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A New Frontier of the College Alcohol Culture: #SocialMedia

Tammy M. Turner

ACCEPTANCE

This dissertation, A NEW FRONTIER OF THE COLLEGE ALCOHOL CULTURE: #SOCIALMEDIA, by TAMMY MARION TURNER, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree, Doctor of Philosophy, in the College of Education and Human Development, Georgia State University.

The Dissertation Advisory Committee and the student's Department Chairperson, as representative of the faculty, certify that this dissertation has met all standards of excellence and scholarship as determined by the faculty. The Dean of the College of Education and Human Development concurs.

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Tammy Marion Turner

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A NEW FRONTIER OF THE COLLEGE ALCOHOL CULTURE: #SOCIALMEDIA

by

Tammy M. Turner

Under the Direction of Daphne Greenberg

ABSTRACT

The college alcohol culture glorifies high-risk drinking while minimizing potential negative consequences. A social ecological framework can be used to understand the college alcohol culture in institutions of higher education (IHEs) because the framework provides a synergistic tapestry of multiple factors such as: individual, institutional, and environmental. The role of social media is important to explore as social media has created a new frontier for college students to navigate throughout their college experience.

The social ecological framework was used as a guide for this study; to explore the college alcohol culture within social media, specifically Twitter. The tweets in IHE hashtags provided a unique opportunity to simultaneously examine individual, institutional, and environmental factors. The publicly available tweets were retrieved during a college football season because of the growing trend of alcohol sales at college football stadiums. The sample included the IHEs represented in the 2014 football tournaments: Historically Black College and University (HBCUs) Classics, the College Football Bowl, along with the National College Athletic Association (NCAA) Division II and III Football Championships. Tweets found in the identified

IHE hashtags were used to examine the frequency of alcohol reference terms along with the association to institutional and environmental factors of the college alcohol culture. A quantitative research design was employed, using factor analyses and hierarchical linear modeling. The factors examined in this study included: individual (i.e., alcohol related risk and protective behaviors), institutional (i.e., size of the student population, the NCAA division, and the HBCU affiliation), and environmental (i.e., alcohol sales, availability, and advertising). The majority of the identified IHE hashtags had at least one alcohol reference term in the tweets. Most of the tweets referenced a type of alcohol; beer was the alcohol reference term found most often in the tweets of the identified IHE hashtags. Institutional factors accounted for some of the difference in the frequency of terms. The environmental factor of alcohol sales during football games did not account for a significant amount of variance among the frequency of alcohol terms in the hashtags. Future research and implications for practice are discussed.

INDEX WORDS: Alcohol, College alcohol culture, College students, Social media, Twitter, Hashtags

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ABBREVIATIONS

ABI	Anheuser-Busch InBev
BAC	Blood Alcohol Content
HBCU	Historically Black College and University
HLM	Hierarchical Linear Modeling
ICC	Intraclass Correlation
IHEs	Institutions of Higher Education
NAIA	National Association of Intercollegiate Athletics
NCAA	National Collegiate Athletic Association
NIAAA	National Institute on Alcohol Abuse and Alcoholism
PWI	Predominately White Institutions
RTs	Retweets

THE COLLEGE ALCOHOL CULTURE

The college alcohol culture has demonstrated consistent trends since the late 1980s with the majority of college students drinking alcohol, and 35% engaging in high-risk drinking (Blinn-Pike, Worthy, Jonkman, & Smith, 2008; Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2014; Johnston et al., 2018; White, Labouvie, & Papadaratsakis, 2005). The rates of high-risk drinking among college students tend to be higher than those of non-college students (O'Malley & Johnston, 2002; Blinn-Pike et al., 2008; White et al., 2005; White, Kraus, & Swartzwelder, 2006). A national objective for Healthy Campus 2020 and a health priority for most institutions of higher education (IHEs) is the reduction of high-risk drinking and its associated negative consequences among college students (American College Health Association, 2012; Hingson, 2010).

High-Risk Drinking within the College Alcohol Culture

High-risk drinking is quantified as the consumption of five or more drinks in a row for men and four or more drinks in a row for women at least once in the past two weeks (National Institute on Alcohol Abuse and Alcoholism, 2017; Wechsler & Nelson, 2001). Nationally, one in five college students engage in frequent high-risk drinking (i.e., three or more times in a two-week period) and these drinkers consume most of the alcohol on campuses (Wechsler, Molnar, Davenport, & Baer, 1999). Multiple individual, institutional, and environmental factors contribute to the college alcohol culture of high-risk drinking (DeJong et al., 1998). For example, students' behaviors (i.e., alcohol related risk and protective) are individual factors (Nelson & Winters, 2012) and National Collegiate Athletic Association (NCAA) division, size of the student population, and Historically Black College and University (HBCU) affiliation (Weschler, Davenport, Dowdall, Moeykens, & Castillo, 1994) are institutional factors associated with the

college alcohol culture. Environmental factors like alcohol sales, availability, and advertising are associated with students' initiation of high-risk drinking and contribute to the college alcohol culture (Weitzman, Nelson, & Wechsler, 2003). The growth of social media has been exponential among college students and the evolving research suggests a relationship between the college alcohol culture and social media (Groth, Longo, & Martin, 2017).

The social ecological framework, used in the 2002 National Institute on Alcohol Abuse and Alcoholism (NIAAA) report, provides a comprehensive approach to acknowledge the interdependence of individual, institutional, and environmental factors on the college alcohol culture of high-risk drinking. The purpose of this paper is to utilize this framework to describe and understand the college alcohol culture of high-risk drinking and the relevancy of social media to this culture. The paper will include a brief description of the social ecological framework followed by a description of individual (i.e., alcohol related risk and protective behaviors), institutional (i.e., size of the student population, the NCAA division, and the HBCU affiliation), and environmental (i.e., alcohol sales, availability, and advertising) factors associated with the college alcohol culture. The final section will focus on the role of social media. The paper will conclude with a summary of the research, as well as the limitations of and gaps in the current available literature.

Social Ecological Framework

The social ecological framework was derived from the paradigm shift in the 1970's to explain human growth and development beyond individual factors (Bronfenbrenner, 1994) and has been applied to explain the multiple factors of influence on individuals' health behavior (Sallis, Owen, & Fisher, 2008). Ecological models highlight the bidirectional interaction between an individual and the environment (Sallis et al., 2008). All ecological models of health

promotion include the same basic principles: individuals influence their health behaviors, health behaviors are influenced by social and environmental factors, and the environment is multidimensional with more than one factor explaining health behaviors (Stokols, 1992; 2003). Matryoshka dolls, or Russian nesting dolls, have been used as an illustration of the environments' multiple systems of influence (Bronfenbrenner, 1994). The degree of influence of the multiple factors in the environment, on an individual's health behavior, is variable (Stokols, 1992; 2003).

The social ecological framework illustrates that people are producers as well as products of the environment; unhealthy behaviors can be cultivated and maintained through social reinforcement and environmental cues (Bandura, 2001). Individual, institutional, and environmental factors influence the student and the college alcohol culture. A description of these factors and their relationship to the college alcohol culture follows. Negative consequences associated with high-risk drinking on college campuses are associated with each factor and a summary of consequences follows each factor.

Individual Factors

An individual's influence on their own alcohol related behavior has been the focal point of the alcohol research, with a relatively long history in the alcohol research. The purpose of the first alcohol study with college students was to evaluate the mandatory health education curriculum, infused into the public schools because of the Temperance Movement, based on individual factors (e.g., gender) associated with the rate of student drinking (Straus & Bacon, 1953). The health education curriculum focused on the individual; specifically, informing students about the evils of alcohol, "for their own good" (Russell, 1970, p. 438). The individual factors, used to describe differences among groups of college students, have maintained a

consistent trend since the late 1980s. Male college students tend to have a higher prevalence of high-risk drinking compared to female college students (O'Malley & Johnston, 2002; Nelson, Xuan, Lee, Weitzman, & Wechsler, 2009; Schulenberg et al., 2017). White (non-Hispanic) students have consistently had the highest rates of high-risk drinking, African American students the lowest and Hispanic students with intermediate rates (O'Malley & Johnston; Schulenberg et al., 2017).

Students are the core of the college alcohol culture. Interventions to address students' cognitive-behavioral skills are a foundational component of prevention efforts at IHEs (Larimer & Cronce, 2002; Cronce & Larimer, 2011); for example, increasing protective behaviors and decreasing risk behaviors among students (Dimeff, Baer, Kivlahan, & Marlatt, 1999; Jessor & Jessor, 1977; Jessor, Van Den Bos, Vanderryn, Coasta, & Turbin, 1995; Walters & Baer, 2006). Protective behaviors (e.g., limiting the number of drinks or designating a sober driver) are actions that decrease the likelihood of a person engaging in a risk behavior (i.e., high-risk drinking) or experiencing the negative consequences associated with a risk behavior (Hawkins, Catalano, & Miller, 1992). The more protective behaviors a person uses, the less likely they are to engage in risk behaviors or experience the negative consequences associated with the risk behaviors (Jessor et al., 1995). Risk behaviors (e.g., drinking games) are those actions that increase the likelihood of a person engaging in a problem behavior like high-risk drinking (Jessor & Jessor, 1977; Jessor et al., 1995). Risk behaviors can be mediated to reduce the negative consequences (Hawkins et al., 1992).

Protective behaviors. Protective behaviors are actions that curtail high-risk drinking and the associated negative consequences (Martens et al., 2005). A recent study with students from two IHEs noted students' use of protective behaviors, before an event like a football game or

nightclub (i.e., pre-gaming), decreased the students' motivation to consume alcohol (Montes, LaBrie, & Froidevaux, 2016). Examples of protective behaviors include eating before drinking, eating during a drinking episode, avoiding drinking games, and having a designated sober driver (American College Health Association, 2016; Martens et al., 2005). Most college students use at least one protective behavior some of the time (Haines, Barker, & Rice, 2006). Students report drinking less (LaBrie, Lac, Kenney, & Mirza, 2011) and experiencing fewer negative consequences when using a protective behavior (Araas & Adams, 2008; Delva et al., 2004; Haines et al., 2006; Martens et al., 2005; Ray, Turrisi, Abar, & Peters, 2009).

One of the most frequently reported protective behaviors among college students is using a designated driver after drinking (DeJong & Winsten, 1999; Delva et al., 2004). Organizations like Mothers Against Drunk Driving (2018) have advocated for designated driver programs since 1980 and their efforts have contributed to the reduction in the number of fatal alcohol related car crashes. A designated driver is a person who agrees to abstain from consuming alcohol and drives for one or more people who have been drinking; typically, less alcohol is consumed among the group (Barr & MacKinnon, 1998). Contrary to early critics of the designated driver program, the amount of alcohol consumed by people using a designated driver is not significantly greater than the amount of alcohol consumed by people not using a designated driver (Glindemann, Clarke, & Hargrove, 2004). Among college students, a significant decrease in students reporting driving after drinking was seen between 1997 and 2005 (Nelson et al., 2009).

Risk behaviors. Among college students, drinking to get drunk, participating in drinking games, and driving under the influence of alcohol are common risk behaviors (Chen, Yi, & Faden, 2015; National Institutes of Health, 2016). An increase in a person's blood alcohol

content (BAC) is an inherent outcome of the first two activities and associated with health consequences like getting sick, blacking out, or alcohol poisoning (National Institutes of Health, 2016). Consuming a large amount of alcohol in a short amount of time, to the point of reaching a BAC of .08 within two hours poses health risks to an individual (National Institute on Alcohol Abuse and Alcoholism, 2017). In addition to health risks, legal impairment is defined as a BAC of .08 or higher in all 50 States, the District of Columbia and Puerto Rico (National Highway Traffic Safety Administration, 2017). College aged drivers account for the highest percentage of fatal crashes among drunk drivers (National Center for Statistics and Analysis, 2015).

Getting drunk is reported as a primary reason to drink among college drinkers (Wechsler et al., 2002) and 40% of college students report having been drunk (Johnston et al., 2014). Multiple studies have identified members of Greek letter organizations as the most likely group to engage in high-risk drinking (Borsari, Hustad, & Capone, 2009; Mallett et al., 2013). First year students are another population of concern among IHEs because of the prevalence rate of drinking with the purpose to getting drunk (Boekeloo, Novik, & Bush, 2011). The phenomena of drinking to get drunk is also more common among men compared to women (White et al., 2006). High-risk drinkers tend to consume most of the alcohol on campus; as much as 68% of the alcohol (Wechsler et al., 1999).

Driving under the influence of alcohol, among college students, has declined since a peak of 38% in 2001 yet the rates remain higher than non-college students (Hingson, Zha, & Smyth, 2017; Paschall, 2003). One study with college students observed an increase in reported driving under the influence, driving after using any alcohol, and riding with a driver under the influence when students turned the legal drinking age (Beck et al., 2010). Some of the factors associated with alcohol impaired driving among college students include: identifying as male, belonging to

a fraternity, engaging in high-risk drinking, and perceiving impaired driving as socially acceptable (LaBrie, Kenney, Mirza, & Lac, 2011). Even though most students use a designated driver (Glascoff, Knight, & Jenkins, 1994; Martens et al., 2004) the risk factors associated with the misuse of a designated driver are like the risk factors of an impaired driver. Most students agree the designated driver should never drink (Glascoff et al., 1994) and college students serving as designated drivers tend to have lower BACs compared to non-designated drivers (Timmerman, Geller, Glindemann, & Fournier, 2003). However, among high-risk college drinkers the designated drivers tend to have consumed some alcohol (Barr & Mackinnon, 1998) and among college men the designated driver is often only the least intoxicated person of the group (Timmerman et al., 2003).

Drinking games are also common among college students and are associated with high-risk drinking and negative consequences (Borsari, 2004; Moser, Pearson, Hustad, & Borsari, 2014). Similarities of the different types of games include: taking place during a social event, having specific rules, consuming large amounts of alcohol, and completing cognitive or motor tasks (Zamboanga et al., 2013). Chance and competition are two types of drinking games. Chance games do not involve any specific skill but rather involve taking turns (e.g., dice) and are more common among women, non-White, and non-Greek-letter organization students (LaBrie, Ehret, & Hummer, 2013). Male, White, and Greek-letter organization students are more likely to participate in competitive and consumption games (LaBrie et al., 2013). Competitive games include beer pong and flip cup; consumption games include keg stands and chugging competitions (LaBrie et al., 2013). Chance style games tend to lead to the consumption of high levels of alcohol, consequently high levels of BAC, based on simulated drinking game research (Cameron, Leon, & Correia, 2011).

Individual consequences. Memory loss, shame, and embarrassment are consequences reported by students participating in drinking games (LaBrie et al., 2013) but for some students the consequences serve as a badge of honor for participating in the game (Polizzotto, Saw, Tjhung, Chua, & Stockwell, 2007). The individual level consequences associated with high-risk drinking, occurring to the drinker or the non-drinker, are not always considered negative by students (Mallett, Bachrach, & Turrisi, 2008). In fact, students who view alcohol as an integral part of the college experience indicate that college is the time for individuals to have the freedom and flexibility to consume a lot of alcohol with minimal attention to the negative consequences (Crawford & Novak, 2006). Experiencing a negative consequence associated with high-risk drinking does not necessarily mean a student will define their own drinking as high-risk. In one study of about 300 students, the students overestimated the number of drinks associated with the negative consequence (i.e., getting sick, unwanted sex, hangovers, and blackouts) even after they experienced the consequence (Mallett, Lee, Neighbors, Larimer, & Turrisi, 2006).

Among college drinkers the physical consequences of high-risk drinking may include blackouts, injuries, and alcohol poisoning (Hingson, Zha, & Weitzman, 2009; Perkins, 2002). In one study, 87% of college students reported experiencing at least one symptom of a hangover (e.g., dehydration, lethargy, headaches) in a year time frame (Slutske, Piasecki, & Hunt-Carter, 2003). Being arrested, regretted sexual encounters, and getting sick were consistently defined as negative by students but as many as 25% of students endorse hangovers as a positive consequence of high-risk drinking (Mallett et al., 2008).

Most students do not report alcohol as an academic impediment (American College Health Association, 2017). Yet, high-risk drinking has been found to be associated with missed classes, late assignments, lower grade point averages, and less engagement with faculty members

(Porter & Pryor, 2007; Wechsler et al., 2002). Among students receiving a lower grade on an exam the experience is consistently reported as a negative consequence of their drinking (Mallett et al., 2008). The consequences associated with high-risk drinking have been quantified on a continuum with most students experiencing an alcohol related consequence like a missed class and fewer students experiencing the more extreme consequences associated with authoritative figures, like a criminal arrest (Vik, Carrello, Tate, & Field, 2000). Approximately, 18% of college students meet the clinical definition of an alcohol use disorder (e.g. dependence or abuse) during their college career (Slutske, 2005).

Nationally, drinking and driving is rarely a onetime action. Approximately one-third of all fatal traffic crashes involve an alcohol-impaired driver and the same proportion of drivers have been previously arrested or convicted of impaired driving (Fell, 1995). Amongst a sample of college students, previous high-risk drinking and impaired driving were linked to current self-reported behavior (Clapp, Shillington, Lange, & Voas, 2003). Driving after drinking, among college students, is associated with identifying as a male, belonging to a fraternity, engaging in high-risk drinking, and perceiving driving after drinking as socially acceptable (LaBrie, Kenney et al., 2011).

