "impulsivity" were retained separately to determine their impact on gender as males were anticipated to have higher risk taking scores associated with underage drinking and females were anticipated to have higher impulsivity scores associated with underage drinking. The moderate association (.584) was anticipated between 'male friends who drink" and "female friends who drink".

Bivariate analysis for university 2. Table 15 indicates that for this sample, only four of nine independent variables (average high school drinks per week, male friends, Greek social life,

and gender) have statistically significant bivariate correlations with the dependent variable (average drinks per week in college). The highest correlation between two independent variables remains the relationship between "risk taking" and "impulsivity" (.751). The second highest correlation remains between "male friends who drink" and "female friends who drink" (.589).

Table 15

Bivariate Analysis University 2 (n=66)

Pearson Correlation Coefficients	Avg. Drinks per wk College (DV)	Avg. drinks per wk HS	Male drinking friends	Female drinking friends	Greek Life	Gender	Parent Approve	Risk Taking	Impulse	Risk Taking and Impulse
Avg. College	1									
Avg. HS	.454**	1								
Male Friends	.245*	.082	1							
Female Friends	.145	.014	.589**	1						
Greek Life	.442**	-.080	.089	.050	1					
Gender	.279*	.368**	.077	.066	-.218	1				
Parent Approve	-.091	-.033	-.136	-.035	.024	.081	1			
Risk Taking	.233	.138	.167	.008	.170	-.068	-.096	1		
Impulse	.065	.020	.274*	.115	.144	-.023	-.059	.751**	1	
Risk & Impulse	.170	.092	.228	.059	.170	-.052	-.085	.951**	.919**	1

** . Correlation is significant at the 0.01 level (2-tailed).
 * . Correlation is significant at the 0.05 level (2-tailed).

Bivariate analysis for university 3. Table 16 indicates that for this sample, only two of nine independent variables (average high school drinks per week and risk taking) have statistically significant bivariate correlations with the dependent variable (average drinks per week in college). The highest correlation between two independent variables is between "male friends who drink" and "female friends who drink" (.725). The second highest correlation remains the relationship

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between "risk taking" and "impulsivity" (.697). Of interest is the strength of the correlation between high school drinking and college drinking (.623). The mean average for this bivariate correlation for university 1 and university 2 (Table 14 and Table15) was .457. For this sample, it would appear that "high school drinking levels", "risk taking", and "impulsivity" are significantly correlated, which has not been observed in previous models.

Table 16

Bivariate Analysis University 3 (n=35)

Pearson Correlation Coefficients	Avg. Drinks per wk College (DV)	Avg. drinks per wk HS	Male drinking friends	Female drinking friends	Greek Life	Gender	Parent Approve	Risk Taking	Impulse	Risk Taking and Impulse
Avg. College	1									
Avg. HS	.623**	1								
Male Friends	.231	.284	1							
Female Friends	.158	.196	.725**	1						
Greek Life	-.101	-.126	-.057	.139	1					
Gender	.243	.296	.015	-.036	-.187	1				
Parent Approve	.117	.071	.048	.092	.109	-.148	1			
Risk Taking	.345*	.496**	-.028	-.076	-.202	.371*	.083	1		
Impulse	.248	.492**	-.112	-.011	.012	.226	-.001	.697**	1	
Risk & Impulse	.328	.535**	-.070	-.052	-.117	.333	.050	.940**	.899**	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Bivariate analysis for university 4. Table 17 suggests that at the bivariate level, similar to university 2, four of nine independent variables (average high school drinks per week, male friends, female friends, and gender) have statistically significant correlations with the dependent variable (average drinks per week in college). Unlike university two, where Greek Social Life

displayed a statistically significant relationship with the dependent variable, in this sample, Greek

Social Life was replaced by female friends. The highest correlation between two independent

Table 17

Bivariate Analysis University 4 (n=40)

Pearson Correlation Coefficients	Avg. Drinks per wk College (DV)	Avg. drinks per wk HS	Male drinking friends	Female drinking friends	Greek Life	Gender	Parent Approve	Risk Taking	Impulse	Risk Taking and Impulse
Avg. College	1									
Avg. HS	.713**	1								
Male Friends	.400*	.272	1							
Female Friends	.336*	.226	.833**	1						
Greek Life	.243	.115	.188	.155	1					
Gender	.542**	.398*	.327*	.337*	-.066	1				
Parent Approve	.061	.130	-.178	-.223	.093	-.055	1			
Risk Taking	.230	.048	.140	.078	-.211	.155	.059	1		
Impulse	.282	.118	.083	.040	.134	.194	-.063	.444**	1	
Risk & Impulse	.290	.086	.138	.074	-.094	.197	.015	.920**	.760**	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

variables is between "male friends who drink" and "female friends who drink" (.833). Of interest

is the strength of the correlation between high school drinking and college drinking (.713), which

is similar to the correlation observed for university 3.

Sample 2 bivariate analysis summary. At the bivariate level, the correlation matrices for

all four universities indicated that "average drinks per week in high school" had the strongest

association with the dependent variable "average drinks per week in college". This association is

positive indicating the more a student reported drinking per week in high school, the more s/he

reported drinking in college. The survey questions appear to be a better fit for university 1 where the survey originated, as eight of the nine independent variables were correlated significantly with the dependent variable at the bivariate level. Only the independent variable "impulsivity" did not display a significant relationship with the dependent variable at the bivariate level. "Impulsivity" was one on the new variables add to the survey for this study.

Additional independent variables that displayed significant bivariate correlation with the dependent variable included male friends who drank and gender (universities 1, 2, and 4). Of the two new variables entered into the survey, "risk taking" and "impulsivity", only "risk taking" displayed a significant relationship with the dependent variable and then only for university 1 and university 3. "Impulsivity" was not significantly correlated with the dependent variable at any of the universities. Of interest, when the data are restricted by gender "impulsivity" is significantly correlated with "average high school drinks per week and "risk taking" is not significantly correlated. This relationship changes when assessed to "average college drinks per week" with "risk taking" having the significant correlation and "impulsivity" not being significantly correlated, suggesting for females in this sample that when monitored by parents drinking was impulsive, which transitioned to the willingness to take risks in college. For males in this sample, only risk taking at the high school and college levels were significantly correlated with alcohol consumption.

Several moderate to high correlations between various independent variables were anticipated. These moderate to high correlations were observed between male and female friends and risk taking and impulsivity. These impact of these correlations were assessed in the regression models and a general best fit model was selected. As all models must include the same variables,

once a general best fit model was identified, this model was used for all four universities to permit an assessment of the slope values for each university compared to the other three universities.

OLS Regression for All Criminology and Criminal Justice Majors

Table 18 highlights the Ordinary Least Squares (OLS) regression output for all criminology and criminal justice students who had consumed alcohol in the past 30 days at all four universities (n = 314). Several models were generated interchanging the variables identified as moderately to highly correlated in the bivariate analysis. Based on the various models, a decision was made to combine male and female friends who drink as both were significant at the $p < .01$ level when placed in the models separately, but only male friends who drank was significant when both sexes were placed in the model. This finding held true even when the regression models were restricted to samples comprised of only males and then females. The decision also was made to maintain both "risk taking" and "impulsivity" as separate variables, even though impulsivity was not significant in any of the models. This decision was based on the F statistic being of less value when the variables were combined, as well as a greater difference between the R^2 value and the adjust R^2 value when the variables were combined.

The R^2 for the model is .398, indicating that the variables in the model can account for 40% of the explained variance associated with alcohol consumption levels among college students. All Variance Inflation Factor values (VIF) are less than 1.716 suggesting multicollinearity is not an issue for this model, using a conservative VIF factor of 2.5 for an area of concern. The Durbin Watson statistic (1.793) indicates a slight positive autocorrelation (less than 2.0), but well within the range of 1.5 – 2.5; thus, autocorrelation concerns are cautiously dismissed.

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Table 18

Sample 2 OLS Regression Results for All Universities Weekly College Alcohol Use (n=314)

Variable	B	SE	Beta	*t*
Constant	-5.221	1.762		-2.963**
Drinks per wk high school	.653	.077	.403	8.457***
All friends	.655	.169	.178	3.880***
Greek Social Life	4.813	1.003	.220	4.798***
Gender (Female = 0)	2.269	.739	.144	3.071**
Parental approval	.415	.326	.058	1.273
Risk Taking	.157	.057	.161	2.769**
Impulsivity	-.056	.072	-.044	-.777

R^2 = .398 (adjusted .384), F = 28.860 (p < .001)
    ** p < .01, *** p < .001

For this sample, the variables significantly associated with how many drinks per week on average a student consumes across the four universities were 1) "average drinks per week consumed in high school", 2) "Greek Social Life", 3) "closest friends who drink", 4) "risk taking", and 5) "gender". The independent variables "parental approval" and "impulsivity" were not significant indicators of weekly alcohol consumption at the college level.