The consequences of drinking are not exclusive to drinkers. Sixty-six percent of students report experiencing two or more negative second-hand consequence of someone's drinking (Nelson et al., 2009; Wechsler, Moeykens, Davenport, Castillo, & Hansen, 1995). Some of the second-hand consequences of high-risk drinking, consistently reported by college students, include: sleep or study disruptions, caretaking for another student, finding vomit in residence halls, being insulted, arguments, property damage, along with physical and sexual assaults (Nelson et al., 2009). Within weeks of arriving on campus, first-year students report

experiencing second-hand alcohol consequences (Boekeloo, Bush, & Novik, 2009). High-risk drinking is also associated with damage to other student's or institutional property along with hate related incidents, noise disturbances, and interpersonal violence (Perkins, 2002).

Institutional Factors

Individual factors help to explain some of college students' drinking behavior, but the social environment is also a significant factor (Read, Wood, Kahler, Maddock, & Palfai, 2003). Consistent with the social ecological framework, institutional factors have been found to be associated with high-risk drinking rates among college students (Presley, Meilman, & Lyerla, 1993). Institutional factors that have been found to be related to differences in the alcohol culture across IHEs include two-year versus four-year colleges, size of student population, NCAA Division I IHEs, and HBCU affiliation. Based on data from the National College Health Risk Behavior study high-risk drinking was more common among students attending four-year IHEs compared to two-year IHEs (Douglas et al., 1997; Meilman, Presley, & Cashin, 1997). The Harvard Alcohol Study identified institutional differences based on NCAA division and size of the student population. NCAA Division I IHEs tended to have higher prevalence rates of high-risk drinking compared to other NCAA divisions (Wechsler, Lee, Kuo, & Lee, 2000; Weitzman et al., 2003). IHEs with a large student population (i.e., 10,000 or more) tended to have higher prevalence rates of high-risk drinking compared to IHEs with smaller student populations (Wechsler et al., 2000; Weitzman et al., 2003). An analysis of institutional differences within the American College Health Association-National College Health Assessment mirrors the association of larger student populations and high-risk drinking rates (Oswalt, Lederer, & Schrader, 2015). Comparisons between HBCUs and predominately white institutions (PWI)

suggest lower drinking rates reported among students attending HBCUs (Meilman, Presley, & Cashin, 1995).

The college culture includes unique customs and traditions that highlight the synergistic relationship between individual and institutional factors (Horowitz, 1987). Fifty percent of students agree the social atmosphere on their individual campus promotes the use of alcohol (Core Institute, 2013). Academic breaks and other times of low academic demands are unique to IHEs and are associated with high-risk drinking among students (Beets et al., 2009; Del Boca, Darkes, Greenbaum, & Goldman, 2004; Tremblay et al., 2010). Institutional response to the college alcohol culture varies by institution, small IHEs compared to large IHEs are more likely to prohibit alcohol during events (e.g., tailgating, receptions) and to prohibit alcohol advertising in the school newspaper (Lenk, Erickson, Nelson, Winters, & Toomey, 2012).

A paucity of alcohol related research exists about HBCUs, IHEs established prior to 1964 to serve and educate Black students when there were no other post-secondary options for the students (Moore, 2000). The founding leaders of HBCUs stressed character training, religion, and a support for the Temperance Movement (Fletcher & Epstein, 1996). Using the National College Health Risk Behavior Survey data to highlight alcohol-related health needs of students at HBCUs, Fennell (1997) found that men were more likely to report high-risk drinking than women. More recently alcohol was reported as the third most common health concern, among students attending HBCUs (Hale, Branch-Vita, & Ford, 2011). Research suggests that the Black community is disproportionately targeted by alcohol companies and their alcohol advertisements (Kwate, Jernigan, & Lee, 2007; Kwate & Lee, 2007). HBCUs need to be included in the alcohol research and should be of concern because they tend to be in high alcohol outlet density locations; urban neighborhoods disproportionately plagued with alcohol advertisements (Berke

et al., 2010). Non-HBCUs are in diverse settings with bars and restaurants near IHEs (LaVeist & Wallace, 2000).

The college football experience is another institutional factor associated with the college alcohol culture. Football fans tend to drink more on football game day compared to their last social event (Glassman, Werch, Jobli, & Bian, 2007). Collegiate sports fans are also likely to drink with a purpose to get drunk and experience negative alcohol related consequences (Nelson & Wechsler, 2003; Sperber, 2000). The score of the football game, the opponent (e.g., rivalry game), and policies of the institution are all factors that may account for the high-risk drinking that takes place during football games (Glassman, Braun, Reindl, & Whewell, 2011).

Institutional consequences. The consequences of high-risk drinking among students is evident at the institutional level. For example, physical damage to property is a significant consequence of students' high-risk drinking and a financial burden to IHEs (Eigen, 1991; Wechsler et al., 1995). Institutional costs of high-risk drinking have also been associated with student attrition, loss of perceived academic rigor of IHEs, and poor relations with community partners and citizens (Perkins, 2002). Alcohol has been estimated to account for 15% of attrition at IHEs (Soutiea, 2017).

About half of all campus policy violations involve alcohol (Anderson & Gadaleto, 2001). The response to alcohol violations and the rate of alcohol violations vary across IHEs, but the institutional cost is commonly related to the human resources needed to respond to the incident (Perkins, 2002). Campus police or security officers will typically refer a high-risk drinker to a campus service; only about one-third of IHEs report consistently issuing criminal charges or a citation to a drinker (Bernat, Lenk, Nelson, Winters, & Toomey, 2014). The size of the student population has also been linked to the rate of alcohol violations and disciplinary actions. Alcohol

violations are highest at public, residential IHEs with student populations of 10,000 students or more (Lewis & Farris, 1997). Similarly, Bernat and colleagues (2014) found that large (i.e., more than 2,500 students) IHEs were more likely than smaller IHEs to charge students with an alcohol related crime.

Football games at IHEs have been found to be associated with increases in alcohol-related offenses and disorderly conduct (Rees & Schnepel, 2009). IHEs with NCAA Division I football programs have elevated alcohol arrests during home football games in comparison to weekends without football games (Merlo, Hong, & Cottler, 2010). High-risk weekends have been defined as those with a home or high-profile football game (Champion et al., 2009) and driving under the influence is the most significant alcohol related violation on game days (Merlo, Ahmedani, Barondess, Bohnert, & Gold, 2011).

Environmental Factors

Alcohol sales, advertising, and availability are examples of environmental factors that contribute to the college alcohol culture at IHEs (DeJong et al., 1998; Clapp et al., 2003; Toomey & Wagenaar, 2002). Environmental strategies (e.g., reductions in alcohol advertising to young people, restricting alcohol availability) have demonstrated success in reducing the negative alcohol related consequences of alcohol (Anderson, Chisholm, & Fuhr, 2009). The methods to ensure that the college community is aware of the environmental policies put forth to create a safer community during college games appear to vary. A study reviewing the IHEs' athletic websites of NCAA Division I IHEs revealed inconsistent or missing information about the alcohol policies for the football stadium; for example, 47% of IHEs did not have a stadium alcohol policy on their websites (Menaker & Connaughton, 2010). Additional relationships exist between institutional and environmental factors. For example, IHEs with a large student

population are more likely to accept alcohol sponsorship, compared to IHEs with smaller populations, contributing to the college alcohol culture (Nelson, Naimi, Brewer, & Roeber, 2010; Mitchell, Toomey, & Erickson, 2005; Wechsler et al., 2000; West & Graham, 2005).

Alcohol sales. There are recommendations and research to demonstrate the success of limiting access to alcohol through sales but there is an increase in the number of IHEs permitting alcohol sales during football games (Dodd, 2016; New, 2016). A primary reason cited for selling alcohol during campus sporting events is to increase revenue (Mehrotra, 2014). About 25% of the 120 NCAA Division I football programs permit alcohol sales during the regular football season (DeRusha, 2012; Opdyke & Kesmodel, 2009; Peterson, 2011). Some IHEs and stakeholders note the advantages to alcohol sales are: an enhanced fan experience, a boost in student attendance, an expanded market audience, and crowd management (Mitchell & Montgomery, 2015). Supporters of the alcohol sales at college football stadiums suggest strategies like setting drink limits or prohibiting alcohol sales after half time may reduce the high-risk drinking that leads to negative consequences on game days (Mitchell & Montgomery, 2015).

Alcohol sales at college football stadiums are of concern because about 10% of alcohol company's profits are based on sales to underage drinkers (Nelson & Winters, 2012) and on college campuses about half of all alcohol is consumed by underage drinkers (Wechsler et al., 2002). Additionally, alcohol sales, particularly during football games is a possible concern because of data from professional games that suggests that about 8% of fans leave the venue with a BAC above the legal limit to drive; the rate is 14% among fans that tailgated prior to the game (Erickson, Toomey, Lenk, Kilian, & Fabian, 2011). There is a growing sentiment among stadium administrators that contend the profits from alcohol sales may assist in covering the expenses

acquired by fan misconduct, sometimes associated with high-risk drinking (Menaker, Chaney, & Sheptak, 2016). However, the case study of a major college athletic department found the net financial gain of alcohol sales was not significant, less than 1% (Huang & Dixon, 2013).

Alcohol advertising. Most evidence suggests alcohol marketing is associated with high-risk drinking (Anderson, De Bruijn, Angus, Gordon, & Hastings, 2009; Jernigan, Noel, Landon, Thornton, & Lobstein, 2017; Scott, Muirhead, Shucksmith, Tyrrell, & Kraner, 2016; Smith & Foxcroft, 2009). College-aged students have historically been a population of interest to the alcohol industry. An alcohol dealer in 1912 noted, "We must create the appetite for liquor in the growing boys….Nickels expended in treats to boys now will return in dollars to your tills after the appetite has been formed" (Burnham, 1993, p. 57). Today, alcohol advertising is a worldwide phenomenon with significant influence on young people (Jernigan, 2010; Martin et al., 2002). Research has consistently demonstrated that exposure to alcohol marketing is a factor associated with underage drinking; people under the age of 21 with greater exposure to alcohol marketing are more likely to start drinking at an earlier age compared to those people with less exposure to alcohol marketing (Anderson, De Bruijn et al., 2009; Hastings, Anderson, Cooke, & Gordon, 2005).

Alcohol advertising is robust among underage drinkers, highlighting the social context of drinking and downplaying the negative consequences of high-risk drinking (Anderson, De Bruijn et al., 2009; Center of Alcohol Marketing and Youth, 2004; Jernigan, 2011). Alcohol marketing within television has been established to be associated with alcohol initiation among underage drinkers (Anderson, De Bruijn et al., 2009) and this association appears to be emerging within internet marketing (McClure et al., 2016). The websites of alcohol brands tend to have multiple

sources of interaction; such as, videogames, screensavers, music, video, and opportunities to win prizes (Center on Alcohol Marketing and Youth; Gordon, 2011).

Exposure to alcohol use and brands in television, movies, and music has been associated with alcohol initiation and prevalence (Dalton et al., 2009; Mundt, 2011; Primack, McClure, Li, & Sargent, 2014; Ross et al., 2014). One study demonstrated that in television shows, popular among people under the age of 21, a total of 61 alcohol brands were referenced and the underage drinkers were four times more likely to consume alcohol brands that they reported viewing in the television programs (Ross et al., 2015). A correlation has also been found between the number of times alcohol brands are mentioned in popular songs and adolescents' binge drinking rates (Primack et al., 2014). In one experimental study, researchers monitored students' neural responses and demonstrated a motivational state of being after viewing beer logos imposed with the students' college or university logo (Bartholow et al., 2017).

Alcohol sales at college football games provide an additional benefit to alcohol companies via advertisement. Alcohol companies appear to build brand loyalty by infusing alcohol into the culture; brands used most by underage drinkers have the highest sponsorship rates and sporting events are the typical sponsorship arena (Belt et al., 2014). Most alcohol advertisements, particularly for beer, happen on the weekends during a sporting event (Snyder, Milici, Mitchell, & Proctor, 2000). Among a sample of 50 IHEs, about a third allowed beer advertisements within the stadium and 90% allowed beer advertisements via radio and television broadcasts (Whiteside, 2009). Some IHEs are partnering with local breweries to include their logo on beer cans or bottles; in fact, Tulane University's Green Wave beer is a customized beer for the institution (McNulty, 2017).

Alcohol availability. High-risk drinking is common in "wet" environments where there is easy access to cheap alcohol (Weitzman et al., 2003). Students in wet environments are more likely to engage in high-risk drinking compared to their peers in different environments (Weitzman et al., 2003). Access to large quantities of alcohol via parties with kegs is a behavior that contributes to high-risk drinking among college students (Toomey & Wagenaar, 2002). For some IHEs, availability is based on location. HBCUs are typically located in urban neighborhoods with proximity to liquor stores (LaVeist & Wallace, 2000). Easy access to cheap alcohol via peers or establishments located near a campus are environmental factors associated with students' initiation of high-risk drinking, regardless of institutional characteristics (Weitzman et al., 2003).

Environmental consequences. Within the social ecological framework environmental consequences are situated as the strategies to reduce the high-risk drinking associated with the college alcohol culture. Limiting alcohol availability, limiting access to alcohol advertising, and prohibiting alcohol sales are environmental factors with evidence of success in decreasing arrests and other negative alcohol related consequences (Bormann & Stone, 2001; Toomey, Lenk, & Wagenaar, 2007). Across IHEs, gaps exist between recommended evidence-based strategies and the implementation of the strategies (Murphy, Barnett, & Correia, 2012). One study focused on the Minnesota-Wisconsin area to assess the influence of institutional factors on the use of environmental strategies (i.e., various policies) to reduce high-risk drinking (Mitchell et al., 2005). The majority of IHEs prohibited the sales of alcohol at home games; however, IHEs with a large student population were more likely to accept alcohol sponsorship in comparison to their counterparts (Mitchell et al., 2005).

Alcohol sales at college games have been linked to an increase in alcohol-related crime on game day (Menaker & Chaney, 2014). Environmental strategies have demonstrated success to reduce the negative consequences of high-risk drinking on college campuses. A decrease in game day drunk driving arrests was noted after Arizona State University implemented a ban on alcohol sales at their football stadium (Boyes & Faith, 1993). A case study of the University of Arizona's homecoming revealed that institutional factors (e.g., a change in the time of the game) combined with an environmental factor (i.e., a policy change to prohibit kegs of alcohol) contributed to a reduction in game day alcohol related problems (Johannessen, Glider, Collins, Hueston, & DeJong, 2001). The University of Colorado banned alcohol sales in 1996 and compared to the previous year there was a decrease in alcohol related arrests, assaults, and ejections from the stadium on game day (Bormann & Stone, 2001).

Summary

The social ecological framework highlights the interactive and synergistic relationship of individual, institutional, and environmental factors as they relate to the college alcohol culture and the strategies used to reduce high-risk drinking as well as the negative consequences among college students (DeJong & Langford, 2002). IHEs have been described as having an "organized collegiate drinking-infrastructure" (Carey, 2014, p. A72). Students are at the center of the college alcohol culture based on the social ecological framework and historically the alcohol research has focused on individual strategies to address the college alcohol culture (Malloy, Goldman, & Kington, 2002). The college alcohol culture includes individual (i.e., alcohol related risk and protective behaviors), institutional (i.e., size of the student population, the NCAA division, and the HBCU affiliation), and environmental (i.e., alcohol sales, availability, and advertising) factors.

Alcohol use among college students occurs at most IHEs (Wechsler et al., 1994). High-risk drinking on college campuses is sustained by individual high-risk behaviors (i.e., drinking to get drunk, drinking games, and drunk driving). Protective behaviors (e.g., sober drivers) are individual factors that assist in mitigating the risks and consequences associated with high-risk drinking. The college alcohol culture is different among IHEs; that is, institutional and environmental factors influence students and the culture created surrounding alcohol. College football games are associated with high-risk drinking among students (Glassman et al., 2011; Neal & Froome, 2007). Some administrators associated with college stadiums have noted game day alcohol sales can be an advantageous to increasing alcohol policies to assist with fan management (Menaker et al., 2016).

The next section will explore the college alcohol culture within social media using the same factors illuminated by the social ecological framework. IHEs are unique social systems because of the synergy between individual, institutional, and environmental factors creating a college alcohol culture. The landscapes of IHEs are inherently different today because of social media, a factor that was not considered or in existence over 15 years ago when the first NIAAA report (Malloy, Goldman, & Kington, 2002) was published. Today, social media is part of college students' everyday life; providing an opportunity for students to express their identities and socialize with others (boyd, 2014). Alcohol companies are also using social media (e.g., #ItsMillerTime) to build brand loyalty and engage users with their brand (Furubayashi, 2014). The emerging research focused on alcohol brand preference suggests students are willing to pay for their brand of preference and not only seek out the lowest price brand (Albers, DeJong, Naimi, Siegel, & Jernigan, 2014).

Social Media

Social media is altering and influencing social systems (boyd, 2014) and IHEs are not an exception. The Centers for Disease Control and Prevention (2012) refers to social media as the collective umbrella term for the online and electronic tools for sharing and creating content. Social networking sites are a primary development of the social media phenomenon. The "networking publics" are environments that shape social media and are shaped by social media (boyd, 2014). Social networking sites allow people to engage, collaborate, and share information (Ellison & boyd, 2013). The most influential and popular social networking sites are: Facebook, Google+, LinkedIn, Pinterest, and Twitter (Lutrell, 2014). In this paper, social media is used as a global reference to the technologies and interactions that take place on social networking sites or social media platforms.

Social media is designed to be disseminated through social interaction (Luttrell, 2014) and is changing the way cultures interact. In the United States, two-thirds of people get news from social media (Shearer & Gottfried, 2017). The college culture is not immune to the cultural shifts taking place because of social media (boyd, 2014). Ninety-percent of emerging adults (18 to 25 years of age) use social media (Perrin, 2015) and they use social media at a greater rate than older adults (Smith, Raine, & Zickuhr, 2011). In fact, emerging adults spend more hours per week engaging with social media compared to time spent watching television or general Internet searching (boyd, 2014; Melton, Bigham, Bland, Bird, & Fairman, 2014).

Social media is used by IHEs to recruit prospective students (Barnes & Lescault, 2013; Tucciarone, 2009) and to engage with students before they arrive on campus (Greenwood, 2012). The engagement within one Big Ten football team's Twitter account revealed the interactions across multiple networks of people, ranging from fans to the media (Clavio, Burch, & Frederick,

2012). Social media also plays a significant role in branding campaigns among NCAA Division I athletic programs (Cooper, 2010). Mississippi State University was the first school to paint a Twitter hashtag, #HAILSTATE, in the end zone during a football game with rival University of Mississippi (Stevens, 2013). The hashtag was removed because the NCAA prohibits advertising on the field and considers Twitter hashtags a form of advertisement. The University of Massachusetts at Lowell has incorporated their #CodeBlue tagline on their video scoreboard throughout games to ensure social media presence (Gibbs, 2013).

Research is emerging to contextualize the bidirectional relationship of social media and college alcohol culture of high-risk drinking. The social media research related to the college alcohol culture of high-risk drinking has focused primarily on Facebook but continues to expand to other social media platforms. The following is a review of the synergistic relationship between social media and the individual, institutional, and environmental factors of the college alcohol culture of high-risk drinking.

Individual Factors and Social Media

The high-risk drinking norms associated with the college alcohol culture appear to be pervasive within social media. Alcohol is referenced on most Facebook public profile pages of college students and underage drinkers (Egan & Moreno, 2011; Fournier & Clarke, 2011; Moreno et al., 2010; Ridout, Campbell, & Ellis, 2012). In general, alcohol references within college students' social media accounts are perceived as humorous by their peers and include a positive tone about alcohol with pictures of friends' drinking (Beullens & Schepers, 2013; Morgan, Snelson, & Elison-Bowers, 2010). Students report their peers' social media profiles are accurate reflections of alcohol use and influential in their own decisions to initiate using alcohol (Litt & Stock, 2011).

Risk behaviors and social media. High-risk behaviors like drinking to get drunk, participating in drinking games, and driving under the influence are being exposed and examined within social media. The role of social media as a predictive factor to high-risk drinking is beginning to emerge in the research related specifically to Facebook. First year students with an alcohol reference in their profile picture are more likely to engage in high-risk drinking compared to those without an alcohol reference in their profile picture (Moreno, Cox, Young, & Haaland, 2015). A students' social media alcohol references along with their exposure to peers' alcohol references, within the first few weeks of classes, has also been linked to high-risk alcohol use during the students' second semester (Boyle, LaBrie, Froidevaux, & Witkovic, 2016). An ethnographic study of Facebook profiles revealed a "partier" profile is the most common type of profile among college students and included the impression that students attend social functions with the purpose of getting drunk (Birnbaum, 2013). A positive correlation has been demonstrated between the number of alcohol related references on a college student's Facebook page and the quantity and frequency of a college student's use of alcohol (Fournier & Clarke, 2011). Gender differences suggest females check Instagram and Snapchat more often than males and are subsequently exposed to a higher frequency of alcohol references (Boyle et al., 2016).

A study of Twitter users in the general population suggests most alcohol related tweets include a positive message about alcohol and specifically reference high-risk drinking (Cavazos-Rehg, Krauss, Sowles, & Bierut, 2015). Similar to episodic drinking within the college alcohol culture, tweets with the word, drunk, have been found to peek on Saturdays, Super Bowl Sunday, Saint Patrick's Day, Cinco de Mayo, Independence Day, and Thanksgiving within the general population (Ramezani, Terdal, Pepper, & Anderson, 2014). Tweets with the word "drunk" are also more likely on Friday and Saturday nights between 10 p.m. and 2 a.m. (West et al., 2012).

In one college town, social media was used to underscore the student-constructed alcohol event of "State Patty's Day"; a wordplay of the cultural and religious celebration of Saint Patrick's Day. Public Facebook pages referenced bars and drink specials, a sense of belonging to the movement and high-risk drinking (Lefkowitz, Patrick, Morgan, Bezemer, & Vasilenko, 2012). Two examples of Facebook posts were: 1.) tell the bars or stores…to make tee shirts, 2.) DEAR STATE, thanks for creating a holiday where we can black out by noon, love the students (Lefkowitz et al., 2012).

Drinking games and driving under the influence of alcohol have been amplified within social media. Neknominate is a drinking challenge game that originated on Twitter and spread to other social media platforms (Nguyen, 2014). The international sensation is based on videos of people drinking or "necking" a large amount of alcohol and then nominating friends to also accept the challenge (Groom, 2014). Five deaths have been linked to the Neknominate phenomenon (Wilkinson & Soares, 2014). Additional deaths of college age students have been linked to driving drunk and sharing the episode with a video in social media (Bowerman, 2017; Flowers, 2015; Sheehey-Church, 2017). The phenomenon of driving drunk and posting to social media has incited a MADD campaign - #DrunkDrivingGoesViral (Smart Start, 2017). The purpose of the campaign is to encourage social media policies to prohibit posting images, videos, and other content that glorifies or promotes drunk driving.

Protective behaviors and social media. Few studies were found to reference any type of protective behaviors within social media. A small study of a college town music festival revealed one-third of participants used social media while engaging in high-risk drinking and 11% of the high-risk drinkers used social media to arrange a sober ride home (Whitehall, Pumper, & Moreno, 2015). The lack of protective behaviors in social media appears to mirror a content

analysis of popular music where only 4% of the songs contain an anti-alcohol, tobacco, or other drug use message (Primack, Dalton, Carroll, Agarwal, & Fine, 2008).

Since social media is not widely used among health promotion entities (Gold et al., 2011) it may not be surprising that there are few references to protective behaviors. Statewide, public health departments are only in the early stages of adopting social media (Avery et al., 2010; Thackeray, Neiger, Smith, & Van Wagenen, 2012). Among state health departments, as of 2014, 67% had a Facebook page, but fewer than 2% of their Facebook messages related to alcohol (Jha, Lin, & Savoia, 2016). Among health centers at IHEs, 51% maintain a Facebook page, but they tend to lack the ability to engage users by generating return visits to the page or creating a dialogue (Waters, Canfield, Foster, & Hardy, 2011). No studies were found to describe the content of social media messages from health centers or health promotion departments associated with IHEs.

Institutional Factors and Social Media

There is a paucity of social media research analyzing high-risk drinking based on institutional factors (e.g., size of the student population). One study that was found, compared the Facebook pages of first year students at two different IHEs. All students had a significant increase in alcohol related posts upon entering college but there was a significant difference in the number of alcohol references between IHEs (Moreno et al., 2014). The alcohol related Facebook posts at one IHE appeared to spike in the fall semester during a Halloween themed party and in the spring semester during a large block party. Similar events did not occur at the other institution and the authors concluded the events, unique to an institution, may help to explain a difference in the alcohol culture of IHEs (Moreno et al., 2014).

Environmental Factors and Social Media

Alcohol companies have embraced social media as an effective marketing tool (Jernigan, 2009; Lutrell, 2014) to increase sales and to connect with current and future customers. The potential reach of social media is exponentially greater and less expensive than traditional marketing for alcohol companies (Mart, 2011). Across all social media platforms, conversations that highlight the positive aspects of their brands are encouraged by alcohol companies, like Diageo the parent company of the Johnnie Walker and Smirnoff brands (Van Belleghem, 2011). The positive alcohol brand conversations, led by alcohol marketing teams, are accessible to underage students because of the sharing capabilities on social media platforms (Barry et al., 2015; Griffiths & Casswell, 2010). The environmental factors of alcohol sales, advertisement, and availability are directly and indirectly connected. The influence of the environmental factors within social media is emerging along with an association to the college alcohol culture.

Alcohol sales and social media. The association between alcohol sales and access to alcohol has a unique relationship developing within social media. For example, students report purchasing alcohol related products through social media and using coupons downloaded from social media sites to purchase alcohol (Hoffman, Pinkleton, Weintraub-Austin, & Reyes-Velazquez, 2014). Locally, some bars encourage customers to bypass their website and go directly to the establishments' social media accounts to learn about drink specials (Lyons, Goodwin, McCreanor, & Griffin, 2015). No studies were found to specifically link alcohol sales in college football stadiums and social media to the college alcohol culture. However, the indirect association may be to alcohol advertising and the college alcohol culture. An upsurge in the number of IHEs allowing alcohol sales at football stadiums suggests that students will also be experiencing a greater exposure to alcohol brands via alcohol advertising at football stadiums.

Alcohol advertising and social media. Alcohol advertising via social media can create a ripple effect to influence social norms and over-represent a pro-alcohol attitude within social media. The ripple effect is caused when a social media user likes, shares, or retweets (RTs) an alcohol advertisement; the alcohol advertisement that was liked, shared, or retweeted has the potential to be seen by the social media users' followers (Nicholls, 2012). Social media users under the legal drinking age are not excluded from the influence of alcohol advertising via social media. In fact, the social media activity of the most popular alcohol brands among underage users has increased and underage users contribute to the social media activity (Jernigan & Rushman, 2014). Twitter has partnered with several alcohol brands to create an age screening tool, users can verify their age on one alcohol brand account and are then able to follow other alcohol brands without further screening (Jain, 2013). The age verification systems are not always reliable considering one study demonstrated beer websites received 90,000 visits from people under the age of twenty-one (Jernigan, Ostroff, & Ross, 2005).

The hashtag, accessible to anyone with a Twitter account, plays a pivotal role in alcohol marketing. In one study, about 15% of college students reported following alcohol related Twitter accounts (Hoffman et al., 2014). According to Twitter, "Bud Light is using age-screened Promoted Accounts to reach people who are 21 years of age and older and interested in the National Football League during their #whatsyoursuperstition campaign" (Jain, 2013). The age screening tool prevents an underage person from following an alcohol brand on Twitter, but the alcohol campaign created with a hashtag is accessible to all Twitter users. In 2011, Jack Daniels was the first alcohol company to advertise on Twitter with their "promoted trend" (i.e., paid advertisement) of #JackDanielsHoney (Dugan, 2011). Beam, an alcohol spirits' marketer, has

used #mycostume to link its Hornitos tequila to Halloween (Schultz, 2012) an event that is associated with high-risk drinking among college students.

Recent research among underage drinkers revealed a person's drinking identity and preferred alcohol brand are additional factors, beyond alcohol expectancies and social norms that explain the association between alcohol marketing and high-risk drinking (McClure, Stoolmiller, Tanski, Engels & Sargen, 2013). Alcohol brands have been found in photos that college-aged students share on social media (Griffiths & Casswell, 2010). The advertisement lines are often not clear to social media users because alcohol marketing is often embedded into users' normal activities by means of accepting invitations to events and liking a friends' posts (Niland, McCreanor, Lyons, & Griffin, 2017). Facebook posts with pictures including an alcohol logo received more "likes" compared to pictures without logos (Beullens & Schepers, 2013). Anheuser-Busch discovered a one-minute clip of advertising was not receiving many visitors when it was located on their website; however, when the clip was moved to the social networking site of YouTube it received over two million views (Jernigan, 2009). On Twitter, the accounts of alcohol brands have more followers and are more likely to use interactive features (e.g., hashtags) compared to the accounts of health promotion related agencies (Burton, Dadich, & Soboleva, 2013).

A reduction in the advertisement of alcohol specials offering cheap alcohol is a suggested environmental strategy to reduce high-risk drinking on college campuses (Nelson & Winters, 2012). However, self-imposed regulations by the alcohol industry do not prohibit underage people from accessing marketing and alcohol advertising within social media (Barry et al., 2015). Social media is used to spread favorable brand messages and to encourage social media

users to share the favorable message with other social media users, by default underage drinkers are included in the sharing process (Mart, 2011).

Alcohol availability and social media. Social media also provides college students an opportunity to share the alcohol that is available to them and offer the same availability to their followers. Students describe using Facebook to invite friends to a party and as an essential tool to document a night of high-risk drinking, to share with others during and after the party (Hebden, Lyons, Goodwin, & McCreanor, 2015). In one study, 40% of first year students' alcohol references included a photograph of alcohol consumption during a football game or party (Moreno et al., 2015). In another study, more than half of the college students shared photos of themselves drinking along with information about past or future parties with alcohol (Kolek & Saunders, 2008). The use of social media to share available alcohol may provide an impetus for high-risk groups to act on their intentions. Increased intentions to drink were demonstrated among first year college students presented with hypothetical, pro-alcohol Facebook posts, messages, and pictures (D'Angelo, Zhang, Eickhoff, & Moreno, 2014).

Alcohol Related Consequences and Social Media

The consequences of high-risk drinking within social media appear to be mirroring the trend of consequences within music. Alcohol is the most common substance referenced in popular music, and when consequences are referenced, they tend to be positive by portraying alcohol as a social stimulant (Primack et al., 2008). The negative consequences of high-risk drinking are rarely referenced within social media (Moreno et al., 2010). Students tend to post social media photos that glamorize high-risk drinking compared to posting any negative events or extreme intoxication (Moewaka-Barnes et al., 2016). A sample of adolescents exposed to Facebook profiles with alcohol references depicted as the norm were more likely to report a

desire to initiate alcohol use and reported a decreased sense of vulnerability to the negative consequences of alcohol (Litt & Stock, 2011). Among Facebook users, alcohol related posts have been found to be associated with negative outcomes (e.g., missed work) along with risks associated with alcohol use disorder (Ridout et al., 2012; Westgate, Neighbors, Heppner, Jahn, & Lindgren, 2014).

Conclusion

The college alcohol culture is created by a dynamic relationship between individual, institutional, and environmental factors. The landmark College Alcohol Study of the 1990s highlighted the existence of college student drinking patterns in addition to the influence of institutional and environmental factors on the college alcohol culture (Wechsler et al., 2002). The individual factors associated with high-risk drinking (i.e., risk behaviors) have some similarities across institutions but the impact of the relationship between individual, institutional, and environmental factors is unique to each institution. The social ecological framework explains the synergistic relationship among individual, institutional, and environmental factors that need to be considered when attempting to address high-risk drinking and the negative consequences among college students (DeJong & Langford, 2002). Athletic events, football games specifically, are one of the most researched events associated with high-risk drinking among students (Glassman et al., 2011; Neal & Froome, 2007). A one size fits all approach in strategies to address the college alcohol culture is not possible because each institution is a unique environment. The more we know about students' event specific drinking practices the more we can assist in providing interventions at peak consumption times (Neighbors et al., 2007).

Interventions to reduce high-risk drinking have primarily focused on individual factors. Cognitive-behavioral skills-based interventions are the strategies with the most research and

evidence of effectiveness to reduce high-risk drinking and the associated negative consequences on college campuses (Larimer & Cronce, 2002; Cronce & Larimer, 2011). A fundamental component of cognitive-behavioral skills programs at IHEs (Dimeff et al., 1999; Walters & Baer, 2006) is a focus on individual factors; alcohol related protective and risk behaviors. (Jessor & Jessor, 1977; Jessor et al., 1995). By definition, protective alcohol related behaviors are actions that decrease the likelihood of a person engaging in high-risk drinking (Hawkins et al., 1992).

Consistent with the social ecological framework, institutional factors are associated with the college alcohol culture and the rates of high-risk drinking among college students. The size of the student population, the NCAA division, and HBCU affiliation are all associated with the rate of high-risk drinking (Meilman et al., 1995; Wechsler & Nelson, 2008). Alcohol sales, advertising, and availability are fundamental environmental factors influencing the college alcohol cultures (Meilman et al., 1995; Wechsler & Nelson, 2008). Institutional factors have also been found to be associated with environmental factors. For example, IHEs with large student populations are more likely to accept alcohol sponsorship, compared to IHEs with smaller populations (Mitchell et al., 2005; Nelson et al., 2010; Wechsler et al., 2000; West & Graham, 2005).

Social media needs to be considered as an additional influence on the college alcohol culture. Prior to social media, students were exposed to factors (e.g., media) that glamorized and normalized high-risk drinking as a part of the college culture (DeJong et al., 1998). Today college aged students check their social media accounts, multiple times a day (Lenhart, 2015) providing an additional forum for the glamorization and normalization of the college alcohol culture of high-risk drinking. College students are willing to add health related social media

accounts associated with university and medical centers (Uhrig, Bann, Williams, & Evans, 2010), but the role of social media and alcohol prevention is in an infancy stage (Nicholls, 2012).

Social media users are listening to, viewing, and reading posts by other social media users (boyd & Crawford, 2012). Among college students, most students post pro-alcohol related content that minimizes risk behaviors associated with negative alcohol related consequences (Beullens & Schepers, 2013; Egan & Moreno, 2011; Kolek & Saunders, 2008; Moreno et al., 2014). Alcohol companies and their marketing teams know that social media is a powerful tool to monitor customer sentiment and to expand word of mouth advertising in real time (Jansen, Zhang, Sobel, & Chrowdery, 2009). In addition to collecting information about social media users the alcohol companies are using the platforms to get closer to the social media user, potential customers, with unique and unprecedented strategies (Chester, Montgomery, & Dorfman, 2010). Self-imposed regulations by the alcohol industry do not prohibit underage people from accessing marketing and alcohol advertising within social media (Barry et al., 2015). Social media provides an avenue for collecting data about a user and communicating with the user (boyd, 2014; Paul & Dredze, 2011). Public health may also be able to "exploit" the same media for health promotion to better understand the college alcohol culture within social media (Freeman & Chapman, 2008).