For this sample, the amount of alcohol consumed in high school per an average week was the best indicator of the amount of alcohol consumed in college per an average week. For each drink a student reported consuming per week in high school, there was a .65 drink increase in college. A student who drank five drinks a week in high school would be predicted to increase to 8.25 drinks per week in college, if all other variables were held at zero.

Similarly, if students reported Greek Life membership, their alcohol consumption increased by approximately 4.8 drinks per week. An increase of just over one half of a drink per week (.655) is associated with each close friend a student reported as having who consumed alcohol. For example, a student who reported having two of their ten closest friends who drank, would drink approximately 4 less drinks per week than a student who reported having six of their ten closest friends who drank. The more willing students were to take risks, the more drinks per week they reported consuming in college. Risk taking was measured on a scale ranging from 4 to 40. For

each one point increase in risk taking score, a student consumed 16% of another alcoholic drink, indicating that for every six or seven points a student's risk taking score increased, that student reported drinking one more drink per week compared to a student who had a risk taking score six or seven points lower. Finally, males in this sample drank approximately 2.3 more drinks per week on average than did females.

OLS Regression for Criminology and Criminal Justice Majors by Gender

   OLS regression for criminology and criminal justice females. Table 19 and Table 20 display the results for two additional OLS regression analyses that were performed separating gender within criminology and criminal justice majors. Table 19 presents the OLS regression analysis used to estimate the effects of the independent variables on the likelihood of weekly alcohol consumption among female criminology and criminal justice majors, who had consumed alcohol in the past 30 days at all four universities (n = 157).

Table 19

Sample 2 OLS Regression Results for All Females' Weekly College Alcohol Use (n = 157)

Variable	B	SE	Beta	*t*
Constant	-2.246	1.840		-1.221
Drinks per wk high school	.624	.136	.326	4.574***
All friends	.422	.169	.177	2.502*
Greek Social Life	4.468	1.247	.259	3.583***
Parental approval	-.156	.362	-.031	-.431
Risk Taking	.155	.062	.219	2.503*
Impulsivity	-.053	.072	-.042	-.735

R^2 = .289 (adjusted .261), F = 10.179 (p < .001)
  * p < .05, *** p < .001

   The R^2 for the model is .289, indicating that the variables in the model can account for 29% of the explained variance associated with alcohol consumption levels among college female students. All Variance Inflation Factor values (VIF) are less than 1.623 suggesting multicollinearity is not an issue for this model, using a conservative VIF factor of 2.5 for an area of concern. The Durbin Watson statistic (2.175) indicates a slight negative autocorrelation (greater

than 2.0), but well within the range of 1.5 – 2.5; thus, autocorrelation concerns are cautiously dismissed.

For this sample, the variables significantly associated with how many drinks per week on average a female student consumes across the four universities were 1) "average drinks per week consumed in high school", 2) "Greek Social Life", 3) "risk taking", and 4) "closest friends who drink". The independent variables "parental approval" and "impulsivity" were not significant indicators of weekly alcohol consumption at the college level.

For this sample, the amount of alcohol consumed in high school per an average week was the best indicator of the amount of alcohol consumed in college per an average week. For each drink a student reported consuming per week in high school, there was a .62 drink increase in college. A student who drank five drinks a week in high school would be predicted to increase to 8.1 drinks per week in college, if all other variables were held at zero.

Similarly, if students reported Greek Life membership, their alcohol consumption increased by approximately 4.5 drinks per week. The more willing students were to take risks, the more drinks per week they reported consuming in college. Risk taking was measured on a scale ranging from 4 to 40. For each one point increase in risk taking score, a student consumed 15% of another alcoholic drink, indicating that for every six or seven points a student's risk taking score increased, that student reported drinking one more drink per week compared to a student who had a risk taking score six or seven points lower. An increase of just under one half of a drink per week (.422) is associated with each close friend a student reported as having who consumed alcohol. For example, a student who reported having two of their ten closest friends who drank, would drink approximately 2.25 less drinks per week than a student who reported having seven of their ten closest friends who drank.

OLS regression for criminology and criminal justice males. Table 20 presents the OLS regression analysis used to estimate the effects of the independent variables on the likelihood of weekly alcohol consumption among male criminology and criminal justice majors, who had consumed alcohol in the past 30 days at all four universities (n = 157). The R^2 for the model is .364, indicating that the variables in the model can account for 36% of the explained variance associated with alcohol consumption levels among college male students. All Variance Inflation Factor values (VIF) are less than 1.791 suggesting multicollinearity is not an issue for this model, using a conservative VIF factor of 2.5 for an area of concern. The Durbin Watson statistic (1.792) indicates a slight positive autocorrelation (less than 2.0), but well within the range of 1.5 – 2.5; thus, autocorrelation concerns are cautiously dismissed.

Table 20

Sample Two OLS Regression Results for All Males' Weekly College Alcohol Use (n = 157)

Variable	B	SE	Beta	*t*
Constant	-7.131	3.369		-2.117*
Drinks per wk high school	.658	.104	.436	6.328***
All friends	.999	.340	.200	2.943**
Greek Social Life	5.111	1.546	.221	3.306**
Parental approval	.947	.563	.112	1.683
Risk Taking	.164	.098	.146	1.672
Impulsivity	-.073	.121	-.051	-.597

R^2 = .364 (adjusted .339), F = 14.333 (p < .001)
    * p < .05, ** p < .01, *** p < .001

For this sample, the variables significantly associated with how many drinks per week on average a male student consumes across the four universities were 1) "average drinks per week consumed in high school", 2) "Greek Social Life", 3) "closest friends who drink". The independent variables "parental approval", "risk taking", and "impulsivity" were not significant indicators of weekly alcohol consumption at the college level.

For this sample, the amount of alcohol consumed in high school per an average week was the best indicator of the amount of alcohol consumed in college per an average week. For each

drink a student reported consuming per week in high school, there was a .66 drink increase in college. A student who drank five drinks a week in high school would be predicted to increase to 8.3 drinks per week in college, if all other variables were held at zero. This finding is similar to that of female drinkers in the sample (.62 for females, .66 for males).

Similarly, if students reported Greek Life membership, their alcohol consumption increased by approximately 5.1 drinks per week. An increase of one drink per week (.999) is associated with each close friend a student reported as having who consumed alcohol. For example, a student who reported having two of their ten closest friends who drank, would drink approximately 5 less drinks per week than a student who reported having seven of their ten closest friends who drank.

OLS Regression for Criminology and Criminal Justice Majors by University

Four OLS regression analyses were performed (Tables 21 – 24), separating criminology and criminal justice majors by university. Table 21 presents the OLS regression analysis used to estimate the effects of the independent variables on the likelihood of weekly alcohol consumption among criminology and criminal justice majors at university 1, Table 22 for university 2, Table 23 for university 3 and Table 24 for university 4.

OLS regression for university 1. Table 21 presents the OLS regression analysis used to estimate the effects of the independent variables on weekly alcohol consumption among university 1 students, who had consumed alcohol in the past 30 days (n = 173). The model's R^2 is .371, indicating model's variables can account for 37% of the explained variance associated with alcohol consumption levels among university 1 students. All VIF values are less than 1.692 suggesting multicollinearity is not an issue for this model. The Durbin Watson statistic (1.632) indicates a slight positive autocorrelation (less than 2.0), but within the range of 1.5 – 2.5.

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Table 21

OLS Regression Results for University 1 Weekly College Alcohol Use (n=173)

Variable	B	SE	Beta	t
Constant	-6.095	2.450		-2.488*
Drinks per wk high school	.567	.102	.366	5.584***
All friends	.766	.244	.204	3.145**
Greek Social Life	3.386	1.314	.170	2.576*
Gender (Female = 0)	2.193	1.065	.136	2.059*
Parental approval	.728	.471	.101	1.546
Risk Taking	.125	.083	.122	1.516
Impulsivity	-.010	.104	-.007	-.092

R^2 = .371 (adjusted .345), F = 13.915 (p < .001)
  * p < .05, ** p < .01, *** p < .001

For this sample, the variables significantly associated with how many drinks per week on average a student consumes who attends university 1 were 1) "drinks per week high school", 2) "all friends", 3) "Greek Social Life", and 4) "gender". The independent variables "parental approval", "risk taking", and "impulsivity" were not significant indicators of weekly alcohol consumption for students at university 1.