Gaps and Future Research

The prevalence of high-risk drinking among college students has been established. Since the late 1980s, college students have had higher rates of high-risk alcohol use compared to other emerging adults (Blinn-Pike et al., 2008; Johnston et al., 2014; White et al., 2005; White et al., 2006). The environment and individual behavior change are inseparable in a social ecological framework (Green, Richard, & Potvin, 1996). The social ecological framework presents an

opportunity to shift prevention and research efforts from solely individually focused to environmentally focused (DeJong & Langford, 2002). The college alcohol culture research has a plethora of research focused on the individual factors associated with college students' high-risk alcohol use (National Institutes of Health, 2016; Malloy et al., 2002) but gaps exist among institutional and environmental factors.

Students will always be the center of the college alcohol culture along with the need to examine individual factors. Alcohol related risk and protective behaviors are individual factors that need to be examined on a continuous basis because of the shift in trends. For example, most drinking games are based on the inherent risk of consuming a large amount of alcohol in a short amount of time. Future research needs to examine the nuances of drinking games as new trends emerge (e.g., Neknominate). Research also needs to address the consequences of the college alcohol culture at each level of the social ecological framework: individual, institutional, and environmental.

The current alcohol assessments (i.e., American College Health Association-National College Health Assessment, the Core Alcohol and Drug Survey) primarily focus on individual factors associated with the college alcohol culture with less attention to institutional and environmental factors (American College Health Association, 2016; Core Institute, 2018). Most nationally based alcohol surveys only address the type of alcohol. Brand research is emerging but is lacking in the research; students are not simply consuming the least expensive alcohol but are rather forming brand preferences (Albers et al., 2014). Future research examining individual factors associated with college students high-risk drinking should mirror the trend of research with underage drinkers; that is, to examine students' drinking identity and alcohol brand

preferences to determine the association between alcohol marketing and high-risk drinking (McClure et al., 2013).

Institutional factors are essential to include when examining the college alcohol culture but are either inconsistently included or consistently excluded. A representative sample of IHEs settings, to examine the college alcohol culture and evidence-based strategies associated with reducing high-risk drinking, is essential to future research (Glasgow & Linnan, 2008). The exclusion of HBCUs in the college alcohol prevention research is a concern because alcohol is a health concern at HBCUs. Students attending HBCUs compared to PWIs, tend to have lower drinking rates and fewer negative alcohol consequences (Meilman et al., 1995), but alcohol is still the third most common health concern among students at HBCUs (Hale et al., 2011).

Capturing the influence of environmental factors on the college alcohol culture is probably the result of a dynamic relationship among the varying degrees of implementing environmental strategies along with the assessing the efficacy of the strategies to IHEs and the students. Many speculate that the trend of alcohol sales and alcohol advertising within athletic stadiums will become the norm across IHEs because of the need for revenue (Smith, & Lefton, 2017). More research needs to examine the role of alcohol sales, access, and advertising on the college alcohol culture.

The examination of the college alcohol culture within social media is only beginning to emerge. Currently the research has focused on the public display of high-risk drinking among college students using Facebook revealing references to high-risk alcohol related behaviors (Moreno et al, 2010). Some high-risk behaviors related to drugs other than alcohol have been explored within Twitter, but no studies were found to be directly related to college alcohol culture and Twitter. One study found three million mentions of prescription drug terms within

tweets in one year and found that abusive behavior was associated with more exposure to these prescription drug terms (Hanson, Cannon, Burton, & Giraud-Carrier, 2013). In addition, even though most college students use at least one protective behavior when consuming alcohol (Haines et al., 2006) there is a gap in the research examining protective alcohol related behaviors within social media.

Twitter has not been used to examine the college alcohol culture even though it is well suited for data collection and communication. The unique interactions on social media platforms like Twitter may provide a forum to identify alcohol behaviors that "amplify" the norm of high-risk drinking and to also identify opportunities for contributing health information (Loss, Lindacher, & Curbach, 2014). The paucity of research related to Twitter and the college alcohol culture is one gap in the research that needs to be addressed. Hashtags originated on Twitter and provide an opportunity to examine the alcohol related conversations taking place in real time. An examination of the tweets within Twitter hashtags provides a unique environment to examine individual, institutional, and environmental factors within the college alcohol culture. Hashtags associated with IHEs during a football season provide an ideal opportunity to examine real time conversations during event specific, high-risk drinking episodes that are a hallmark of the college alcohol culture.

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The College Alcohol Culture and the #Hashtag

Each year an estimated 1,700 college students die from alcohol-related unintentional injuries, including motor vehicle crashes (Hingson, Heeren, Winter, & Wechsler, 2005). Thirty-five percent of college students engage in high-risk drinking, a consistent trend since the late 1980s (Schulenberg et al., 2017). Reducing the rate of high-risk drinking at institutions of higher education (IHEs) is a national objective of Healthy Campus 2020 (American College Health Association, 2012). Administrators at IHEs are concerned not only about the rate of high-risk drinking but also the associated negative consequences to the drinker, other students, and the entire college community (Hingson et al., 2005; Hingson, Zha, & Weitzman, 2009; Perkins, 2002; Wechsler, Lee, Kuo, & Lee, 2000). To try to understand the phenomenon of college drinking, the 2002 National Institute on Alcohol Abuse and Alcoholism (NIAAA) report used a social ecological framework to describe key individual, institutional, and environmental factors influencing the college alcohol culture (Davidson, 2007; Malloy, Goldman, & Kington, 2002).

Due to the publication date of the 2002 NIAAA report (Malloy et al., 2002), missing from the report was social media's impact on the college alcohol culture. The launch of Facebook was two years after the NIAAA report was published, followed by Twitter in 2006, and Instagram in 2010 (Hendricks, 2013). Social media has altered and influenced social systems (boyd, 2014), and the college alcohol culture is no exception. The adoption of social media use has been exponential. Five percent of all Americans used social media in 2005 compared to 69% of all Americans using social media in 2016, and most social media users have multiple social media accounts (Greenwood, Perrin, & Duggan, 2016). Age has been found to be the single most important factor of social media use and college age students are the most engaged social media users (Chou, Hunt, Beckjord, Moser, & Hesse, 2009). Since 2006, college aged people have

consistently used social media platforms (e.g., Facebook, Twitter, and Instagram), at a higher rate compared to any other group (Greenwood et al., 2016).

Social media is a collective umbrella term for the online and electronic tools for sharing and creating content (Centers for Disease Control and Prevention, 2012). Social media sites are internet applications that allow for user generated content: status updates within Facebook, videos through YouTube, photos via Instagram, or both videos and photos, for a limited viewing time, with Snapchat (Kaplan & Haenlein, 2010; Moreau, 2017). To date, there are 105 English language social media sites worldwide (Mehra, 2017). The most influential and popular social media sites are: Facebook, Google+, LinkedIn, Pinterest, and Twitter (Lutrell, 2014). Facebook has consistently been the most popular social media site (Lenhart, 2015; Perrin, 2015). Some social media sites have had a short shelf life, Yik-Yak was an anonymous messaging app for college students that began in 2014 and ended in 2017 (Statt, 2017). Twitter has maintained consistent usage, about 24% of online adults have used Twitter, throughout the years (Lenhart, 2012). People 18 to 29 years of age are adopting Twitter at the highest rate (Lenhart, 2012).

Most college students tend to use their social media account at least once a day (Lenhart, Purcell, Smith, & Zickuhr, 2010). In fact, emerging adults spend more hours per week engaging with social media compared to time spent watching television or general internet use (boyd, 2014; Melton, Bigham, Bland, Bird, & Fairman, 2014). The interactive nature of social media is appealing to emerging adults because of the bi-directional interaction; users can see and be seen by others (boyd, 2014). The inherent nature of social media revolves around connecting people, places, and ideas. The Twitter hashtag emerged in 2007 with the tweet, “how do you feel about using # (pound) for groups. As in #barcamp [msg]?” (Messina, 2007). By 2009, Twitter began aggregating, hyperlinking, and announcing the top trending topics on the left-hand side of the

timeline feed; #iranelection and #swineflu were among the first top ten trends (Chowdhury, 2009).

This study focuses on Twitter to examine the tweets within hashtags, associated with IHEs, to further our understanding of the college alcohol culture. A social ecological framework will be used as a lens through which to understand the college alcohol culture. Before the study is described, a brief literature review will include a description of the social ecological framework and the association with the college alcohol culture, followed by a brief description of the social media platform, Twitter. The review will conclude with describing how the social ecological framework can guide an analysis of social media to provide an understanding of individual, institutional, and environmental factors influencing the college alcohol culture. In this study, the tweets mentioned in identified IHE hashtags, during a college football season will be used to examine the college alcohol culture.

The Social Ecology of the College Alcohol Culture

The culture of an IHE includes the traditions and customs created and promoted by current and perspective students, alumni, faculty and staff, along with community supporters (Horowitz, 1987). The college alcohol culture of high-risk drinking among students and the associated consequences are the result of multiple factors. A social ecological framework addresses the interdependence between socioeconomic, cultural, political, environmental, organizational, psychological, and biological determinants of health and illness (Stokols, Allen, & Bellingham, 1996). Unhealthy behaviors (e.g., high-risk drinking) are maintained through social reinforcement and environmental cues; students are producers as well as products of social systems, like the college alcohol culture (Bandura, 2001). Half of all college students concur that high-risk drinking is promoted by the college culture (Core Institute, 2013). Within weeks of

arriving on campus, first-year students report experiencing negative second-hand consequences (e.g., sleep or study disturbances, vomit in common spaces, caretaking responsibilities for others) of high-risk drinking of other college students (Boekeloo, Bush, & Novik, 2009).

High-risk drinking among college students is commonly associated with specific events contributing to the college alcohol culture (Glassman, Dodd, Sheu, Rienzo, & Wagenaar, 2010; Neighbors et al., 2007; Woodyard & Hallam, 2010). Football games are one of the most researched events associated with the college alcohol culture (Glassman, Braun, Reindl, & Whewell, 2011; Neal & Fromme, 2007). Football fans tend to drink more on game days compared to their last social event (Glassman, Werch, Jobli, & Bian, 2007) and are more likely to experience negative alcohol related consequences (Glassman et al., 2010; Nelson & Wechsler, 2003; Rees & Schnepel, 2009; Sperber, 2000). Among some IHEs the student tradition is to drink an excessive amount of alcohol to celebrate the last home football game of a season (Ragsdale et al., 2012). Other IHEs pay homage to alcohol brands by including a former commercial jingle, "When You Say Budweiser, You've Said It All" in the band's playlist (Karmen, 1970; Ramblin Reck Club, 2018).

College football games are an event specific example of the college alcohol culture of high-risk drinking among college students and the associated alcohol-related consequences to individuals, institutions, and the larger community surrounding college campuses. The social ecological framework has been used to examine the synergistic relationship of multiple factors (i.e., individual, institutional, and environmental) to the college alcohol culture. The factors described in the literature review and examined in this study include: individual (i.e., references to types and brands of alcohol, along with protective and risk behaviors), institutional (i.e., size of student population, National Collegiate Athletic Association [NCAA] division and

Historically Black College and University [HBCU] affiliation), and environmental (i.e., alcohol sales, alcohol availability, and alcohol advertisement).

Individual Factors

Multiple factors create the college alcohol culture and students' high-risk drinking patterns are at the center of the framework (Nelson & Winters, 2012). Most IHEs focus on the individual level of the social ecological framework when selecting strategies to reduce high-risk drinking (Davidson, 2007; Nelson, Toomey, Lenk, Erickson, & Winters, 2010). Common outcome measures among the surveys used to assess the effectiveness of alcohol prevention strategies at IHEs include changes in students' behavior; such as, a reduction in amount of alcohol consumed (e.g., per week, peak consumption, heavy episodic or binge drinking), and a person's blood alcohol content (BAC), and alcohol-related negative consequences (Cronce & Larimer, 2011; Larimer & Cronce, 2002; Malloy et al., 2002). This study will examine the following variables at the individual level, types and brands of alcohol associated with student drinking, alcohol related risk and protective behaviors, along with individual consequences to high-risk drinking.

Types and brands of alcohol. The large scale, college alcohol studies are based on students' self-reported alcohol use and define alcohol use as a consumption of beer, wine, or liquor; only assessing the type of alcohol and defining type as a homogenous category (American College Health Association, 2011; Core Insitute, 2018; Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2014). The exploration of types and brands of alcohol associated with student drinking is relatively new and provides interesting findings related to the college alcohol culture. For example, amongst the general population and college students, drinkers who consume beer tend to engage in higher-risk drinking and experience negative alcohol-related

consequences at a higher rate than people who consume wine (Clapp & Shillington, 2001; Gronbaek, Jensen, Johansen, Sorensen, & Becker, 2004; Kuntsche, Knibbe, Gmel, & Engels, 2006). Underage drinkers report being less familiar with distinguishing different types of alcohol (i.e., beer, wine, or liquor) and more familiar with an alcohol brand (Siegel et al., 2013). Two-thirds of underage drinkers report a favorite alcohol brand; the same underage drinkers also have higher drinking rates than the comparison group (Tanski, McClure, Jernigan, & Sargent, 2011).

Some experimental research has demonstrated that college students may be consuming alcohol at a higher rate than most surveys report because students tend to over-pour a standard drink allowance, and types of alcohol also seem to influence the amount of alcohol poured (Kerr & Stockwell, 2012). There is evidence to suggest people have a stronger level of proficiency when pouring a standard drink of beer, but there is greater variability in pouring a standard drink of wine or liquor (Kerr, Greenfield, Tujague, & Brown, 2005). Students have been found to overpour shots of mixed drinks by 80% and liquor and beer by about 25% (White, Kraus, McCracken, & Swartzwelder, 2003). The brand of alcohol also accounts for some of the variability in successfully pouring a standard drink of alcohol (Kerr et al., 2005). Collectively these studies support examining alcohol types and brands of alcohol when exploring the individual level of the college alcohol culture.

Risk behaviors associated with alcohol. Alcohol risk behaviors increase the likelihood of, or are associated with, high-risk drinking and negative consequences (Jessor & Jessor, 1977; Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995). Two common alcohol related risk behaviors among college students include drinking games (Borsari, 2004; Ragsdale et al., 2012) and driving after drinking (Paschall, 2003). The common denominator of both alcohol related risk behaviors is the possibility of death from just one night of drinking.

Among college students, the purpose of drinking is typically to get drunk (Boekeloo, Novik, & Bush, 2011; Crawford & Novak, 2006) and drinking games align with the purpose. By nature, drinking games like chugging alcohol or keg stands are a common activity to facilitate the consumption of a large amount of alcohol in a short amount of time; raising a person's BAC to potentially lethal levels (Borsari, 2004; Zamboanga et al., 2013). Driving under the influence of alcohol is also a familiar risk-related behavior among college students (Paschall, 2003). The rates of alcohol impaired driving are disproportionately higher among college students compared to their non-college peers (Hingson, Zha, & Smyth, 2017). Additionally, a fatal crash is more common among college aged people than any other age group (National Center for Statistics & Analysis, 2014).

Memory loss, shame, and embarrassment are additional consequences associated with and reported by students related to drinking games (LaBrie, Ehret, & Hummer, 2013). High-risk drinking among college students also results in students experiencing blackouts, physical assaults, injuries, unintended and unprotected sexual activity, and alcohol poisoning (Hingson et al., 2009; Perkins, 2002). At the institutional level, administrators are responsible for managing many of the second-hand consequences of college students' high-risk drinking. For example, damage to campus property is noted as a significant problem at IHEs because of high-risk drinking among college students (Wechsler, Moeykens, Davenport, Catillio, & Hansen, 1995). Additional institutional costs of high-risk drinking include student attrition, loss of perceived academic rigor, and poor relations with the surrounding community based on students' damage to property or violent acts associated with high-risk drinking (Perkins, 2002).

Protective behaviors associated with alcohol. The synergistic relationship of factors to create the college alcohol culture is exemplified by the inverse relationship between alcohol risk

and protective behaviors. Among first year students, high-risk drinking tends to increase and self-reported protective behaviors (i.e., avoid drinking and driving) tend to decrease during the first few weeks of the academic calendar (Nguyen, Walters, Wyatt, & DeJong, 2011). Most students acknowledge using at least one alcohol related protective behavior during some of their drinking episodes (Haines, Barker, & Rice, 2006). Alcohol related protective behaviors are associated with students' reporting drinking less (LaBrie, Lac, Kenney, & Mirza, 2011; Pearson, 2013) and experiencing fewer negative consequences when using the protective behavior (Araas & Adams, 2008; Delva et al., 2004; Haines et al., 2006; Martens et al., 2004; Ray, Turrisi, Abar, & Peters, 2009). Examples of alcohol related protective behaviors include eating before or during drinking, limiting the number of drinks, and avoiding drinking games (American College Health Association, 2011; Martens et al., 2005). For many college students, identifying a way of getting home before they start drinking, is viewed as a responsible action (Rapaport, Minelli, Angera, & Thayer, 1999). In fact, using a designated driver to get home is one of the most frequently reported protective behaviors associated with alcohol, among college students (DeJong & Winsten, 1999; Delva et al., 2004).

Institutional Factors

An editorial in *The Chronicle of Higher Education* described some IHEs as having an "organized collegiate drinking-infrastructure" (Carey, 2014, p. A72) and institutional factors have been found to be associated with the college alcohol culture of high-risk drinking and the negative consequences associated with high-risk drinking (Weschler, Davenport, Dowdall, Moeykens, & Castillo, 1994). The multi-year Harvard College Alcohol Study (Wechsler & Nelson, 2008) provides the most comprehensive examination of the association between individual and institutional factors to form the college alcohol culture. Specifically, the

institutional factors (i.e., size of the student population size and NCAA division) were examined in the Harvard College Alcohol Study. An examination of the relationship of HBCUs' affiliation to the college alcohol culture was not included within the Harvard College Alcohol Study.

A consistent trend revealed through the years of the Harvard College Alcohol Study, was the association between a large student population and a higher-prevalence of high-risk drinkers (Wechsler et al., 2000; Weitzman, Nelson, & Wechsler, 2003). NCAA Division I status IHEs tended to be associated with having a higher-prevalence of high-risk drinkers compared to Division II and Division III IHEs (Wechsler et al., 2000; Weitzman et al., 2003). Even though an analysis of HBCU affiliation was not part of the Harvard College alcohol study future research should include the factor because students attending HBCUs identify alcohol and impaired driving as common health concerns (Hale, Branch-Vita, & Ford, 2011). The only study found to compare students attending HBCUs to students attending predominately white institutions (PWIs) revealed students attending HBCUs tended to have lower drinking rates and fewer negative alcohol consequences compared to students attending PWIs (Meilman, Presley, & Cashin, 1995).

Environmental Factors

A social ecological framework enables IHEs to shift prevention efforts from being solely focused on individual factors to include an examination of institutional and environmental factors (DeJong & Langford, 2002). Alcohol sales, alcohol advertising, and availability of alcohol are all environmental factors that influence the college alcohol culture. Identifying associations between individual and environmental factors provides opportunities for effective strategies to reduce high-risk drinking and the negative consequences (Merrill & Carey, 2016). For example, at the University of Arizona, the homecoming football game was historically

associated with high-risk drinking among the students. To reduce high-risk drinking, the university changed the game time (an institutional factor) and applied keg restrictions (an environmental factor). The changes resulted in a decrease in alcohol related, game day violations (Johannessen, Glider, Collins, Hueston, & DeJong, 2001).

Sales of alcohol on game day. The growing trend among IHEs to allow alcohol sales during college football games (DeRusha, 2012; Opdyke & Kesmodel, 2009; Partnership for Drug-Free Kids, 2011; Peterson, 2011) contrasts with NIAAA recommendations to limit sales and availability of alcohol on a college campus (Malloy et al., 2002). (). About 25% of the 120 NCAA Division I football programs permit alcohol sales during the regular football season (DeRusha, 2012; Opdyke & Kesmodel, 2009; Peterson, 2011). An increase in revenue is the primary reason cited for selling alcohol at college football stadiums, but other reasons include enhancing the fan experience and increasing student attendance (Mehrotra, 2014; Mitchell & Montgomery, 2015). Proponents of alcohol sales during college football games suggest strategies, like setting drink limits or prohibiting alcohol sales after half time of a game, could reduce game day high-risk drinking and the associated negative consequences (Mitchell & Montgomery, 2015).

Advertisements for alcohol. A collusion between alcohol sales and alcohol advertising is apparent at some college football games (Smith & Lefton, 2017) even though restrictions on alcohol advertising is noted as an effective evidence-informed strategy to decrease college alcohol drinking (Malloy et al., 2002). Alcohol brands are often associated with sports because alcohol companies tend to spend the most in sponsorship for sport related events (Belt et al., 2014). An integration of specific brands to a targeted sport is a popular marketing strategy for the largest alcohol companies; that is, Budweiser targets the National Basketball League and Bud

Light targets the National Hockey League (Lefton, 2009). Dos Equis became the first official beer sponsor of the college football playoffs in 2016 (Smith & Lefton, 2017) and the relationship has been described as an opportunity to help fans, "stay thirsty" (Heineken, 2016). The impact of alcohol advertising and HBCUs is understudied even though Black communities, the location of many HBCUs, are disproportionately besieged by alcohol advertisements (Kwate, Jernigan, & Lee, 2007; Kwate & Lee, 2007).

Availability of alcohol. Tailgating events are popular before college football games and typically include alcohol (Drenton, Peters, Leigh, & Hollenbeck, 2009). People attending tailgating events are about three times more likely to engage in high-risk drinking than other spectators at an event (Lawrence, Hall, & Lancey, 2012). At one Midwest IHE most people attending a tailgate event consumed alcohol and had BACs higher than the legal driving limit (Glassman et al., 2011). The availability of alcohol to students is also influenced by the location of the institution to outlets that sell alcohol. The density of alcohol outlets to an IHE have been associated with high-risk drinking and negative alcohol related consequences (Weitzman, Folkman, Folkman, & Wechsler, 2003). Among non-HBCUs the surrounding communities tend to be diverse settings with alcohol served in bars or restaurants; however, HBCUs are typically located in urban neighborhoods with liquor stores near (LaVeist & Wallace, 2000).

The Emergence of Social Media

Students' individual behaviors combined with institutional and environmental factors create the college alcohol culture on campuses across the United States of America. New factors like social media have emerged and influence the college alcohol culture. Within social media the normalization of high-risk drinking with minimal consequences is pervasive (Griffiths & Casswell, 2010). The college alcohol culture is emerging within social media but there is a

paucity of research because of the breadth of social media and the interaction of multiple factors contributing to the college alcohol culture. A review follows of Twitter and the unique opportunity tweets within the hashtags associated with IHEs provide to examine the college alcohol culture.

Twitter

Twitter provides a forum for instantaneous sharing of information, thoughts, pictures, and links to sites among followers of similar mind sets (Kwak, Lee, Park, & Moon, 2010; Muralidharan, Rasmussen, Patterson, & Shin, 2011). Globally, Twitter has been used to communicate about shared situations (e.g., conferences), emergencies (e.g., earthquakes), and events like presidential debates (Milstein, Chowdhury, Hochmuth, Lorica, & Magoulas, 2008). In a nationally representative study of IHEs, social media was used by all IHEs to communicate with students, primarily as a recruitment strategy (Barnes & Mattson, 2010). The peer to peer communication of Twitter is also infused into college courses to provide students a space to communicate within and beyond the physical classroom (Aspden & Thorpe, 2009; Kassens-Noor, 2012).

Tweets have been described as the twenty-first centuries' telegrams (Grajales, Sheps, Ho, Novack-Lauscher, & Eysenbauch, 2014). Twitter users can create tweets (i.e., messages) in 280 characters or less to interact with other people or groups about interests, events, thoughts, and ideas. Twitter users can reply to others, comment on a tweet, join a conversation, retweet to share another user's tweet, favorite a tweet by selecting the heart icon, and use a hashtag in a tweet to join the conversation (e.g., #WorldCup). Alcohol advertisers have harnessed the benefits of Twitter to share content and generate new content. Budweiser created 286 tweets, in a five-

month period, and the tweets were retweeted by their followers 13,523 times (Dadich, Burton, & Soboleva, 2013).

In 2007, the hashtag was first used in Twitter to organize discussions and is now used across social media platforms (Brandom, 2013; Smarty, 2015). A hashtag is a word or phrase preceded by the pound or hash sign (#); a hashtag becomes a searchable link within Twitter (St. John, 2015). Hashtags within Twitter make sharing easier (Patterson, 2014) by creating a collective conversation for people to react, cope, and express thoughts about the event or topic (Tournas, 2013). Students can participate in a conversation or even a social movement by including a hashtag in their tweet. For example, college students gathered and tweeted #BostonStrong in response to the capture of the accused bombers during the 2013 Boston Marathon (Tournas, 2013). Graduation is another popular time for IHEs to use Twitter hashtags because it provides a forum for commentary on a shared experience (Wilburn, 2008). The hashtag has been used to generate new content by Twitter users. The alcohol brand, Ciroc, used #IheardDiddy to encourage followers to share stories about PDiddy (i.e., the celebrity brand ambassador): #IheardDiddy single handily beat the 1992 dream team (Meredith, 2014).

Social media can be included in the examination of the college alcohol culture through a social ecological framework (Sudhinaraset, Wigglesworth, & Takeuchi, 2016). The literature review will now turn to a discussion of using a social ecological framework to understand the relevance of social media to the college alcohol culture. A brief description of the synergistic relationship of the college alcohol culture and social media in relation to glamorizing high-risk drinking, minimizing negative consequences associated with high-risk drinking, and college football will be provided. The social ecological framework will then be applied to studying the

college alcohol culture of tweets, using identified IHE hashtags, based on individual, institutional, and environmental factors.

Social media's relevance to the college alcohol culture: Using a social ecological framework

Social media is influencing social systems (boyd, 2014) and the individual, institutional, and environmental factors of the college alcohol are not exempt from the influential nature of social media. When social media is examined from a social ecological framework the individual is at the center. Social media is a familiar environment to college students and provides a place to share their personal alcohol behaviors (Moreno, 2011). Institutionally, one of the most apparent infusions of social media and college culture is within the world of college athletics. Social media is designed to be used for social interaction (Lutrell, 2014) and college sports are by nature a social interaction associated with building a sense of community (Warner & Dixon, 2013). The environmental level of the social ecological framework including the normative behavior of high-risk drinking, with minimal consequences, apparent in television, movies, and music is also emerging within social media (Jernigan, 2011; Stoddard et al., 2012).

The hashtag, specifically, has been described as the watercooler conversation of the virtual age because of the interactive nature of the communication tool (Smith & Smith, 2012). Collegiate athletic programs use hashtags to encourage dialogue and brand their programs (Cooper, 2010). A study of hashtags, used by fans in the College Baseball World Series, revealed the hashtags were used to communicate throughout the game about call selection by the officiating crew along with cheering and taunting their respective teams (Smith & Smith, 2012). Alcohol advertisers capitalize on innovative strategies, like the hashtag, to engage and connect with college students (Chester, Montgomery, & Dorfman, 2010; Jernigan, 2009; Lutrell, 2014). One example is the Beam liquor alcohol marketing team that used the hashtag (e.g.,

#mycostume) to connect with students and support the normalization of alcohol consumption on Halloween (Schultz, 2012). Alcohol advertisers embrace hashtags (e.g., #alwayslimeoclock, #musicmonday, #roadtothefinals, #superbowl) to associate their brands with positive themes and events (Dadich et al., 2013).

A review follows of the synergistic relationship of individual, institutional, and environmental factors emerging within the college alcohol culture of social media. The social media factors described in the literature review and examined in this study include: individual (i.e., references to the types and brands of alcohol as well to protective and risk behaviors), institutional (i.e., size of student population, NCAA division, and HBCU affiliation), and environmental (i.e., alcohol sales, alcohol availability, and alcohol advertisement). While most alcohol related research in social media has been focused on Facebook, research related to Twitter (the social media focus of this study) will be described when available.

Social media's relevance: Individual factors.

Most of the research associated with the college alcohol culture within social media is focused on the individual and the social media platform of Facebook. For example, alcohol is referenced on most Facebook public profile pages of college students and underage drinkers (Egan & Moreno, 2011; Fournier & Clarke, 2011; Moreno et al, 2010; Ridout, Campbell, & Ellis, 2012). Other studies have revealed an association between college students' alcohol related Facebook photos or status updates with high-risk drinking intentions (D'Angelo, Zhang, Eickhoff, & Moreno, 2014) and high-risk drinking behavior (Moreno, Cox, Young, & Haaland, 2015; Ridout et al., 2012; van Hoof, Bekkers, & van Vuuren, 2014; Westgate, Neighbors, Heppner, Jahn, & Lindgren, 2014). Among a group of first year students, there was a 40% increase in alcohol related Facebook posts and a 20% increase in high-risk drinking by the end of

their first year in college (Moreno et al., 2014). The individual factors that will be examined in this study include social media references to the types and brands of alcohol along with references to alcohol related risk and protective behaviors.

References to types and brands of alcohol. Advertisers in traditional media or social media want to connect with people for a positive brand experience with their product. Some brands of alcohol have been found in emerging adults' photos within social media (Griffiths & Casswell, 2010). Social media provides alcohol advertisers an ideal opportunity to personally connect with their current and future customers. Alcohol brands become part of everyday life by creating a "personality" in social media to meet their primary audience (Jernigan, 2011). For example, tweets from Budweiser were targeted to young men to illicit athletic aspirations (e.g., #tothedream) while Malibu generated a more personal, intimate persona by tweeting birthday wishes, with a smiling emoticon, to individual followers (Purves, Stead, & Eadie, 2014). A study in the United Kingdom, to examine children's familiarity with alcohol brands and advertising, found children as young as 10 years of age recognized alcohol logos more frequently than logos for Ben & Jerry's ice-cream (Alcohol Concern, 2012).

References to alcohol related risk behaviors. Alcohol-related risk behavior is evident in social media. References to alcohol related risk behaviors (e.g., drinking games, beer pong, and keg stands) have been observed via a content analysis of college students' Facebook status (Moreno et al., 2010). Even though most college alcohol research has focused on Facebook there are risk behaviors emerging on Twitter and Twitter may be the preferred social media platform to share high-risk behavior (Madden et al., 2013; Morgan, Snelson, & Elison-Bowers, 2010). Twitter users, 14 to 17 years of age, report moving from Facebook to Twitter for greater anonymity and more freedom to express themselves (Madden et al., 2013). Among emerging

adults on Twitter, when exposed to pro-alcohol related tweets they are more likely to self-report their own high-risk alcohol use (Cabrera-Nguyen, Cavazos-Rehg, Krauss, Bierut, & Moreno, 2016).

Among a sample of general Twitter users in the public, "drunk" was the most common alcohol term followed by "beer" (Cavazos-Rehg, Krauss, Sowles, & Bierut, 2015). Additionally, references to high-risk drinking (e.g., It takes only 1 drink to get me drunk. The trouble is I can't remember if it's the thirteenth or the fourteenth) were found in half of the tweets (Cavazos-Rehg et al., 2015). Neknominate was a drinking challenge game that originated on Twitter and spread to other social media platforms (Nguyen, 2014). The international sensation was based on videos of people drinking or "necking" a large amount of alcohol and then nominating friends to also accept the challenge (Groom, 2014). Five deaths have been linked to the neknominate phenomenon (Wilkinson & Soares, 2014).

The phenomenon of minimizing negative consequences on social media has been described as "air-brushing" high-risk drinking episodes (Niland, Lyons, Goodwin, & Hutton, 2014). Students acknowledge posting alcohol related consequences (i.e., illness and violence) they viewed as humorous (Hebden, Lyons, Goodwin, & McCreanor, 2015). However, consequences like unconsciousness were deemed as too extreme to post on Facebook because a potential employer could view the picture (Hebden et al., 2015). College students also admit that the fun-loving pictures of alcohol use on Facebook do not tell the entire story of how the night ended by falling down the stairs or other negative consequences (Lyons, Goodwin, McGreanor, & Griffin, 2015).

References to alcohol related protective behaviors. Even though most college students use at least one type of protective behavior when consuming alcohol (Haines et al., 2006) there is

no current data to suggest protective behaviors are included in social media. No studies were found to examine the protective behaviors of college students within Twitter or any other social media. The tweets within the general population have been examined based on a pro or anti-alcohol sentiment: most of the tweets were pro-alcohol, 13% of tweets had a neutral sentiment, and seven percent had an anti-alcohol sentiment referencing the dangers of alcohol, disliking drunk people, or a reference to recovering from alcohol problems (Cavos-Rehg et al., 2015). Among alcohol companies a one-month scan revealed only seven tweets referencing any type of protective behavior (e.g., Celebrate #MojitoMonday responsibly); typically, the reference was to a vague behavior characteristic of alcohol companies marketing (Nicholls, 2012). The "drink responsibly" messages embedded within some alcohol marketing tends to be ineffective and ambiguous when providing a presumable protective behavior in the message (Smith, Atkin, & Roznowski, 2006; Smith, Cukier, & Jernigan, 2014; Thomsen, & Fulton, 2007). In one study, the majority of alcohol related tweets were from individual people compared to alcohol advertisers and the authors noted the potential influential effect of high profiled people on Twitter sharing protective alcohol behaviors during specific high-risk times (Cavazos-Rehg et al., 2015).

Social media's relevance: Institutional factors

Twitter and Facebook are the leading social media platforms used by IHEs to engage with students before students arrive on campus and to communicate with alumni and the general community (Greenwood, 2012). The rate of students' engagement with IHEs' Facebook accounts has declined; however, students' engagement has increased with IHEs' Twitter accounts (Noel-Levitz, 2013). The tweets of faculty members reflect a range of themes from sharing information about their scholarly work and classroom practices to connecting and networking with others (Seaman & Tiniti-Kane, 2013; Veletsianos, 2012). College athletic

programs use social media to assist with branding their programs (Cooper, 2010) and college football Twitter accounts are some of the most active accounts (Clavio, Burch, & Frederick, 2012). The University of Massachusetts at Lowell was one of the first college athletic programs to embed a hashtag (i.e., #CodeBlue) into their digital scoreboard to ensure a social media presence throughout the game (Gibbs, 2013).

Studies illuminating a relationship between institutional factors, the college alcohol culture, and social media are limited but there is some emerging research of the relationship. Among first year students at two different IHEs, the number of alcohol related Facebook posts increased among all students but there were differences in the number of posts by institution to suggest the alcohol culture may differ between IHEs (Moreno et al., 2014). A study with Twitter used global positioning data to determine the number of tweets with the word "Adderall," the most commonly abused prescription stimulant among college students. The number of tweets during a period of final exams with a reference to "Adderall" were higher among college students in the Northeastern portion of the United States, compared to the entire United States (Hanson, et al., 2013). Prior to social media the pressure to drink and portray a "party" persona was limited to students' peer group; post social media the influence of social media to embrace a "party" persona can be influenced by the culture of the institution. A student participating in an ethnographic study of Facebook shared, "I think definitely at SU everyone wants to have this party school reputation…most of the students want to portray the image just to tell everyone else, yeah I'm getting in on the action" (Birnbaum, 2013, p. 161).