OLS regression for university 2. Table 22 presents the OLS regression analysis used to estimate the effects of the independent variables on weekly alcohol consumption among university 2 students, who had consumed alcohol in the past 30 days (n = 66). The model's R^2 is .552, indicating model's variables can account for 55% of the explained variance associated with alcohol consumption levels among university 2 students. All VIF values are less than 2.504 suggesting multicollinearity is not an issue for this model. The Durbin Watson statistic (2.112) indicates a slight negative autocorrelation (greater than 2.0), but within the range of 1.5 – 2.5.

For this sample, the variables significantly associated with how many drinks per week on average a student consumes who attends university 2 were 1) "Greek Social Life", 2) "drinks per week high school", 3) "gender", and 4) risk taking". The independent variables "all friends", "parental approval", and "impulsivity" were not significant indicators of weekly alcohol

Table 22

OLS Regression Results for University 2 Weekly College Alcohol Use (n=66)

Variable	B	SE	Beta	*t*
Constant	-2.453	3.158		-.777
Drinks per wk high school	.547	.153	.348	3.570**
All friends	.552	.310	.164	1.782
Greek Social Life	15.406	2.794	.506	5.515***
Gender (Female = 0)	3.416	1.246	.269	2.741**
Parental approval	-.475	.505	-.084	-.941
Risk Taking	.228	.107	.297	2.137*
Impulsivity	-.269	.136	-.274	-1.977

R^2 = .552 (adjusted .498), F = 10.230 (p < .001)
  * p < .05, ** p < .01, *** p < .001

consumption for students at university 2. Although this model is impacted by the small sample

size, a bivariate correlation with the variables of interest (Table 15) displayed only a significant

relationship between the dependent variable and the variables "Greek Social Life", "drinks per

week high school", "gender", and risk taking". A regression model with only these four

independent variables indicated a R^2 of .498 (adjusted .465) with similar statistics to the full model

above (Table 22).

OLS regression for university 3. Table 23 presents the OLS regression analysis used to

estimate the effects of the independent variables on weekly alcohol consumption among university

3 students, who had consumed alcohol in the past 30 days (n = 35). The model's R^2 is .409,

indicating model's variables can account for 41% of the explained variance associated with alcohol

consumption levels among university 3 students. All VIF values are less than 2.287 suggesting

multicollinearity is not an issue for this model. The Durbin Watson statistic (1.838) indicates a

slight positive autocorrelation (less than 2.0), but within the range of 1.5 – 2.5.

For this sample, only "drinks per week in HS" was significantly associated with drinks per

week on average a student consumes who attends university 3. All other variables used in the

model did not display a significant relationship in the regression analysis. Although this model is

impacted by the small sample size, a bivariate correlation with the variables of interest (Table 16)

Table 23

OLS Regression Results for University 3 Weekly College Alcohol Use (n=35)

Variable	B	SE	Beta	t
Constant	.144	5.782		.025
Drinks per wk high school	.800	.256	.595	3.121**
All friends	.141	.468	.048	.302
Greek Social Life	.051	3.868	.002	.013
Gender (female = 0)	.934	2.349	.066	.398
Parental approval	.448	.966	.071	.463
Risk Taking	.097	.188	.119	.517
Impulsivity	-.145	.232	-.139	-.626

R^2 = .412 (adjusted .260), F = 2.703 (p < .05)
   ** p < .01

displayed only a significant relationship between the dependent variable and the variables "drinks per week in HS" and "risk taking". A regression model with only these two independent variables indicated a R^2 of .390 (adjusted .352) with only "drinks per week in HS" remaining significant (B=.806, SE .214, t = 3.771**) with similar statistics to the full model above (Table 23).

OLS regression for university 4. Table 24 presents the OLS regression analysis used to estimate the effects of the independent variables on weekly alcohol consumption among university 4 students, who had consumed alcohol in the past 30 days (n = 40). The model's R^2 is .674, indicating model's variables can account for 64% of the explained variance associated with alcohol consumption levels among university 4 students. All VIF values are less than 1.458 suggesting multicollinearity is not an issue for this model. The Durbin Watson statistic (2.352) indicates a slight negative autocorrelation (greater than 2.0), but within the range of 1.5 – 2.5.

For this sample, only "drinks per week in high school" and "gender" were significantly associated with how many drinks per week on average a student consumes who attends university 4. All other variables used in the model did not display a significant relationship in the regression analysis. Although this model is impacted by the small sample size, a bivariate correlation with the variables of interest (Table 17) displayed only a significant relationship between the dependent

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Table 24

OLS Regression Results for University 4 Weekly College Alcohol Use (n = 40)

Variable	B	SE	Beta	*t*
Constant	-5.104	5.6857		-.898
Drinks per wk high school	1.142	.240	.544	4.760***
All friends	.341	.460	.087	.742
Greek Social Life	5.233	2.795	.212	1.872
Gender (Female=0)	5.092	2.213	.272	2.301*
Parental approval	-.036	1.107	-.003	-.032
Risk Taking	.189	.133	.173	1.417
Impulsivity	.099	.218	.0548	.453

R^2 = .674 (adjusted .603), F = 9.468 (p < .001)
   * p < .05, *** p < .001

variable and the variables "drinks per week in HS", "gender", and "all friends". A regression

model with only these three independent variables indicated a R^2 of .605 (adjusted .572) with

similar statistics to the full model above (Table 24).

Summary of OLS regression results for universities 1, 2, 3, and 4. The overall survey

instrument obtained an R^2 across the four universities that ranged from .371 at university 1 to .674

at university 4. The one independent variable that remained an indicator of alcohol consumption

levels in college was "average drinks per week in high school" which had an unstandardized

coefficient that ranged from .547 at university 2 to 1.142 at university 4. This finding suggests that

those who drink in college increase their alcohol consumption from anywhere between .55 to 1.1

drinks per week in college for each drink they consumed weekly in high school. The variable

"gender" was statistically significant at all universities except university 3, with males consuming

more than females. Greek Social Life membership was a significant indicator of average drink per

week in college at universities 1 and 2. The variables "parental approval", "risk taking", and

"impulsivity" were not significant indicators of drinks consumed per week in college with the

exception of "risk taking" a university 2. This finding is addressed in more detail in the discussion

section (Chapter V).

Predictive Value Comparison of Old and New Models

The formula $z = [b_1-b_2]/[sqrt(SEb_1^2+SEb_2^2)]$ recommended by Paternoster and colleagues (1998) was used to determine if there was a significant difference between the unstandardized coefficient values from the regression models generated for each of the four universities. The critical zone for $[b_1-b_2]/[sqrt(SEb_1^2+SEb_2^2)]$ is the area located outside of -1.96 and 1.96, meaning variables with a lower score than -1.96 or higher than 1.96 were statistically different between the two universities. Table 25 displays these results for university 1 compared to university 2.

Table 25

Unstandardized Coefficient Assessment Universities 1 and 2

Variable	b_1-b_2	$SEb1^2$	$SEb2^2$	SEb_1^2+ SEb_2^2	Sqrt Sb_1^2+ SEb_2^2	$\frac{b_1+b_2}{Sqrt\ SEb_1^2}$ $+SEb_2^2$
HS drink per week	.020	.010	.023	.033	.184	.109
All friends	.214	.060	.096	.156	.395	.542
Greek Social Life	-12.020	1.727	7.806	9.533	3.088	-3.893
Gender	-1.223	1.134	1.553	2.687	1.639	-.746
Parental approval	1.203	.222	.255	.477	.691	1.742
Risk Taking	-.103	.007	.011	.018	.135	-.760
Impulsivity	.259	.011.	.018	.029	.171	1.512

Only one variable was identified in the critical region. The overall percentage of variation explained by "Greek Social Life" by the university 1 model was significantly different (lower) than the variation explained by the university 2 model ($z = -3.893$) based on a two-tailed test with non-critical scores ranging between $z = -1.96$ and $z = 1.96$).

Table 26 displays the difference between the unstandardized coefficient values from the regression models generated for university 1 compared to university 3. For this comparison, there were no significant differences identified in the unstandardized coefficients generated in the models as $z = [b_1-b_2]/[sqrt(SEb_1^2+SEb_2^2)]$ remained within the boundaries of -1.96 and 1.96.

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Table 26

Unstandardized Coefficient Assessment Universities 1 and 3

Variable	b_1-b_2	$SEb1^2$	$SEb2^2$	SEb_1^2+ SEb_2^2	Sqrt Sb_1^2+ SEb_2^2	$\dfrac{b_1+b_2}{\text{Sqrt } SEb_1^2 +SEb_2^2}$
HS drink per week	-.233	.010	.066	.076	.276	-.845
All friends	.625	.060	.219	.279	.528	1.184
Greek Social Life	3.335	1.727.	14.961	16.688	4.085	.816
Gender	1.259	1.134	5.518	6.652	2.579	.488
Parental approval	.280	.222	.933	1.155	1.075	.261
Risk Taking	.028	.007	.035	.042	.206	.136
Impulsivity	.135	.011	.054	.064	.254	.531

Table 27 displays the difference between the unstandardized coefficient values from the regression models generated for university 1 compared to university 4. Only one variable was identified i the critical region. The overall percentage of variation explained by "HS drink per week" by the university 1 model was significantly different (lower) than the variation explained by the university 4 model ($z = -2.204$) based on a two-tailed test with non-critical scores ranging between $z = -1.96$ and $z = 1.96$).

Table 27

Unstandardized Coefficient Assessment Universities 1 and 4

Variable	b_1-b_2	$SEb1^2$	$SEb2^2$	SEb_1^2+ SEb_2^2	Sqrt Sb_1^2+ SEb_2^2	$\dfrac{b_1+b_2}{\text{Sqrt } SEb_1^2 +SEb_2^2}$
HS drink per week	-.575	.010	.058	.068	.261	-2.204
All friends	.425	.060	.212	.272	.521	.816
Greek Social Life	-1.847	1.727	7.812	9.539	3.088	-.598
Gender	-2.899	1.134	4.897	6.031	2.456	-1.180
Parental approval	.764	.222	1.225	1.447	1.203	.635
Risk Taking	-.064	.007	.018	.025	.157	-.408
Impulsivity	-.109	.011	.048	.059	.242	-.451

Table 28 displays the difference between the unstandardized coefficient values from the regression models generated for university 2 compared to university 3. Only one variable was identified in the critical region. The overall percentage of variation explained by "Greek Social Life" by the university 2 model was significantly different (higher) than the variation explained by the university 3 model ($z = 3.218$) based on a two-tailed test with non-critical scores ranging between $z = -1.96$ and $z = 1.96$).

Table 28

Unstandardized Coefficient Assessment Universities 2 and 3

Variable	b_1-b_2	$SEb1^2$	$SEb2^2$	$SEb_1^2+SEb_2^2$	Sqrt $Sb_1^2+SEb_2^2$	$\dfrac{b_1+b_2}{\text{Sqrt } SEb_1^2+SEb_2^2}$
HS drink per week	-.253	.023	.066	.089	.298	-.848
All friends	.411	.096	.219	.315	.561	.732
Greek Social Life	15.355	7.806	14.961	22.767	4.772	3.218
Gender	2.482	1.553	5.518	7.071	2.660	.933
Parental approval	-.923	.255	.933	1.188	1.090	-.847
Risk Taking	.131	.011	.035	.046	.216	.606
Impulsivity	-.124	.018	.054	.072	.269	-.461

Table 29 displays the difference between the unstandardized coefficient values from the regression models generated for university 2 compared to university 4. Two variable were identified in the critical region. The overall percentage of variation explained by "HS drinks per week" and "Greek Social Life" by the university 2 model was significantly different than those in the university 4 model. For university 2, the unstandardized slope coefficient for "HS drinks per week" was significantly smaller ($z = -2.090$) than that observed for university 4. For university 2, the unstandardized slope coefficient for "Greek Social Life" was significantly larger ($z = 2.574$) than that observed for university 4. This assessment was based on a two-tailed test with non-critical scores ranging between $z = -1.96$ and $z = 1.96$).

Table 29

Unstandardized Coefficient Assessment Universities 2 and 4

Variable	b_1-b_2	$SEb1^2$	$SEb2^2$	$SEb_1^2+SEb_2^2$	Sqrt $Sb_1^2+SEb_2^2$	$\dfrac{b_1+b_2}{\text{Sqrt } SEb_1^2+SEb_2^2}$
HS drink per week	-.595	.023	.058	.081	.285	-2.090
All friends	.211	.096	.212	.308	.555	.380
Greek Social Life	10.173	7.806	7.812	15.618	3.952	2.574
Gender	-1.676	1.553	4.897	6.450	2.540	-.660
Parental approval	-.439	.255	1.225	1.480	1.217	-.361
Risk Taking	.039	.011	.018	.029	.171	.228
Impulsivity	-.368	.018	.048	.066	.257	-1.432

Table 30 displays the difference between the unstandardized coefficient values from the regression models generated for university 3 compared to university 4. For this comparison, there were no significant differences identified in the unstandardized coefficients generated in the models as $z = [b_1-b_2]/[sqrt(SEb_1^2+SEb_2^2)]$ remained within the boundaries of -1.96 and 1.96. The negative z score values suggest that the slope weights for all variables assessed were lower at university three than at university four, with the exception of parental approval.

Table 30

Unstandardized Coefficient Assessment Universities 3 and 4

Variable	b_1-b_2	$SEb1^2$	$SEb2^2$	$SEb_1^2+SEb_2^2$	Sqrt $Sb_1^2+SEb_2^2$	$\dfrac{b_1+b_2}{\text{Sqrt } SEb_1^2+SEb_2^2}$
HS drink per week	-.342	.066	.058	.124	.351	-.975
All friends	-.200	.219	.212	.431	.656	-.305
Greek Social Life	-5.182	14.961	7.812	22.773	4.772	-1.086
Gender	-4.158	5.518	4.897	10.415	3.227	-1.288
Parental approval	.484	.933	1.225	2.158	1.469	.329
Risk Taking	-.092	.035	.018	.053	.230	-.399
Impulsivity	-.244	.054	.048	.102	.318	-.766

The assessment of the unstandardized coefficients for the regression models for the four universities suggest that with few exceptions, the items used in the survey measured consistently

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across the universities. The unstandardized coefficient for the variable "Greek Social Life" for university 2 was significantly different (higher) than that of the other three universities. The slope weight for university 2 for this variable was 15.406, for universities 1, 3, and 4 the slope values were 3.386, .051, and 5.233 respectively. Similarly, the unstandardized coefficient for the variable "HS drink per week" for university 4 was different (higher) than that of the other three universities, although it was significantly higher with only university 1 and university 2. The slope weight for university 4 for this variable was 1.142, for universities 1 through 3 the slope values were .567, .547, and .800 respectively.

Analysis Summary

In summary, upon examining each hypothesis:

H1: The descriptive statistics for male and female criminology/criminal justice students' alcohol consumption habits have remained consistent over all three survey periods.

Table 8 indicates that alcohol consumption may have changed at university 1 since model 3 was completed three years ago. Descriptive statistics for this sample suggest that over the past two years, students' alcohol consumption per week on average in college has declined from 9.6 drinks per week to 7.4 drinks per week. Reported high school alcohol use as measured in average drinks per week also declined from 4.16 weekly average to 3.29 weekly average. Male friends in college who drink and female friend in college who drink remained relatively the same (male 4.72 to 4.40, female 4.57 to 4.43). Greek Social Life membership for the samples increased from 17% to 19%. Parental attitudes towards underage drinking increased slightly from 1.77 to 1.82.

H2: There will be no statistically significant differences between the varying PASSHE universities throughout Pennsylvania, accounting for external validity of the survey instrument.

The study found there were significant differences between the models for each university, but these differences were restricted to what appear to be anomalies at a certain university on one variable (e.g., Greek Social Life at university 2 and "HS drinks per week" at university 4). Table 13 indicates that for students who drank in the past 30 days, university 2 reported Greek Social Life membership as just under 5% of their sample (n=66), compared to university 1 at 23%, university 3 at 9%, and university 4 at 20%. For students who drank in the past 30 days, the sample from university 4 reported average weekly alcohol consumption in college as 9.78 drinks per week (n=34), compared to university 1 at 7.73, university 2 at 6.17, and university 3 at 4.94. With the exception of these two variables, at these two universities, there was not a statistically significant difference between the varying PASSHE universities.

H3: There will be no significant changes in the coefficients in the data collected previously in survey three compared to the data collected using the new survey.

Although only one variable in the current study was identified in the critical region as being statistically different from model 3, which was the base survey used for comparison. Table 12 indicated that the overall percentage of variation explained in "HS drinks consumed per week" in the current study is significantly different (lower) than the variation explained in "HS drinks consumed per week" from the previous study ($z = 3.093$) based on a two-tailed test with non-critical scores ranging between $z = -1.96$ and $z = 1.96$). Similarly, the variable "female friends", which was significant in model 3, but not in the current model has a Z score of 1.93, which is approaching the critical zone of being equal to or greater than 1.96. The current model does not hold similar predictive value in variation of "drinks consumed per week in college" as the previous model, with R^2 values of 0.424 and 0.541, respectively.