Social media's relevance: Environmental factors

The environmental factors (i.e., alcohol sales, availability, and advertisements) of the college alcohol culture are interrelated and the factors are also reflected within social media. No

studies were found to specifically examine a relationship among alcohol sales or availability with social media. Alcohol advertising in general has been linked to the alcohol culture but establishing the specific links to the college alcohol culture can be challenging because of the multiple influences on college student behavior (Hastings, Anderson, Cooke, & Gordon, 2005). Television and billboards were historically the focus of alcohol advertisements, but social media is providing a new platform for alcohol advertising. Most underage people report seeing some type of alcohol advertising on the Internet (McClure et al., 2016). In fact, the Internet versions of television shows (e.g. The Daily Show, The Colbert Report) include alcohol advertising of alcohol brands popular among underage drinkers (Siegel et al., 2016).

Alcohol related social media engagement explains high-risk drinking patterns more than general social media engagement (Hoffman, Pinkleton, Weintraub-Austin, & Peyes-Velazquez, 2014). In one study, with college students at two different IHEs (one public and one private), 35% of students reported watching alcohol advertising on social media and 15% used Twitter to receive updates from alcohol companies, the students at the public IHEs were more likely to engage in the activities compared to students at the private IHEs (Hoffman et al., 2014). High-risk drinking is associated with alcohol sales' promotion, like advertising beer specials (Kuo, Wechsler, Greenberg, & Lee, 2003), and social media is an ideal tool for the promotions (Fischer & Hoover, 2014).

Jack Daniels advertisements were the first alcohol related advertisements to appear on Twitter and the amount of money spent was reported to be equivalent to television advertising (Dugan, 2011). Marketing strategies used by alcohol marketers on Facebook and Twitter include: associating messages with real time events (e.g., Smirnoff's worldwide concerts included tweets encouraging engagement: "Were you at the Nightlife Exchange? We want #stories. We want

#pictures. Go!"), interactive games or quizzes (e.g., If you were a Blossom Hill wine, which would you be?), along with encouragement to drink (e.g., Bacardi's #MojitoMonday). Assessing the impact of alcohol advertising within social media requires new approaches because of the challenge to correlate the amount of social media exposure to people under the legal drinking age (Jernigan & Rushman, 2014). Alcohol advertising sometimes blurs the line between an advertisement and sponsorship of a special promotion (Jernigan, 2011). For example, the Jim Beam Party Crew generated engagement on social media by attending motorsport venues throughout the year, 12,000 likes on Facebook were garnered in one year (Carah, 2014). A study conducted between 2009 and 2013 revealed a significant increase in the number of followers along with engagement with the alcohol related posts and pictures of the 16 most popular alcohol brands; followers were essentially becoming brand ambassadors by engaging with the alcohol brands social media account (Jernigan & Rushman, 2014).

Gaps in the Literature and Purpose of this Study

The influence and presence of social media is apparent in the alcohol culture and social media is also reshaping data collection (boyd, 2014; Paul & Dredze, 2011). Twitter is unique because it provides accessible health related data to monitor unique social interactions (Korda & Itani, 2013; Loss, Lindacher, & Curbach, 2014). This study used the tweets within hashtags associated with IHEs to examine the synergistic relationship between individual, institutional, and environmental factors of the college alcohol culture. Specifically, this study explored the college alcohol culture within Twitter, by examining hashtags associated with IHEs, and capitalizing on the Twitter search function as an avenue for data collection.

Exploring the College Alcohol Culture in Twitter

When interactions on social media platforms such as Twitter are used as data it is comparable to observing students in their natural environments (Li & Bernoff, 2009), and can provide prevalence and incidence rates of alcohol use among college students (Greenfield & Kerr, 2008). The alcohol culture within Twitter is understudied and only three studies were found to examine the college alcohol culture within Twitter. These studies highlight specific peaks in alcohol references, the power of engagement within social media, and the use of hashtags in alcohol advertising.

In the first study, the frequency of alcohol-related tweets was monitored over a four-month period with the greatest peaks of tweets during the weekends and significantly higher during the New Year Eve's weekend (West, et al., 2012). In the second study, the alcohol-related tweets from some of the most engaged Twitter users (i.e., those with the highest Klout scores, a numerical social media influencers' score) peaked around spring break and Saint Patrick's Day with 54% of the tweets referencing high-risk or frequent drinking (Cavazos-Rehg et al., 2015). The researchers report that a tweet from the musician, Lady Gaga, was retweeted 8,000 times and reflects a culture of alcohol, "Happy st Patricks day. Ay the sound of trashed New Yorkers. Grab some green beer and no other instruments. My bf is Irish forgive me" (Cavazos-Rehg, et al., 2015). In the third study, among tweets with alcohol reference words (e.g., beer, wine) a tweet with a hashtag was more likely to be an alcohol advertisement than a tweet without a hashtag (Menom, et al., 2014). The infusion of social media sites, such as Twitter into student life means there is accessible data to observe the unique social interactions within the college culture (Korda & Itani, 2013; Loss, Lindacher, & Curbach, 2014; Lewis, Kaufmann, Gonzalez, Wimmer, & Christakis, 2008), including the college alcohol culture (McCreanor et al., 2013).

Examining Hashtags Associated with IHEs

The tweets within hashtags may provide valuable data about the college alcohol culture because IHEs are using Twitter for multiple purposes. To date, alcohol research within Twitter has focused on the tweets (Cavazos-Rehg, et al., 2015; Menom, et al., 2014; West, et al., 2012); no studies were found that utilize the tweets within hashtags associated with IHEs to examine the college alcohol culture. The effectiveness of hashtags has been singled out for its usefulness in collecting data on tweets. The hashtags can be quantified based on frequency of use, specificity to topic, consistency of use among users, stability over time (Laniado & Mika, 2010), and have become an important part of Twitter analysis (Efron, 2010).

Using hashtags as data is akin to collecting data in a different manner than surveys and focus groups (Li & Bernoff, 2009). A hashtag associated with an IHE provides a collective conversation of tweets related to the IHE. For example, a person may tweet about chugging a specific brand of alcohol while watching a college football game. The tweet could include individual factors associated with the college alcohol culture (i.e., an alcohol related risk behavior and a brand of alcohol). The hashtag provides a link to institutional (e.g., NCAA division) and environmental (e.g., alcohol sales) factors associated with the IHE. Tweets provide an insight into individual factors and hashtags provide a unique tool to assist in examining the institutional and environmental factors associated with the college alcohol culture.

Since hashtags can be viewed by anyone, an examination of the tweets within the hashtags provides an innovative approach to acquire accurate and time sensitive population level data. Among individual IHEs this approach may prove useful for administrators who want to understand an IHE's unique college alcohol culture. For the collective understanding, examining hashtags provides an opportunity to examine differences across campuses. The current research

related to the college alcohol culture in social media is marginalized because most studies include only individual IHEs (Thompson & Romo, 2016) or occur outside of the United States of America (Erevik, Torsheim, Vedaa, Andreassen, & Pallesen, 2017). References to type and brands of alcohol, alcohol risk and protective behaviors, alcohol related consequences, and alcohol availability, sales, and advertisement are all factors related to the college alcohol culture and have not yet been explored within the tweets of hashtags used in Twitter.

Capitalizing on Twitter Search Feature

Examining alcohol references in popular social media platforms like Twitter, and more specifically the tweets of identified IHE hashtags,, is unexplored social media territory related to the college alcohol culture. Twitter provides a unique opportunity to search for key terms (Bosley et al., 2013). The advanced search function of Twitter allows users to search for tweets by combinations of key words (including hashtags), people (Twitter accounts), and dates. The risk factors (e.g., drinking games, beer pong, keg stands, and partying) that have been found via content analyses of Facebook statuses with college students and popular music (Moreno et al., 2010; Primack, Dalton, Carroll, Agarwal, & Fine, 2008) provide a framework for alcohol reference terms common about college students.

Conclusions and Context of Current Study

Social media is an emergent factor associated with the college alcohol culture. Students along with institutional and environmental factors creating the college alcohol culture are not stagnant, but rather, dynamic factors that are influenced by emergent factors. The exploration of the college alcohol culture within Twitter has been understudied and the tweets within hashtags associated with IHEs have not been studied for alcohol related content.

This study contributes to the research by examining multiple IHEs and the tweets within the identified IHE hashtags. Additionally, the time studied is unique because it marks the starting point for the allowance of alcohol sales during the regular and tournament seasons of college football games. Prior to the 2014 and 2015 football season, alcohol sales were only allowed during the regular season football games (Tracy, 2015). This study includes the IHEs represented in the 2014-2015 football championship tournaments for each NCAA division (i.e., College Football Bowl, Division II, and Division III) along with the HBCU Classics (i.e., regular season games with the feel of a tournament game), to include IHEs typically underrepresented within the college alcohol research. During the 2014-2015 football season, 32 IHEs sold alcohol during football games (DeRusha, 2014) and thirteen of these IHEs were also represented in football championship tournaments.

The college alcohol culture within Twitter has been understudied even though Twitter provides unique opportunities to discover emerging or existing trends (Prier, Smith, Giraud-Carrier, & Hanson, 2011). In addition to searching for beverage type (beer, spirits, and wine), brand-specific drinking measures can be searched within Twitter (Kerr, et al., 2005). Alcohol research is expanding to include measuring alcohol prevalence use with questions about both types of alcohol and brands of alcohol to provide a more accurate representation of alcohol consumption (Kerr et al., 2005). The top 25 alcohol brands used in the past 30 days among underage drinkers (Siegel et al., 2013) along with the top alcohol "binge brands," those that underage drinkers report using in a high-risk manner (Naimi, Siegel, DeJong, O'Doherty, & Jernigan, 2015) provide a useful list of search terms for examining the college alcohol culture. A binge brand list (Naimi et al., 2015) exists but has not been examined in Twitter.

The purpose of this study is to utilize the social ecological framework to explore the college alcohol culture of tweets using identified IHE hashtags. This study explores the dynamic relationship of individual, institutional, and environmental factors. In addition, hashtags provide a unique tool to explore gaps within the literature. This study capitalizes on the search feature of Twitter to examine novel trends (e.g. the Neknominate drinking game) and growing trends (i.e., alcohol sales during college football games) associated with the alcohol risk behavior, along with emergent variables (i.e., types of alcohol versus brands of alcohol) in the alcohol literature.

Research Questions

Due to the paucity of research within Twitter the two primary research questions, and sub-questions, are exploratory.

Research Question 1

How frequently are alcohol reference terms mentioned in the tweets of identified IHE hashtags?

Research question 1, sub-questions. a.) How frequently are types of alcohol and alcohol brands mentioned in the tweets of identified IHE hashtags?, b.) How frequently are alcohol binge brands and popular alcohol brands mentioned in the tweets of identified IHE hashtags?, c.) How frequently are alcohol risk and protective behaviors mentioned in the tweets of identified IHE hashtags?, and d). Do institutional and environmental factors account for differences in the frequency of alcohol reference terms in the tweets of identified IHE hashtags?

Research Question 2

What does the content of tweets reveal about the most common alcohol reference term?

Research question 2, sub-questions. a.) What does the content of tweets, with the most common alcohol reference term, reveal about alcohol risk and protective behaviors?, b.) What

does the content of tweets, with the most common alcohol reference term, reveal about alcohol associated consequences to the person, other people, or the institution?, c.) What does the content of tweets, with the most common alcohol reference term, reveal about references to alcohol sales, advertisements, or availability to alcohol?, and d.) Do institutional factors and environmental factors account for differences in the content of alcohol related tweets?

Study

Before the actual study was implemented, a pilot study was conducted to confirm the presence of alcohol reference terms in the tweets of identified IHE hashtags. The identified IHE were retrieved through a multi-step process, and the study that is described below utilizes data retrieved from this pilot study (see Appendix A for a complete description of the pilot study and the multi-step process to retrieve the hashtags).

Sample

All data for this study were publicly available, and the study was designated as a non-human subject study by the Institutional Review Board at Georgia State University. Publicly available English language tweets (N = 10,851) were analyzed in the current study. The tweets were posted between August 1, 2014 and January 15, 2015 within the hashtags of IHEs involved in the football classics or tournaments, during the football season. The football classics and tournaments were: the HBCUs Football Classics (2014 HBCU Classics Football Schedule, 2014; Gibson, 2014), the College Football Bowl tournament (Kirk, 2014), along with the championship tournaments for NCAA Division II and III football (NCAA Division II football season, 2014; NCAA Division III football season, 2014). A complete list of IHEs, by the football tournament, are in Appendix B, tables 1-4. The institutional factors (i.e., size of student population, NCAA division, and HBCU affiliation) along with identifying the status of alcohol sales during college

football games (i.e., the environmental factor) are also located in Appendix B, tables 1-4. The tweets were extracted from hashtags associated with 136 IHEs with at least one unique hashtag (see Appendix C tables 1-4 for the list of IHEs, the Twitter handles, and identified hashtags included in the study).

Methods

Tweets within identified IHE hashtags were used to examine factors related to the college alcohol culture, during a college football season. The multi-step process of data collection included: retrieving hashtags associated with IHEs, extracting the tweets with alcohol reference terms, assigning level-2 variables to the tweets, aggregating tweets to create level-1 variables for research question number one, and coding the tweets, based on a content reading of the most frequently used alcohol reference term, for research question number two.

Retrieving hashtags. The identified IHE hashtags were collected during the pilot study (see Appendix A for the pilot study protocol and results). The Twitter accounts for IHEs included institutional, athletic, and football accounts, if available. The hashtags used in this study were identified as associated with the respective Twitter accounts because the hashtag was either promoted on an institutional website or frequently used within the Twitter account. The complete list of identified IHE hashtags are in Appendix C, tables 1-4. The number of unique identified IHE hashtags for each IHE is in Appendix D tables 1-4.

Extracting tweets. Alcohol reference terms (Tables 1-3) were paired individually with each hashtag in the Twitter advanced search feature. The advanced search function provided data entry into the following cells: this exact phrase (e.g., beer), in these hashtags (e.g., #LSU), along with a start and end date (i.e., August 1, 2014 start and January 15, 2015 end). The advanced search function in Twitter was compressed to the following code: "beer" #lsu since:2014-08-01

until:2015-01-15. This process resulted in a display of publicly available tweets with the alcohol reference term highlighted. The process is the same process used in the pilot study (see Appendix A). The tweets with an alcohol reference term were copied and pasted into an Excel spreadsheet. Tweets were assigned dichotomous variables (i.e., 0,1) for all alcohol reference terms. A numeric value of one indicated that the alcohol reference term (e.g., wine) was present in the tweet when the search was completed (i.e., "wine" #lsu since:2014-08-01 until:2015-01-15); zero indicated that the alcohol reference term (e.g., wine) was not present within the tweet. Tweets were assigned the appropriate institutional and environmental variables based on the origin of the hashtag, the associated IHE. The process to extract tweets with an alcohol reference term from a hashtag was tested in the pilot study, as described in Appendix A. The level 1 and 2 factors are described below and included in Figure 1.

Level-2 Factors: Institutional and environmental. Each tweet with an alcohol reference term was assigned institutional and environmental factors based on the hashtag in the tweet. The level-2 factors are institutional (i.e., size of student population, NCAA division, and HBCU affiliation) and environmental (i.e., the sale of alcohol during the 2014-2015 football season) factors. Dichotomous variables were created for each level-2 factor. The institutional factors were retrieved from the National Center for Education Statistics (2016). The environmental factor of alcohol sales during the 2014-2015 football season was retrieved from a newspaper article (Mehrotra, 2014).

Size of the student population. The size of the student population (i.e., IHE_SIZE) was categorized as large (i.e., 1) if size was more than 10,000 students, medium (i.e., 2) if size was between 5,001 and 10,000, and small (i.e., 3) for sizes fewer than 5,000 students (Wechsler et al., 2000; Weitzman et al., 2003). A dichotomous variable was then created for each categorized

population size (i.e., large, medium, or small), with the exclusion or inclusion in the size category, 0 or 1, respectively (i.e., IHE_LARG, IHE_MED, IHE_SMAL).

NCAA division. The NCAA division (i.e., IHE_NCAA) was categorized by NCAA 1A, NCAA 1AA, Division II, Division III, and National Association of Intercollegiate Athletics (NAIA) division. A dichotomous variable was also created for each of the five NCAA division to distinguish exclusion or inclusion in the division as 0 or 1, respectively (i.e., IHE_1A, IHE_1AA, IHE_II, IHE_III, and IHE_NAIA).

HBCU affiliation. The HBCU affiliation (i.e., IHE_HBCU) was a dichotomous variable to represent not an HBCU as 0, and as 1 to represent an HBCU.

Environmental sales. The status of alcohol sales (i.e., ENV_SALE) was a dichotomous variable to represent no alcohol sales on football game day (coded as 0) and alcohol sales on football game day (coded as 1).

Level-1 factors: Aggregated tweets. Research question number consisted of a series of exploratory questions related to the frequency of alcohol reference terms in the tweets of identified IHE hashtags. Tweets with an alcohol reference term were aggregated to represent the total number of tweets with the specific alcohol reference term (e.g., wine). The tweets with alcohol reference terms, within a category, were then aggregated to form a new variable to represent the alcohol reference category (e.g., types of alcohol). For research question number one, the number of tweets were aggregated to create variables to examine the exploratory questions related to the frequency of alcohol reference terms. The six variables created, based on the alcohol reference terms, were the following level-1 factors: type of alcohol, brand of alcohol, binge or popular brand, risk behavior, or protective behavior. The level-1 factors were used as the outcome variables for the research questions.

Types of alcohol. The alcohol reference terms that represented a type of alcohol were one of 11 alcohol reference terms: beer, alcohol, wine, bourbon, gin, rum, scotch, tequila, vodka, whiskey, or liquor (Table 1). Each tweet was assigned a dichotomous variable for type of alcohol (i.e., 0 = tweet did not include the specific type of alcohol or 1= tweet did include the specific type of alcohol). The tweets with one of the alcohol reference terms, within the category of types of alcohol, were aggregated to form the variable: Types of alcohol or the number of tweets with one of eleven alcohol reference terms referencing a type of alcohol in the tweet.