H4: Even with the addition of impulsivity and recklessness, the survey instrument will account for more variation among male drinkers than female drinkers.

Tables 19 and 20 indicate that the current model did account for more variation among male drinkers (R^2=.364) than female drinkers (R^2=.289). Additionally, there was variation in significant indicators. For both genders, the variables "drinks per week in high school", "Greek Social Life", and "All friends" were significant indicators of weekly alcohol consumption in college. For female criminology and criminal justice majors, the variable "risk taking" also was a significant indicator of weekly alcohol consumption in college.

H5: The survey instrument will account for more variation among male binge drinkers than female binge drinkers.

This hypothesis also holds true, as there was a high correlation between average drinks per week and binge drinking episodes (r = .705, p < .01). Those who drink more per week on average tend to also have more binge drinking episodes. Therefore, the model has similar effects when examining either "binge drinking" or "average drinks per week in college". Table 7 supports this finding in that the significant indicators of heavy binge drinking (4 or more times monthly) were "drinks per week in high school", "male friends who drink", and "risk taking".

Chapter V discusses the policy implications and impact of these results. Each analysis is discussed, along with rationale for variation among the predicted hypotheses. Also, limitations of the current study are examined, along with potential future directions of additional studies.

CHAPTER V

DISCUSSION AND CONCLUSION

The current study aimed to enhance the coefficient of determination for underage drinking in college by combining the statistically significant indicators from a previous study about average drinks per week consumed by underage students with the additional plausible indicators of risk taking and impulsivity. The study also looked to examine policy influence, as there were increases in monetary fines for underage drinking at the parent university between survey three and the current study. Additionally, the current study looked to determine the generalizability of the predictive model by examining underage drinking behaviors of students at three additional universities across the Commonwealth of Pennsylvania.

Analysis One

The current study with the parent university population decreased the explained variance by 11.7% (from 54.1% to 42.4%). The same independent variables that were significant indicators of volume of alcohol consumption in college for the prior research remained significant in the current study (e.g., drinks per week in high school, friends who drink, gender, and Greek social membership). The addition of risk taking and impulsivity measures did not add to the explanatory power of the model as neither variable was a significant indicator of underage drinking at the college level for those who consume alcohol in college. Table 4 indicated that the variable "risk taking" was a significant indicator of underage drinking at the college level when comparing those who consumed alcohol to those who reported not consuming alcohol. Basically, those who drank underage in college reported significantly higher willingness to take risks when compared to non-drinkers. Those who did not drink in college also had significantly fewer friends who drank in college, did not drink in high school or drank lightly, and often were not members of Greek social

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organizations, which are three of the key variables associated with increased drinks per week in college. Table 7 indicated that those who reported fewer or no episodes of binge drinking per month, also had significantly lower scores on risk taking, as well as drinks consumed per week in high school and friends who drank. As deterrence operates on an individual's perceived fear, associated with personal and vicarious experiences, those who actually drink and those who drink heavy may not associate these activities as risky as they seldom are detected and punished compared to those who do not drink heavy or at all for fear of sanctions.

While there was a decrease in the variance explained, there was not a significant difference in predictive value between the previous study three model and the current model (see Table 12). Also, it would appear that consistent underage drinking is on the decline at the parent university, with 69% of students consuming at least one alcoholic drink per week (a difference of 10% from the previous study). The data suggest that this decline is not associated with fear of sanctions as only 11% of the total sample identified legal sanctions as a deterrent (39 of 347), which included 24% of non-drinkers (26 of 108) and 5% of underage drinkers (13 of 239). These findings lend support to the concept that those who drink and are not sanctioned find the activity less risky than those who do not drink.

For university 1, in the first study 79% of students surveyed reported underage drinking compared to 77% reported by PCCD for Pennsylvania. For this study, 69% of students surveyed reported underage drinking compared to 71% reported by PCCD for Pennsylvania. The participants in the two studies consumed alcohol underage similarly to those in their senior year of high school, as measured by PCCD. An issue for University 1 is that the PCCD data indicate that the western side of the Commonwealth has significantly more underage drinking reported by high school students (8th, 10th, 12th grades) than the eastern side of the Commonwealth.

Binge drinking episodes also were measured in the current study to determine if characteristics varied (see Tables 5-7). Overall, binge drinking episodes were highly correlated with average drinks per week ($r = .705$, $p < .01$) and provided similar model explanatory power. Put another way, the variables indicating increases in binge drinking episodes are those variables that also predict increased drinks per week in college. The strong association between binge drinking and consuming alcohol underage should be cautiously discussed as the definition of binge drinking offered by the CDC, places almost all drinkers in that category sometime during their life span, and one could be deemed a binge drinker but never have been intoxicated at a legal standard.

There was not a significant difference in predictive value between the findings for the earlier study and those of the current study. These findings suggest that harsher university underage drinking policies were not an effective deterrent in attempting to eliminate, reduce, or significantly decrease underage drinking behaviors at University 1. This coincides with the social viewpoints about the deterrent model, as 88.8% of the parent university sample did not believe an increase in underage drinking fines would deter underage drinking. There are some changes in drinking behavior, though, as the current model holds less explanatory power than the previous model and there is less weekly alcohol consumption.

A plausible explanation could be increases in drug misuse in the location of the parent university. Pennsylvania saw an increase in drug related deaths by 37% between 2015 and 2016, with a rate over double the national average (DEA Philadelphia Division and the University of Pittsburgh, 2017). This, along with the national attention about binge drinking deaths associated with college hazing, could have caused some students to turn away from high risk drinking behaviors and closer parental monitoring. Another explanation could be drug replacement, such as

poly-drug use or tobacco. Students may be using alcohol, tobacco, and other drugs, which also could put less focus on consistent binge drinking behaviors, in general.

A final explanation could be that the doubling of the fine for underage drinking across the Commonwealth has impacted high school drinking habits, which are strongly associated with college drinking habits. A reduction in volume of alcohol consumption in high school could be associated with a reduction of alcohol consumption in college. As noted, the percentage of those who reported drinking in college dropped by 10% and those who did report drinking in college, reported drinking less than those in previous studies conducted at the same university. For the current sample restricted to drinkers, 116 (49%) noted their parents approve of underage drinking, 197 (82.4%) stated their parents were aware that the student consumed alcohol, and 121 (50.6%) reported consuming alcohol in the presence of their parents. Parental teaching of responsible drinking habits may have impacted drinking levels when parents are not present at college.

The strongest indicator from the current parent university model, which is the same as the previous model, is average drinks per week in high school. Students who drink alcohol during their senior year of high school tend to either continue the same level of alcohol consumption, or a slightly higher level of alcohol consumption. This finding is indicative of past research, which indicates early users of alcohol being more prone to binge drinking and drunken behaviors later in life (Thombs & Briddick, 2000; Moss, Chen, & Yi, 2013). Early onset often leads to problematic substance use later in life, as well (Ashenhurst et al., 2015; Bachman et al., 1997; Strom et al., 2014). This behavior is problematic in regard to controlling college campus alcohol issues.

From the study, it appears many students already have established drinking abuse patterns prior to entering college. This is an issue at the point of application and admission. It also could be indicative of alcohol abusing high school students applying to colleges with a known party

atmosphere. This reputation could be highly problematic and could potentially perpetuate alcohol abuse issues on certain campuses. For this reason, stronger anti-drinking initiatives may need to be established at the onset of orientation. Also, any university known as a "party school" should try to reshape their campus image through advertising, recruitment, and other community efforts.

The second indicator from the current parent university model, which is the same as the previous model, is Greek life involvement. Research has indicated there is a certain efficacy with group following in social organizations (DeBard & Sacks, 2011). Greek life tends to provide more social opportunities, socials, and functions that may generally increase the availability of alcohol, thus increasing the temptation to abuse. Also, members of Greek life tend to be exposed to higher rates of peer pressure, which may be indicative of alcohol use (DeBard & Sacks, 2011). There are more pre-drinking party events at Greek life houses than non-Greek life houses (Paschall & Saltz, 2007). In addition, binge-drinking issues have remained a problem within Greek life housing, which is indicative of prevalent alcohol use (Chauvin, 2012; Ragsdale et al., 2012).

There are several plausible interventions available to curb alcohol abuse and reduce alcohol use in the Greek social life environment. One solution is more severe sanctions and suspensions for Greek social organizations, along with mandatory drug and alcohol training for Greek social life members and leadership. Annual "face to face" mandatory training for all Greek social life members about illegal "hazing" practices, binge drinking, contributing to the delinquency of minors, and the liability to the attendees and leadership could deter many issues. All Greek social life organizations requesting university recognition would be required not only to have a faculty adviser, but would agree to random safety inspections, especially at all social events, and these inspections would occur other than between 8:00 AM and 4:30 PM on week days. Greek social life organizational student leadership would be held responsible for all social activities hosted by the

organization, meaning the university could assess a fine to the leadership for actions committed by their members if the actions occurred as part of a Greek social life sponsored event. Basically, the certainty of detection and the certainty and severity of proportional sanctions being applied for abusing alcohol must be real with sanctions publicized. Policies and sanctions must be developed and aggressively enforced to address both those of legal age who binge drink and contribute to delinquency by giving alcohol to minors, as well as for those underage who consume any alcohol.

The third indicator from the current model, which is the same as the previous model, is gender. Males are likely to consume approximately two more drinks per week on average than females. This gender difference could be especially useful for policy making considering while males drink more, both genders have been shown to engage in elevated levels of risky behavior in Greek life (Brown-Rice, Furr, & Jorgensen, 2015) and for this sample, more males reported Greek social life membership than did females and non-drinking males.

The current model differs from the previous model with significant indicators of close drinking male friends and risk taking behaviors. Additionally, close drinking female friends was no longer a significant indicator in the current model. It also is recognized that the correlation between close male and female drinking friends was much higher in the current model compared with the previous model. This change may indicate that gender is beginning to neutralize in social influence regarding drinking behaviors. It is logical that those who have more male drinking friends tend to drink more, as males simply drink more than females, on average.

Regarding risk taking, it is established that males are more likely to engage in risk taking behavior than females (Byrnes et al., 1999; de Haan, Egberts, & Heerdink, 2015; Nolen-Hoeksema, 2004; Rounsaville, Kranzler, Ball, Tennen, Poling, & Triffleman, 1998). In the parent university sample, the mean risk taking measure was 17.76 for males and 15.71 for females. This

was not a significant difference, though, which could indicate general elevated risk taking characteristics as a proponent towards higher average drinking behavior, which was observed in the comparison between non-drinking and drinking students.

A final observation related to underage drinking at the parent university is "legal drinking age opinion". There is a significant difference in opinion between non-drinkers and drinkers about what should be the legal drinking age. For non-drinkers, 48 of 108 (44%) believed the legal drinking age should be 18 years of age; 45 of 108 (42%) believed the drinking age should be 21 years of age or older. For underage drinkers, 169 of 239 (71%) believed the drinking age should be 18 years of age; 41 of 239 (17%) believed the legal drinking age should be 21 years of age or older. These findings suggest that in some part, those who underage drink are at conflict with society and the university about the mandatory drinking age. Additional sanctions for underage drinking only fuels their beliefs about a suppressive and arbitrary age-related alcohol law used by society to assess maturity. University underage drinking policies might be more successful if they focused on the disadvantages of drinking irresponsibly, especially at a younger age, instead of primarily focusing on the legal aspects of getting caught for underage drinking.

Analysis Two

Examining criminology and criminal justice majors across Pennsylvania, 69% of the students sampled consume at least one alcoholic beverage per week. The model explained 42.4% of the variance in drinking behaviors. The new model retained the same significant variables as the initial parent university sample (average drinks per week in high school, Greek life involvement, and gender). The only observed change was close drinking female friends, which was a significant indicator in the earlier study was not statistically significant in the new model. Close drinking male

friends, which was not a significant indicator in the first model was a significant indicator in the new study.

Criminology and Criminal Justice Majors Gendered Models

There was a difference in explanatory power of models based on gender (Tables 18-20). For the overall sample (n=314) the model accounted for 39.8% of the variance in drinking behaviors. For male criminology and criminal justice majors (n=157), the model accounted for 36.4% of the variance in drinking behaviors, while only accounting for 28.9% of the variance in drinking behaviors for female criminology and criminal justice majors (n=157). For both the male and female models, drinks per week during high school, a sum of all friends who drink (five closest male and five closest female), and Greek life involvement were significant indicators of drinks consumed per week in college. Risk taking behaviors was a significant indicator for females only.

An independent sample *t* test with the grouping variable "gender" was conducted to assess for significant differences in the variables of interest (college and high school drinks per week, friends who drink, Greek life, parental approval, risk taking, and impulsivity). The test revealed that on average, males in college drank five drinks per week more than females. The same was true for high school drinks per week, where males drink on average 2.8 more drinks per week than females. Males have significantly more college friends who consume alcohol (9.2 for males compared to 8.6 for females – of five closest male and female friends). For risk taking, males had an average score of 18.5, compared to 16.3 for females (p=.013). There were no statistical differences between genders related to Greek life, parental approval, or impulsivity.

When using Logistic regression to assess females who drink (n=157) compared to females who did not drink (n=75) in the past 30 days, only the number of female friends who drink (4.38

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for drinkers, 2.71 for non-drinkers), the number of male friends who drink (4.19 for drinkers, 2.29 for non-drinkers), and parental approval (1.87 for drinkers, 1.28 for non-drinkers) were significantly different. When using Logistic regression to assess males who drink (n=157) compared to males who did not drink (n=39) in the past 30 days, only the number of high school drinks per week (4.73 for drinkers, 0.62 for non-drinkers), the number of female friends who drink (4.59 for drinkers, 2.49 for non-drinkers), and risk taking (18.5 for drinkers, 12.6 for non-drinkers) were significantly different.

For females, parental approval was a significant indicator of whether to drink underage. Parental approval scores associated with underage drinking were comparable between male and female drinkers (1.97 for males, 1.87 for females) and between male and female non-drinkers (1.26 for males, 1.28 for females), but were only significant for the female model. This indicator was replaced by risk taking when assessing why males refrain from drinking, but again similar scores were identified between the groups (18.52 for males, 16.25 for females) and between male and female non-drinkers (12.62 for males, 13.73 for females).

This observation may be related to both formal and informal social controls. Males who were interested in moving into the criminal justice field during high school may have been warned by parents and others about difficulties in obtaining future employment if they were to be in trouble with the law. Contrary to these warning, parental acceptance of underage alcohol use is highest for male drinkers. With the informal social control of parental disapproval marginalized, male underage drinkers define underage drinking as more of a risk of being caught violating formal social norms; thus, risk taking replaces parental attitudes about underage drinking for those males who consume alcohol. Additionally, research has demonstrated that parents who are more accepting of underage drinking tend to have normative drinking patterns themselves, which has a

trickle-down influence on children (Song, Smiler, Wagoner, & Wolfson, 2012). The normative

behavior downplays the heightened risk, whether for future career paths or socialness.

Criminology and Criminal Justice Majors by University

Criterion variables were created for each university to directly compare the regression

models for significant model and predictor variations between each university. Approximately

69% of students at the parent university have consumed alcohol in the past 30 days, which was

comparable to those students at university 3 (69%). Students from universities 2 and 4, who

reported to have consumed alcohol in the past 30 days were higher (university 3 at 80%, university

4 at 91%). University 4 was the only urban university sampled and university 2 is the only

university of the four located in a county identified by the PCCD for heavy underage drinking. For

these two universities, there may be environmental factors at play regarding normalized underage

drinking behaviors.

The Fisher's Z test revealed there were significant differences in model fit between the four

different universities. The parent university model was most similar in fit to university 3 (medium

sized, public, rural university with a high minority representation in northeastern Pennsylvania).

Universities 2 (medium sized, public, rural university located near the parent university in

southwestern Pennsylvania) and 4 (large, public, urban university located in southeastern

Pennsylvania) were similar in fit to one another. This is surprising, as it was expected that the

parent university would be similar in model fit to university 2 since they are located within the

same region of the state. Additionally, the model had the most explanatory power at university 4

($R^2 = .674$), with university 2 ($R^2 = .552$) as a close second.

The model comparisons suggest there are environmental and social variations in pathways

towards drinking behaviors. The universities had different significant indicators that influence

variations in drinking patterns, along with holding different model explanatory powers. Since a rural, southwestern university and an urban, southeastern university are most similar in explanatory power and indicators, variations in university social structures may be important in the pathway towards underage drinking. These variations also suggest the need for more individualized policies and preventative structures by university, opposed to the current blanketed approach across the state system.