Brands of alcohol. The alcohol reference terms that represented a brand of alcohol were one of 28 names of alcohol brands (Table 2). Each tweet was assigned a dichotomous variable for brand of alcohol (i.e., 0 = tweet did not include a brand of alcohol or 1 = tweet did include a brand of alcohol). The tweets with one of the alcohol reference terms, within the category of brands of alcohol, were aggregated to form the variable: Brands of alcohol or the number of tweets with one of 28 alcohol reference terms referencing a brand of alcohol in the tweet.

Binge brands. The alcohol reference terms that represented a binge brand of alcohol were one of eight names of alcohol brands (Naimi et al., 2015) that were defined exclusively as a binge brand (Table 2). Each tweet was assigned a dichotomous variable for binge brand of alcohol (i.e., 0 = tweet did not include a binge brand of alcohol or 1 = tweet did include a binge brand of alcohol). The tweets with one of the alcohol reference terms, within the category of binge brands of alcohol, were aggregated to form the variable: Binge brands of alcohol or the number of tweets with one of eight alcohol reference terms referencing a binge brand of alcohol in the tweet.

Popular alcohol brands. The alcohol reference terms that represented a popular alcohol brand were one of eight names of alcohol brands (Naimi et al., 2015) that were defined

exclusively as a popular brand (Table 2). Each tweet was assigned a dichotomous variable for popular brand of alcohol (i.e., 0 = tweet did not include a popular brand of alcohol or 1 = tweet did include a popular brand of alcohol). The tweets with one of the alcohol reference terms, within the category of popular brands of alcohol, were aggregated to form the variable: Popular brands of alcohol or the number of tweets with one of eight alcohol reference terms referencing a popular brand of alcohol in the tweet.

Risk behaviors. The alcohol reference terms that represented a risk behavior (Table 3) were one of four behaviors defined as an alcohol-related risk behavior (i.e., drinking games, beer pong, keg stands, or Neknominate). Each tweet was assigned a dichotomous variable for risk behavior (i.e., 0 = tweet did not include a risk behavior, or 1 = tweet did include a risk behavior). The tweets with one of the alcohol reference terms, within the category of risk behaviors, were aggregated to form the variable: Risk behaviors of alcohol or the number of tweets with one of four alcohol reference terms referencing an alcohol-related risk behavior in the tweet.

Protective behaviors. The alcohol reference terms that represented a protective behavior (Table 3) were one of two behaviors defined as an alcohol-related protective behavior (i.e., designated or sober driver). Each tweet was assigned a dichotomous variable for protective behavior (i.e., 0 = tweet did not include a protective behavior, or 1 = tweet did include a protective behavior). The tweets with one of the alcohol reference terms, within the category of protective behaviors, were aggregated to form the variable: Protective behaviors of alcohol or the number of tweets with one of two alcohol reference terms referencing an alcohol-related protective behavior in the tweet.

Level-1 factors: Coded tweets. The tweets with the most common alcohol reference term were used exclusively for research question two. The tweets were read for content and two

people coded the tweets based on the alcohol-related factors of: behavior (i.e., an individual's level of alcohol-related risk and protective behaviors), consequences (i.e., associated to an individual, institution and the environment), and the environment (i.e., alcohol sales, alcohol availability, and alcohol advertisements). All tweets were first considered in the default category of the alcohol-related factor. The variables created represent the total number of tweets with the alcohol factor. The primary author and a professional with a Master's in Public Health coded the tweets with the most frequently found alcohol reference term. A sample of 10% of the tweets were selected for coding until an inter-rater reliability of 0.90 was established for each factor. The codebook, included in Appendix E, was created based on the pilot study for the current study.

Coded behaviors. The behavior factor refers to the protective or risk behaviors associated with high-risk drinking among college students. The behavior factor is used to classify a tweet according to the behaviors referencing alcohol-related protective or risk factors (i.e., to self or others) associated with the alcohol reference term.

Coded risk. A tweet with an alcohol-related high-risk behavior (e.g., drinking games), a quantifiable referent to excessive drinking (e.g., endless supply, more than five drinks for men or three drinks for women), or expressed intoxicated states (e.g., drunk) were coded as risk behavior. A tweet was assigned a dichotomous variable for, coded risk (i.e., 0 tweet did not include a high-risk behavior, or 1 tweet did include a high-risk behavior).

Coded protective. A tweet was coded as including an alcohol-related protective behavior if there was an action that assisted with the reduction of alcohol consumption and the negative consequences associated with alcohol use. A tweet was also coded as protective if there is an expression of consuming alcohol in a low risk manner (i.e., no more than four drinks for men or

two drinks for women). A tweet was assigned a dichotomous variable for, coded protective (i.e., 0 tweet did not include a protective behavior, or 1 tweet did include a protective behavior).

Coded consequences. The factor referring to consequences include consequences associated with general alcohol use and those specific to college students.

Individual consequences. Individual consequences result in (or with the possibility of) damage to a person's self because of high-risk drinking (e.g., missed class, impaired driving, hangover). A tweet containing an individual consequence of alcohol in the tweet was coded as an individual consequence. A tweet was assigned a dichotomous variable for, individual consequences (i.e., 0 = tweet did not include an individual consequence, or 1 = tweet did include an individual consequence).

Other consequences. Other consequences result in (or with the possibility of) damage to others and may be more likely reported by non-drinkers experiencing secondary alcohol-related consequences (e.g., noise violation, property damage, spilled alcohol). A tweet containing an alcohol-related consequence to other people in the tweet was coded as other consequence. A tweet was assigned a dichotomous variable for, other consequences (i.e., 0 = tweet did not include an alcohol-related consequence to other people or 1 = tweet did include an alcohol-related consequence to other people).

Institutional consequences. Institutional consequences result in (or with the possibility of) a cost to the institution (e.g., policy violation, trash, beer showers). A tweet containing an alcohol-related consequence to the institution in the tweet was coded as institutional consequence. A tweet was assigned a dichotomous variable for, institutional consequences (i.e., 0 = tweet did not include an alcohol-related consequence to the institution or 1 = tweet did include an alcohol-related consequence to the institution).

Coded environment. The coded environment refers to the tweets that were coded because the content included references to alcohol sales, alcohol availability, or alcohol accessibility; factors associated with the college alcohol culture.

Coded sales. A tweet was coded as alcohol sales at stadiums if there was a specific reference to alcohol sales during the football game at the stadium (e.g., if you want a real school, they sell beer during games). A tweet was assigned a dichotomous variable for, coded sales (i.e., 0 = tweet did not include a reference to sales or 1 = tweet did include a reference to sales).

Coded advertisement. A tweet was coded as an advertisement if there was an inclusion of drink specials or alcohol prices from bar, restaurant, or alcohol vendor advertisements (e.g., $5 draft specials till midnight). A tweet was assigned a dichotomous variable for, coded advertisement (i.e., 0 = tweet did not include a reference to advertisement or 1 = tweet did include a reference to advertisement).

Coded accessibility. A tweet was coded as accessible if alcohol was available for consumption by individuals or groups along with access to alcohol (e.g., come over for drinks; 60 places you can buy beer but only 4 places to buy an apple). A tweet referencing alcohol available for consumption by individuals or groups was coded for alcohol accessibility. A tweet was assigned a dichotomous variable for, coded accessibility (i.e., 0 = tweet did not include a reference to access or 1 = tweet did include a reference to access).

Analysis

Descriptive, correlational and hierarchical linear modeling (HLM) analyses were employed to answer the research questions. Multilevel analysis was used for sub-questions d of research question one and two, the software HLM 7 (Raudenbush, Bryk, Cheong, Congdon, & Toit, 2011) was used, and the estimation method was restricted maximum likelihood. All the

variables were not centered because they were dichotomous with a meaningful zero value. Unconditional models were fitted to determine how the variation of the outcome variables were partitioned within and between institutions. The intra-class correlation was calculated to determine the percentage of variance explained by the institutional or environmental differences. An exploratory model building approach was adopted for the estimation; each level-2 variable was entered individually.

For research question one, sub questions a-c, descriptive statistics were completed for the level-1 variables: types of alcohol, brands of alcohol, binge brands, popular brands, risk and protective behaviors. For research question one, sub question d, HLM was used to determine the level-2 factors (i.e., institutional, environmental) that account for the most variance in alcohol references within hashtags. Each alcohol variable (i.e., types of alcohol, brands of alcohol, binge brands, popular brands, risk and protective behaviors) was tested as the dependent, level-1 variable. The institutional and environmental (i.e., policy regarding alcohol sales during college football games) factors were the level-2 variables.

The second research question only included the tweets with the alcohol reference term, beer, because it was the most frequently referenced alcohol term. For research question two, sub questions a-c, descriptive statistics were completed on the level-1 variables. An exploratory model building approach was adopted for the estimation; each level-2 variable was entered individually. Level-1 variables were created by coding the content of the tweets, with the alcohol reference term, beer, for alcohol-related references to: behaviors (i.e., protective or risk), consequences (i.e., individual, other, or institutional) and the environment (i.e., sales, accessibility, or advertisement). The level-1 variables represent tweets, with the alcohol

reference term, beer, that include content associated with alcohol-related behaviors, consequences, or the environment.

For research question two, sub question d, HLM was used to determine the factors (i.e., institutional, environmental) that account for the most variance in tweets with the alcohol term, beer. The level-1 variables were tested as the dependent variables. The institutional (i.e., NCAA division, size of the student population, and HBCU affiliation) and environmental (i.e., policy regarding alcohol sales during college football games) factors were the level-2 variables. The eight level-1 variables, coded for alcohol-related content based on the codebook, included: coded risk, coded protective, individual consequences, other consequences, institutional consequences, coded sales, coded accessibility, and coded advertisement.

Results

Research Question 1

How frequently are alcohol reference terms mentioned in the tweets of identified IHE hashtags? A total of 10,851 tweets with an alcohol reference term were found in the hashtags associated with IHEs (Table 1-3). The majority of IHEs, 73% (n = 98), had at least one alcohol reference term in a hashtag. Tweets with an alcohol reference term were found in each type of IHEs, based on institutional factors.

Research question 1a. How frequently are types of alcohol and brands of alcohol mentioned in the tweets of identified IHE hashtags? Eighty-seven percent of tweets (n = 9,449) had a reference to a type of alcohol (Table 1) and 7% (n = 748) of tweets had a reference to a brand of alcohol (Table 2). All eleven types of alcohol were referenced in hashtags associated with IHEs. Forty-eight (n = 5,153) percent of tweets included a reference to beer and less than one percent (0.7%, n = 75) of tweets had a reference to scotch, the least referenced type of

alcohol (Table 1). The aggregate number of tweets with a reference to the term liquor or to a specific liquor (i.e., bourbon, gin, rum, scotch, tequila, vodka, and whiskey) accounted for 21% (*n* = 2,310) of the total number of tweets within the hashtags of IHEs. Tweets with the alcohol term, wine (10.8%, *n* = 1,169) were fewer than tweets for beer (48%, *n* = 5,153) and the combination of specific types of liquor 21% (*n* = 2,310). Of the 28 brands of alcohol, the top three brands of alcohol found in 3% of the tweets (Table 2) were: Bud Light (*n* = 122), Guinness (*n* = 115), and Coors (*n* = 114). Most alcohol brands were found in the tweets of identified IHE hashtags at least once; four brands were not found in any of the tweets of IHEs' hashtags (i.e., E&J Gallo brandy, Agwa de Bolivia, Barefoot Wines, and Czechvar).

Research question 1b. How frequently are alcohol binge brands and popular brands mentioned in the tweets of identified IHE hashtags? Only three percent (*n* = 288) of tweets included a reference to a popular brand of alcohol and only 1% (*n* = 111) of tweets included a reference to a binge brand of alcohol (Table 2). One percent (*n* = 115) of the tweets included a reference to the Guinness brand of alcohol, a popular brand of alcohol. Less than 1% (*n* = 38) of tweets referenced Barcardi, the most frequently referenced binge brand of alcohol. The binge brand not referenced in any tweets was E&J Gallo. Two popular brands were not referenced in any tweets: Agwa de Bolivia and Czechvar.

Research question 1c. How frequently are alcohol-related risk and protective behaviors mentioned in the tweets of identified IHE hashtags? Only 6% of tweets (*n* = 613) within IHEs' hashtags included a reference to an alcohol risk behavior: drinking games (*n* = 271), beer pong (*n* = 197), and keg stands (*n* = 145) (Table 3). There was no mention of the risk behavior, Neknominate. Fewer than 1% (*n* = 41) of tweets within IHEs' hashtags referenced an alcohol protective behavior: designated driver (*n* = 36) and sober driver (*n* = 5).

Research question 1d. Do institutional and environmental factors account for differences in the frequency of alcohol reference terms in the tweets of identified IHE hashtags? The between-institution variation with each of the outcome variables was examined using an unconditional model without any predictors. The six outcome variables included the number of tweets with an alcohol reference to: types of alcohol, brands of alcohol, binge brands, popular brands, risk behaviors, and protective behaviors. An additional unconditional model without any predictors was used to examine the outcome variable with the most common alcohol reference term; that is, the number of tweets with the alcohol reference term, beer.

The unconditional model as explained by Raudenbush and Byrk (2002) was used as a preliminary step to determine the amount difference between groups.

$$OUTCOME_{ij} = \gamma_{00} + u_{0j} + r_{ij} \quad (1)$$

Where

γ_{00} is the grand mean; and

u_{0j} and r_{ij} are the random components

An intraclass correlation (ICC) of .04 or greater was found for the following four outcome variables: types of alcohol (.04), brands of alcohol (.05), risk behaviors (.04), and the reference term beer (.11). There is evidence that the ICC fluctuates according to the research design and the characteristics of the population studied (Hedges and Hedberg, 2007). The ICC point at which HLM is unnecessary is not clear. However, multivel analysis offers the flexibility of studying the student level and the institutional level variables simultaneously. Therefore, despite the small ICC in this study, we completed a series of multivel analyses.

An exploratory approach was used to develop the models to explain the variance among outcome variables: types of alcohol (Table 4), brands of alcohol (Table 5), risk behaviors (Table

6), and the reference term beer (Table 7). The institutional and environmental factors were entered individually to explain the variance among the outcome variables. Based on the final estimation of fixed effects with robust standard errors (See Table 4-7) the institutional factors (i.e., NCAA Division III and IA) explained a significant amount of variation of the tweets with a type of alcohol, brand of alcohol, and the tweets with a reference to the word beer. The environmental factor (i.e., alcohol sales at football stadiums) did not explain a significant amount of the variance in the tweets of identified IHE hashtags.

The next sections include the equations of the models with institutional factors associated with explaining a significant amount of variance in the outcome variables. Each section is organized by the outcome variables and an explanation of the institutional variables, accounting for the variance, within the section for the outcome variable. Institutional factors explained some variation for the following outcome variables, number of tweets with: types of alcohol (Table 4), tweets with the alcohol reference term, beer (Table 7), brands of alcohol (Table 5), and risk behaviors (Table 6).

Types of alcohol. A mixed model was used to explore the variance within the outcome variable, types of alcohol, for the institutional factor, NCAA Division III.

$$TYPE_{ij} = \gamma_{00} + \gamma_{01} * IHE\_III_j + u_{0j} + r_{ij} \quad (2)$$

Where

$_{ij}$ is the outcome variable;

γ_{00} is the grand mean; and

u_{0j} and r_{ij} are the random components

The institutional factor, NCAA Division III ($\gamma = 0.086$, $t = 3.694$, $p < .001$), was a significant predictor for the number of tweets with a type of alcohol in a hashtag (Table 4). The number of

tweets with a type of alcohol in a hashtag tended to be higher in hashtags associated with NCAA Division III IHEs compared to non-NCAA Division III IHEs.

Mixed models were used to explore the variance within the outcome variable, tweets with the word beer ($BEER_{ij}$), for the institutional factors, NCAA Division IA, IAA and small student population.

$$BEER_{ij} = \gamma_{00} + \gamma_{01}*IHE\_IA_j + u_{0j} + r_{ij} \quad (3)$$

$$BEER_{ij} = \gamma_{00} + \gamma_{01}*IHE\_IAA_j + u_{0j} + r_{ij} \quad (4)$$

$$BEER_{ij} = \gamma_{00} + \gamma_{01}*SMALL_j + u_{0j} + r_{ij} \quad (5)$$

Where

$_{ij}$ is the outcome variable;

γ_{00} is the grand mean; and

u_{0j} and r_{ij} are the random components

The institutional factors, NCAA Division I AA ($\gamma = -0.223$, $t = -3.843$, $p < .001$), and small student population ($\gamma = -0.211$, $t = -3.601$, $p < .001$) were significant predictor of tweets with the reference term, beer (Table 7). Tweets with the reference term, beer, tended to be higher in hashtags associated with NCAA Division IA compared to non-NCAA Division IA IHEs. Tweets with the reference term, beer, tended to be lower in hashtags associated with NCAA Division IAA compared to non-NCAA Division IAA IHEs. Tweets with the reference term, beer, tended to be lower in hashtags associated with smaller student populations compared to other student populations.