The only variable that was a significant indicator across all four university models was average drinks per week during high school. This indicator consistently has been significant across different samples, populations, and time periods, as well. Universities have programs and policies in place against underage and binge drinking once the students are part of the campus population. Based upon the various sample results, it strongly is suggested that universities need to somehow focus on the incoming student populations prior to their integration into the college atmosphere. Anti-drinking programs and activities during campus visits and orientation events could assist in curbing underage drinking progression once the semester starts. Additionally, universities could focus on recruitment pools and procedures. For example, universities could examine the typologies of students attracted to their universities and direct efforts to provide more structured advertising and recruitment focuses to begin to address binge-drinking issues at a very early stage. It also could be useful to focus on first semester freshman social attractions that potentially lead to excessive drinking. By combining these efforts, universities potentially could recognize high-risk drinkers at a pre-college start and make efforts to curb problematic behaviors at early onset in academic careers.

Gender was a significant indicator of drinks consumed per week in college at all universities except university 3. At university 4, the unstandardized regression coefficient for

gender indicated that males drank five more drinks per week than females, while controlling for all the other variables. At university 1 and university 2 respectively, the unstandardized regression coefficients for gender indicated that males drank 2.2 and 3.4 more drinks per week than females, while controlling for all the other variables. University policies should take advantage of this finding by promoting abstention from underage drinking, while recognizing the positive medical and social aspects of responsible drinking. An aggregated set of sanctions, which include verbal reprimands through dismissal should be based on Blood Alcohol Concentrations (BACs) instead of whether alcohol was consumed. Underage drinking should be proportionally punished, instead of a one size fits all set of sanctions. Students may not refrain from alcohol use, but would understand there are more severe sanctions, including dismissal, for alcohol abuse.

Greek life involvement was a significant indicator in two of the four models, which were the two universities located on the western side of the Commonwealth. Friends who drink (university 1) and risk taking behaviors (university 2) were significant indicators at only one of the universities. The Brame et al. (1998) Z test revealed there were significant differences in the indicators of average drinks per week in high school, Greek life involvement, and gender between the four university models. The variations in model explanatory power, along with the three variables mentioned being inconsistent in predictive quality across universities, suggest environmental and social variations across the campuses. For example, upon deeper examination, the parent university and universities 2 and 4 have approximately 12-13% of their undergraduate campus population involved in Greek life. At university 3, only 5% of the campus population is involved in Greek life. Going back to the model comparisons, university 3 was the only model where Greek life involvement was not a significant indicator. The lower Greek life involvement at university 3 may demonstrate differences in social dynamics compared to the other universities.

Additionally, risk taking behaviors being a significant indicator only at university 2, may be associated with that county being the only one identified of the four by PCCD as a high undergraduate drinking county; thus, the plausibility of more enforcement of underage drinking by law enforcement and liquor control officers. These indicator differences are another reason as to why universities need more individualized focus associated with developing underage drinking deterrents, as the populations are behaving differently and seem to have additional outside influences not captured through this study.

Conclusions

The study attempted to examine personality characteristics and behaviors in comparison to underage drinking behaviors by surveying criminology and criminal justice majors across various universities within Pennsylvania. Since criminology and criminal justice majors exhibited different underage drinking behaviors than other majors in a previous study, the focus of this study was to examine personality characteristics associated with an attraction to being a criminology and criminal justice major (risk taking and impulsivity), along with examining the generalizability of patterned drinking behaviors among underage, undergraduate students across Pennsylvania.

Overall, risk taking and impulsivity characteristics did not aide in model explanatory powers as much as expected. Risk taking behaviors was a significant indicator of weekly alcohol consumption in only one of the student populations examined. Specifically among criminology and criminal justice majors, risk taking was a significant indicator overall, but then varied among gender and university. Impulsivity was not a significant indicator of drinking behavior in criminology and criminal justice majors overall and in three of the four regression models impulsivity had a negative slope (lower impulsive behavior, more drinks per week consumed). There were not significant differences in risk taking and impulsivity by gender of criminology and

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criminal justice students, either. First, these results suggest personality characteristics only provide a loose connection in college major choices. Second, the variations in model predictor significance of risk taking and impulsivity behaviors without significantly different averages among gender, major and university populations suggest that these behaviors might not be as highly related to excessive drinking as previous research suggests (Cheng, Cantave, & Anthony, 2016; De Haan, Egberts, & Heerdink, 2015; Egan & Moreno, 2011; Fernie et al., 2013; Harris et al., 2006; Kazemi et al., 2011; Nguyen et al., 2011).

The study also found that although the survey instrument appeared to have external validity with R^2s for the four universities ranging from .371 to .674, the model was not generalizable outside of the parent university population. Although the results remained comparable at the parent university, the model held varying explanatory power at other universities across Pennsylvania, with different model indicators. First, the results demonstrate a need for different approaches in policy and programs to curb excessive drinking behaviors. An increase in fines for underage drinking at the parent university, demonstrated no significantly different patterns in drinking behaviors; although, the sanctions at the Commonwealth level may have deterred high school drinking patterns, which are displayed as the 10% reduction in students who drink at the parent university. Also, the university models were significantly different, suggesting each university student population behaves differently and displays varying pathways towards underage drinking. These results suggest that more individualized approaches tailored for a specific university would likely be more beneficial than a universal policy and program approach.

Consistent with the previous study, there were significant differences in gendered pathways towards drinking. The model had more explanatory power for male criminology and criminal justice majors compared to females. Males were more influenced by peers, while females were

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more influenced by heightened risk taking behaviors. A continued focus on gendered pathways towards drinking would be useful, along with individualized environmental approaches, to provide the most assistance to produce effective policy and program approaches.

Future directions

This study suggests there are variations in personality and behavioral patterns towards drinking behaviors. The main consistent indicator in variations in drinking behavior in college is drinking behavior in high school. There are studies in place that monitor high school drinking and college drinking patterns, respectively, but there does not seem to be a focus on the transition in between. A longitudinal study tracking high school seniors through their freshman year into college could be beneficial to pinpoint key elements into the likelihood towards binge drinking.

Additionally, it may be important to examine variations in binge drinking behavior. While this study showed a high correlation between average weekly drinking and binge drinking episodes, it may be important to compare those with excessive binge drinking episodes to those with minimal binge drinking episodes. The findings for this study (tables 5 – 7) suggest higher episodes of binge drinking were associated with high school drinks per week, male friends who drink, and risk taking. Additional research is beginning to focus on potential differences of high intensity drinkers from low intensity and it would be interesting to test those differences using the model from this study (Patrick & Terry-McElrath, 2017).

Along with examining differences in high intensity drinkers from low intensity, it is suggested that prolonged high intensity drinking through college begins with excessive high school drinking patterns (Patrick & Terry-McElrath, 2017). Also, it is known that excessive drinking begins to decrease and stabilize after one becomes of legal drinking age. It would be potentially fruitful to compare models of those of legal drinking age in college to those below legal drinking

age in college to determine if there are differences in model characteristics. This assessment could give insight into the influence of prolonged factors and variations in causes of continued excessive drinkers versus those who taper once of legal age.

Lastly, it was mentioned earlier the potential of poly-drug use being a factor in the overall decrease in weekly drinking behaviors. A future study could address this by examining varying types of drug use (both illicit and non-illicit) to determine if that plays a role into drinking characteristics. An association with drug use also could be a factor in the suggested behavior differences in the model, as well. It may be important to examine poly-drug use to determine what types of drugs are being used in combination with alcohol, as well, and whether that varies by environment.

Limitations

While the study provides insight into variations in gender and other behavioral patterns towards drinking, the results should be interpreted with caution. First, the sample size of the parent university was adequate, but the sample sizes at the comparison universities were much smaller. Criterion variables were constructed to compare regression models using the parent university sample to control for Type I and II errors, but it would be beneficial to obtain larger sample sizes to determine if the results from this study could be replicated.

Additionally, it is recognized that criminology and criminal justice majors could be a unique population and display differences in indicators than other college majors. A more diverse population of students would be needed to make stronger conclusions about behavioral drinking patterns. It would be beneficial to obtain samples of other majors from the comparison universities to provide a more accurate picture of potential generalizability.

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Appendix A

Class Listings

University A				University B		
Class	Level	Enrolled		Class	Level	Enrolled
1	Sophomores	35		1	Sophomores	37
2	Sophomores	38		2	Sophomores	37
3	Sophomores	37		3	Sophomores	35
4	Sophomores	36		4	Sophomores	36
5	Sophomores	35		5	Sophomores	37
6	Sophomores	35		6	Sophomores	35
7	Sophomores	36		7	Sophomores	31
8	Sophomores	37		8	Sophomores	32
9	Sophomores	38		9	Junior	31
10	Junior	32		10	Junior	30
11	Junior	32		11	Junior	30
12	Junior	34		12	Junior	30
13	Junior	35		13	Junior	42
14	Junior	36		14	Junior	33
15	Junior	36		15	Junior	33
16	Junior	34		16	Junior	32
17	Junior	35		17	Junior	30
18	Junior	35		18	Junior	30
19	Junior	32		19	Junior	31
20	Junior	33		20	Junior	30
21	Junior	33		21	Junior	30
22	Junior	36				
23	Junior	36				
24	Junior	18				
25	Junior	19				
26	Junior	23				
27	Junior	29				
28	Junior	30				
29	Junior	27				

University C				University D		
Class	Level	Enrolled		Class	Level	Enrolled
1	Sophomores	35		1	Sophomores	22
2	Sophomores	33		2	Sophomores	26
3	Sophomores	20		3	Sophomores	30
4	Sophomores	23		4	Junior	23
5	Junior	30		5	Junior	24
6	Junior	28		6	Junior	22
7	Junior	18		7	Junior	22
8	Junior	30				
9	Junior	28				
10	Junior	29				
11	Junior	30				
12	Junior	29				
13	Junior	30				
14	Junior	30				
15	Junior	28				

Appendix B

Letter to Professor

(IUP Letterhead)

Dear Dr./Professor _____,

My name is Shavonne Arthurs and I am a Criminology student in the criminology department at Indiana University of Pennsylvania. I am writing to solicit your assistance in collecting data for my dissertation project. The university/class you are currently instructing, _____, was selected for participation.

My study focuses on student's alcohol use and possible predictors of alcohol use. Surveys will be used to ask the students about their previous and current alcohol use, along with characterisitics associated with alcohol use. A copy of the survey is attached for your preview, along with the student consent form. The Institutional Review Board for the Protection of Human Subjects at IUP has approved the study and every precaution will be taken to ensure the anonymity of the studetns. The students will be briefed prior to their completing the survey to ensure they are over 18 years of age and that they are aware that participation is purely voluntary. The students also will be given information about whom they can contact if they have any concerns.

Being a graduate student in the Criminology Program, I fully understand the importance of class time, especially as the semester draws to a conclusion. The entire process from introduction to conclusion should last less than 15 minutes and the entire class will be asked to participate, minus those who are under 18 years of age. The survey will be administered on the date and time established by you. Understanding that class time is at a premium, I can fully understand if you cannot support this request. I would deeply appreciate a response, even if you are unable to support the request, 1) to be sure you received the request and 2) so a replacement class can be identified in a timely manner.

I have listed the contact information for my faculty advisor and myself should you have any additional questions. Again, any assistance you can provide will be deeply appreciated.

Sincerely,

Shavonne Arthurs   Dr. John A. Lewis
Doctoral Candidate   Associate Professor
Department of Criminology   Department of Criminology
G-13 Wilson Hall   202 Wilson Hall
Indiana, PA 15705   Indiana, PA 15705
(724) 357-1247   (724) 357-5604
Email: nrsk@iup.edu   Email: j.a.lewis@iup.edu

Appendix C

Letter of Consent

(IUP Letterhead)

IUP Department of Criminology
Wilson Hall, Room 202
Indiana, Pennsylvania 15705

Dear Student,

You are invited to participate in a research study. The attached survey is designed to gather information about different topics related to alcohol use. The answers and personal data you provide will be analyzed and reported only in a group format (aggregate). Once your survey is completed and placed with other completed surveys, all the data will be examined and the responses will be totaled. Even the researchers will not be able to identify individual survey participants.

Your participation is completely voluntary. You may choose to withdraw or not participate at anytime simply by stopping where you are in the survey and leaving the remainder of the survey blank. If you decide not to participate or if you are under the age of 18 years old, please remain seated at your desk and turn the blank or partially completed survey in when the completed surveys are collected. Again, if you are under the age of 18, do not complete this survey. Though your perceptions remain important, statutory regulations prohibit our solicitation of your responses.

There are no known risks for participating in this research. THIS PROJECT HAS BEEN APPROVED BY THE INDIANA UNIVERSITY OF PENNSYLVANIA INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS (PHONE 724-357-7730). Also, there will not be any penalty for non-participation. There will be no benefit for participating other than to assist the researcher. Your participation is anonymous and all information will be held in the strictest confidence. Participation or non-participation will not have any effect on your grade in this course or any other courses.

Other than for the personal data located on the back of the survey, please do not put your name or any other identifying information on the survey. The personal data are requested only for the research proposed. If you are not comfortable completing the personal data portion of the survey, please complete only the questions and submit the form without entering your personal data. All completed surveys will remain secured and only the researcher and her faculty mentor will have access to them.

If at any time you have questions, please ask. You can contact Shavonne Arthurs or Dr. John Lewis at the address or telephone numbers listed below.

Your participation in this survey is very important to us. Please follow the direction provided on the survey and if you have any questions while completing the survey as to the specific meaning of a question, feel free to ask the person administering the survey. Respond to all the questions honestly, there are no right or wrong answers.

Thank you for your assistance in this research.

Sincerely,

Shavonne Arthurs (724-357-1240)
John Lewis, Ph.D. (724-357-5604)
Department of Criminology
202 Wilson Hall
Indiana University of Pennsylvania
Indiana, PA 15705

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Appendix D

Alcohol Assessment Survey

Do not complete this survey if you are under the age of 18. Though your perceptions remain important, regulations prohibit our solicitation of your responses without parental consent.

Instructions: Carefully read each question, answering them as accurately as possible.

For this study, a drink refers to an alcoholic beverage and is defined as a 12 ounce beer, 6 ounces of wine, or one ounce of distilled spirits (hard alcohol). For example, if a person drank one 40 ounce Fosters, it would actually be considered 40/12 = 3.33 drinks; similarly, a 12 ounce Long Island Ice Tea equals two drinks, as do doubles and 12 ounce wine coolers.

Please circle your response for questions 1 – 7.

1. Have you ever consumed alcohol since enrolling in college?   Yes   No

2. Have you consumed alcohol in the past 30 days?   Yes   No

3. Have you consumed alcohol in the past week?   Yes   No

4. Did you consume alcohol when you were in your senior year of high school? Yes   No

5. My parents approve of underage drinking as long as no one gets in trouble. Yes   No

6. I have consumed alcohol with my parent's knowledge.   Yes   No

7. I am allowed to consume alcohol at home.   Yes   No

Please provide your best estimate for questions 8 – 14.

8. On average, how many drinks of alcohol do you currently consume per week?   ____

9. On average, how many drinks of alcohol did you consume per week as a HS senior?   ____

10. Of your five closest male friends at college, how many consume alcohol?   ____

11. Of your five closest female friends at college, how many consume alcohol?   ____

12. Of your five closest male friends in HS, how many consumed alcohol?   ____

13. Of your five closest female friends in HS, how many consumed alcohol?   ____

14. In general over a 30 day period, how many times will you consume four or more   ____
     alcoholic drinks at one setting (during one party or event).

On a scale from 1 – 10, with 1 being "strongly disagree" and 10 being "strongly agree", please answer questions 15 - 17.

15. I like to test myself every now and then by doing something a little risky.   ____

16. I often do whatever brings me pleasure here and now, even at the cost of some   ____
     distant goal.

17. Sometimes I will take a risk just for the fun of it.   ____

Please complete the questions on the reverse side

On a scale from 1 – 10, with 1 being "strongly disagree" and 10 being "strongly agree", please answer questions 18 - 22.

18. I much prefer doing things that pay off right away rather than in the future.   ____

19. Excitement and adventure are more important to me than security.   ____

20. I am more concerned about what happens to me in the short run than in the long   ____
    run.

21. I sometimes find it exciting to do things for which I might get in trouble.   ____

22. I do not devote much thought and effort to preparing for the future.   ____

Please provide your response for questions 23 – 30.

23. Currently the legal drinking age is 21, in your opinion at what age should it be   ____
    legal to purchase and consume alcohol?

24. Pennsylvania raised the underage drinking fine from $300 to $500. The college   **Yes No**
    has raised the underage drinking fine from $150 to $300. Raising these fines
    will deter underage drinking. (please circle one)

25. Are you a member of a Greek Social Fraternity or Sorority? (please circle one)   **Yes No**

26. Which of the following do you most often use to obtain alcohol? (check only one)

____ older student ____ false ID ____ parent ____ friend (not a student)

____ other (Please briefly explain) _____

27. Gender (please circle one)   Female   Male

28. Age in years at your last birthday _____

29. Current major _____

30. (Answer this question only if you have not consumed alcohol since enrolling in college.

   Which answer best describes the reason you do not drink alcohol (choose only one)?

____ legal reasons ____ medical reasons ____ personal reasons ____ religious reasons

____ other (If "other" Please briefly explain) _____

Thank you for your participation.