Brands of alcohol. Mixed models were used to explore the variance within the outcome variable, brands of alcohol ($BRANDS_{ij}$), for the institutional factors, NCAA Division IA and III.

$$BRANDS_{ij} = \gamma_{00} + \gamma_{01}*IHE\_IA_j + u_{0j} + r_{ij} \quad (6)$$

$$BRANDS_{ij} = \gamma_{00} + \gamma_{01}*IHE\_III_j + u_{0j} + r_{ij} \quad (7)$$

Where

$_{ij}$ is the outcome variable;

γ_{00} is the grand mean; and

u_{0j} and r_{ij} are the random components

The institutional factor, NCAA Division IA ($\gamma = 0.030$, $t = 2.154$, $p = .03$), was a significant predictor for the number of tweets with a reference to a brand of alcohol (Table 5). The number of tweets with a brand of alcohol in a hashtag tended to be higher in hashtags associated with NCAA Division IA IHEs compared to non-NCAA Division IA IHEs. The institutional factor, NCAA Division III ($\gamma = -0.065$, $t = -6.268$, $p < .001$), was a significant predictor for the number of tweets with a reference to a brand of alcohol (Table 5). The number of tweets referencing a brand of alcohol tended to be lower in hashtags associated with NCAA Division III IHEs compared to non-NCAA Division III IHEs.

Risk behaviors. Mixed models were used to explore the variance within the outcome variable, risk behaviors ($RISK_{ij}$), for the institutional factors, NCAA Division IAA and III.

$$RISK_{ij} = \gamma_{00} + \gamma_{01}*IHE\_IAA_j + u_{0j} + r_{ij} \quad (8)$$

$$RISK_{ij} = \gamma_{00} + \gamma_{01}*IHE\_III_j + u_{0j} + r_{ij} \quad (9)$$

Where

$_{ij}$ is the outcome variable;

γ_{00} is the grand mean; and

u_{0j} and r_{ij} are the random components

The institutional factor, NCAA Division III ($\gamma = -0.033$, t = -1.964, p = .05), was a significant predictor of risk behaviors (Table 6). Alcohol-related risk behaviors in tweets tended to be lower in hashtags associated with NCAA Division III compared to non-NCAA Division III IHEs. The institutional factor, NCAA Division IAA ($\gamma = -0.031$, t = -2.085, p = .04), was a significant predictor of risk behaviors (Table 6). Alcohol-related risk behaviors in tweets tended to be lower in hashtags associated with NCAA Division IAA compared to non-NCAA Division III IHEs.

A mixed model was used to explore the variance within the outcome variable, risk behaviors ($RISK_{ij}$), for the institutional factors, small student population.

$$RISK_{ij} = \gamma_{00} + \gamma_{01}*\text{SMALL}_j + u_{0j} + r_{ij} \quad (10)$$

Where

$_{ij}$ is the outcome variable;

γ_{00} is the grand mean; and

u_{0j} and r_{ij} are the random components

The institutional factor of a small student population ($\gamma = -0.028$, t = -2.111, p = .04), was a significant predictor of risk behaviors (Table 6). Alcohol-related risk behaviors in tweets tended to be lower in hashtags associated with IHEs with a small student population compared to IHE with medium and large student populations.

Research Question 2

What does the content of tweets reveal about the most common alcohol reference term? The most frequently referenced alcohol term in the tweets of identified IHE hashtagswas beer (n = 5,153). Sixty-four percent (n = 86) of IHEs had an alcohol reference to beer in a hashtag

associated with an IHE. Tweets with the alcohol reference term, beer, were found in each type of IHEs, based on institutional factors. The frequency of tweets with the alcohol reference term, beer, in a hashtag ranged from one IHE with 455 tweets to 17 IHEs with one tweet. The codebook (located in Appendix E) was used to complete a content analysis on each tweet to examine the association between the alcohol reference term, beer, and alcohol-related behaviors (i.e., risk or protective), consequences to (i.e., self, others, institution), and environmental factors (i.e., a reference to alcohol sales during college football games, alcohol advertisement, and access to alcohol). Forty-six percent (n = 2,361) of tweets with the alcohol reference term, beer, were coded as default because the tweets did not contain a reference to behavior, consequences, or the environment.

Research question 2a. What does the content of tweets, with the most common alcohol reference term, beer, reveal about alcohol-related risk and protective behaviors? Twenty-seven percent (n = 1,400) of tweets with the alcohol reference term, beer, contained a reference to an alcohol-related risk or protective behavior. Based on the coding system, 18% (n = 927) of tweets, with the alcohol reference term, beer, referenced a risk behavior compared to 9% (n = 473) of tweets, with the alcohol reference term, beer, referenced a protective behavior (Table 8). Seventy-three percent (n=3,753) of tweets were coded as a default; that is, not referencing a risk or protective behavior. Examples of tweets coded as a risk behavior, protective behavior, and a default are in Table 9.

Research question 2b. What does the content of tweets, with the most common alcohol reference term, reveal about alcohol associated consequences with individuals, others, or institutions? Four percent (n = 207) of tweets with the alcohol reference term, beer, included content associated to alcohol-related consequences with individuals, others, or institutions. Based

on the coding system, 2% (n = 88) of tweets referenced institutional consequences, 1% (n =84) of tweets referenced consequences to others, and 1% (n = 34) of tweets referenced individual consequences (Table 8). Ninety-six percent (n=4,946) of tweets were coded as default because there was no reference to an alcohol associated consequence. Examples of tweets coded for content with consequences to individuals, others, or the institutions are in Table 10.

Research question 2c. What does the content of tweets, with the most common alcohol reference term, reveal about alcohol sales, advertisements, or accessibility? Thirty-three percent (n = 1,725) of tweets with the alcohol reference term, beer, included a reference to alcohol sales, alcohol advertisements, or alcohol accessibility. Based on the coding system, 17% (n = 861) of tweets included content associated with alcohol accessibility, 15% (n = 764) of tweets included content associated with alcohol advertisements, and 2% (n = 100) of tweets included content associated with alcohol sales (Table 8). Sixty-six percent (n=3,428) of tweets were coded as a default because there was not a clear reference to alcohol sales, advertisements, or accessibility. Examples of tweets coded with content associated with alcohol sales, advertisements, or accessibility, along with default content are in Table 11.

Research question 2d. Do institutional factors and environmental factors account for differences in the content of tweets, with the most common alcohol reference term? The between-institution variation with each of the outcome variables was examined using an unconditional model without any predictors.

$$OUTCOME_{ij} = \gamma_{00} + u_{0j} + r_{ij} \quad (11)$$

Where

$_{ij}$ is the outcome variable;

γ_{00} is the grand mean; and

u_{0j} and r_{ij} are the random components

The tweets included the alcohol reference term, beer, and were coded for content based on behaviors, consequences, and the environment. The eight outcome variables were: coded risks, coded protective behaviors, individual consequences, other consequences, institutional consequences, coded sales, coded advertisement, and coded accessibility. Among the eight outcome variables, an intraclass correlation (ICC) of .03 or greater was found for the following five variables: coded protective behaviors (.08), coded risks (.15), coded sales (.05), coded advertisement (.17) and coded accessibility (.03). The variables represent tweets, with the alcohol reference term, beer, with content associated to behaviors, consequences, and the environment. The intraclass correlation suggests the variance in tweets was explained by institutional differences. For example, 17% of the variance in tweets, with the alcohol reference term, beer, coded as including content to alcohol advertising were explained by the institutional or environmental factors. Institutional differences did not account for any of the variance among the outcome variables associated with alcohol-related consequences.

Among the tweets with the alcohol reference term, beer, the institutional factors (i.e., NCAA division and size of the student population) approached significance at the .05 level to explain explain the variation for the outcome variables of: coded advertisements (Table 12) and coded accessibility (Table 13). No significant effects of any level-2 variables were found to explain the variance in the content of tweets with the alcohol reference term, beer, for the outcome variables: protective (Table 14) and risk (Table 15) related alcohol behaviors along with alcohol sales (Table 16). The environmental factor of alcohol sales (i.e., does an IHE sell alcohol during football games) did not explain a significant level of variance in the outcome variables.

The next sections include the equations of the models with institutional factors associated with explaining a significant amount of variance in the outcome variables. Each section is

organized by the outcome variables and an explanation of the institutional variables, accounting for the variance, within the section for the outcome variable. Institutional factors approached significance at the .05 level to explain variation for the following outcome variables, number of tweets with: coded advertisement (Table 12) and coded accessibility (Table 13).

Coded advertisement factor. A mixed model was used to explore the variance within the outcome variable, alcohol advertisements (ADS_{ij}), for the institutional factors, medium student population.

$$ADS_{ij} = \gamma_{00} + \gamma_{01}*\text{MED}_j + u_{0j} + r_{ij} \quad (12)$$

Where

$_{ij}$ is the outcome variable;

γ_{00} is the grand mean; and

u_{0j} and r_{ij} are the random components

The institutional factor, a student population of medium size ($\gamma = -0.082$, t = -2.076, $p = .04$), was a significant predictor among tweets with the alcohol reference term, beer, when the content referenced an alcohol advertisement (Table 12). The tweets with alcohol reference term, beer, when the content referenced an alcohol advertisement tended to be lower in IHEs with a student population of medium size compared to IHEs with other student population sizes.

Coded access. A mixed model was used to explore the variance within the outcome variable, access to alcohol ($ACESS_{ij}$), for the institutional factors, Division IA, III, and small student population.

$$ACESS_{ij} = \gamma_{00} + \gamma_{01}*\text{IA}_j + u_{0j} + r_{ij} \quad (13)$$

$$ACESS_{ij} = \gamma_{00} + \gamma_{01}*\text{III}_j + u_{0j} + r_{ij} \quad (14)$$

$$ACESS_{ij} = \gamma_{00} + \gamma_{01}*\text{SMAL}_j + u_{0j} + r_{ij} \quad (15)$$

Where

$_{ij}$ is the outcome variable;

γ_{00} is the grand mean; and

u_{0j} and r_{ij} are the random components

The institutional factor, IHEs with a NCAA Division IA Division ($\gamma = 0.056$, t = 2.252, p = .03), was a significant predictor among tweets with the alcohol reference term, beer, when the content of the tweet referenced accessibility to alcohol (Table 13). The tweets with the alcohol reference term, beer, when the content referenced access to alcohol tended to be higher in IHEs with a NCAA Division IA Division compared to IHEs with another NCAA division. The institutional factor, IHEs with a NCAA Division III Division ($\gamma = -0.075$, t = -2.146, p = .04), was a significant predictor among tweets with the alcohol reference term, beer, when the content of the tweet referenced access to alcohol. The tweets with the reference term, beer, when the content referenced access to alcohol tended to be lower in IHEs with a NCAA Division III Division compared to IHEs with another NCAA division. The institutional factor, a small sized student population ($\gamma = -0.075$, t = -2.162, p = .03), was a significant predictor among tweets with the alcohol reference term, beer, when the content of the tweet referenced alcohol accessibility. The tweets with alcohol reference term, beer, when the content referenced alcohol accessibility tended to be lower in IHEs with a small student population compared to IHEs with other student populations.

Discussion

The purpose of this study was to address the paucity of research in the college alcohol culture as expressed within Twitter. This study adds to the research by examining the hashtags associated with IHEs; that is, examining tweets within the hashtags associated with IHEs for

alcohol references. Most Twitter research has focused only on the tweets (Menon et al., 2014; West et al., 2012); not on the hashtags that categorize a conversation or trend. The hashtags associated with IHEs were used in this study, to examine the college alcohol culture, because the tweets in the hashtags provide data about individual, institutional, and environmental factors of the college alcohol culture.

Research Question 1

The first research question focused on examining the frequency of alcohol reference terms within the tweets of identified IHE hashtags. The alcohol reference terms used in this study included types of alcohol, brands of alcohol – both popular and binge brands, along with alcohol related risk and protective behaviors. In the current study, a total of 10,851 tweets with an alcohol reference term were found within the hashtags associated with IHEs, during a football season. This prevalence of alcohol references within the the tweets of identified IHE hashtags is similar, to previous research with Facebook (Egan & Moreno, 2011; Fournier & Clarke, 2011; Ridout et al., 2012). In general, types of alcohol were found more often than brands of alcohol, popular brands of alcohol were found more often than binge brands of alcohol, and alcohol related risk behaviors were found more often than protective behaviors. The most common alcohol reference term was, beer, categorized as a type of alcohol. Among the 45 alcohol reference terms used in this study, five terms were not found in the the tweets of identified IHE hashtags: four brands of alcohol (i.e., Barefoot Wines, E&J Gallo brandy, Agwa de Bolivia, Czechvar) and one alcohol related risk behavior (i.e., Neknominate).

Types and brands of alcohol in the hashtags of IHEs. The study examined both alcohol types and alcohol brands. The prevalence of college student drinking has typically been assessed by self-reported consumption measures based on types of alcohol. The research has

expanded to include questions about both types of alcohol and brands of alcohol to provide a more accurate representation of alcohol consumption among college students (Kerr et al., 2005).

In this study, the types of alcohol (i.e., the cumulative number of tweets with one of the eleven types of alcohol) were referenced more often than brands of alcohol (i.e., the cumulative number of tweets with one of the 28 alcohol brands). All 11 types of alcohol were referenced in the tweets; beer (47.5%, *n* = 5,153) was the most referenced and scotch (0.7%, *n* = 75) was the least referenced type of alcohol. The most referenced term in this study mirrors the terms found in the tweets of the general population; that is, beer, drunk, and alcohol were the terms most referenced in another study of Twitter users (Cavazos-Rehg et al., 2015).

The results of the present study indicate that wine (10.8%, *n* = 1,169) was referenced more often than the general term of alcohol (7.5%, *n* = 817); underscoring the relevance of exploring the different types of alcohol as individual categories (Kerr et al., 2005). Additionally, beer (47.5%, *n* = 5,153) and the cumulative references to liquor (18%, *n* = 1,851) were found more often than wine (10.8%, *n* = 1,169). This finding is not surprising considering beer and liquor are typically used more often than wine by college students to get drunk; wine tends to be consumed in a lower-risk manner (Clapp, & Shillington, 2001). The presence of various types of alcohol, referenced within the tweets of identified IHE hashtags, was not surprising; the presence of different types of alcohol in the tweets of identified IHE hashtags suggests the college alcohol culture may be reflected in hashtags.

This study also examined references to brands of alcohol based on the reported emergence of alcohol brands within social media (Griffiths & Casswell, 2010). A brand of alcohol was found in only 7% (*n* = 748) of the tweets. The most frequently referenced brand of alcohol, found in the tweets of identified IHE hashtags, was Bud Light (1.1%, *n* = 122). The

small percentage of references to alcohol brands is surprising considering the relationship between alcohol companies and the sponsorship deals for college football programs. The marketers of alcohol brands have embraced the power of social media and capitalized on effective strategies at a greater rate than health entities (Lim, Hare, Carrotte, & Dietze, 2016). For example, Anheuser-Busch InBev (ABI), the parent company of the Bud Light brand has marketing sponsorship rights with 60 college athletic programs (Smith & Lefton, 2017), an audience of current alcohol users and influential underage students. A recent sponsorship deal between ABI and the University of Houston resulted in the exclusive sale of Bud Light products at the football stadium and beer gardens outside of the stadium (Duarte, 2017). It is unclear why the trends of alcohol brands and the college alcohol culture are not reflected within the tweets of identified IHE hashtags.

Binge and popular brands of alcohol. A small frequency of alcohol brands, within the tweets of identified IHE hashtags, resulted in a smaller frequency of popular or binge-only, alcohol brands. Only 3% (n = 288) of tweets included a reference to a popular brand and 1% (n = 111) of tweets included a reference to a binge brand of alcohol. Previous research has noted the prevalence of alcohol brands (Siegel et al., 2013) and binge brands (Naimi et al., 2015) emerging within the music and social media consumed by emerging adults. Two brands of alcohol, Guinness (1.1%, n = 115) and Coors (1.1%, n =114), were the most frequently referenced popular brands of alcohol in this study. Bacardi was found in less than 1% of tweets in hashtags associated with IHEs (0.4%, n = 38), but was the most frequently referenced binge brand of alcohol in the tweets of identified IHE hashtags.

Behaviors related to alcohol. Consistent with research on other social media platforms (Moreno, 2011), the tweets within hashtags associated with IHEs included more alcohol related

risk behaviors (6%, *n* = 613) and fewer alcohol related protective behaviors (1%, *n* = 41). Alcohol related risk behaviors were found 15 times more often than alcohol related protective behaviors.

Risk behaviors. Drinking games (2.5%, *n* = 271) were directly referenced, along with specific references to beer pong (1.8%, *n* = 197) and keg stands (1.3%, *n* = 143), in the tweets of identified IHE hashtags. There was no mention of the social media drinking game, Neknominate, perhaps indicating a decline in popularity at the time of the study. The Neknominate phenomenon peaked in the first half of 2014 and by 2015 a shift in the phenomenon highlighted the inherent danger of the alcohol drinking challenge game (Wombacher, Reno, & Veil, 2017).

The shocking sentiment shift towards the alcohol related risk behavior, Neknominate, was initiated by fellow social media users discouraging the risk behavior and sharing the negative consequences of the behavior. In fact, there was an attempt to turn the Neknominate phenomenon into a positive campaign by a YouTube user (i.e., #ChangeOneThing) captioning a video, “Downing a can of Castle Light is easy... Imagine if we all harnessed the power of social media to make a real difference in peoples lives.” (Mintz, 2014; Van den Berg, 2014). The YouTube user also mentioned in a blog the importance of protective behavioral strategies, “I can’t be sure if it's harmless fun or stupid people doing stupid things, but maybe the only thing you should be nominating when you have a beer in your hand is a designated driver?” (Mintz, 2014). The shift occurred during the data collection phase of this study; that is, the time when the Twitter search function was being used to find alcohol reference terms in the tweets of identified IHE hashtags. Ironically, no references to Neknominate were found in the tweets of identified IHE hashtags, in the context of an alcohol related risk or protective behavior.

Protective behaviors. The finding in this study of fewer than 1% of all tweets, in a hashtag associated with IHEs, including a reference to an alcohol related protective behavior suggests there are opportunities for future research and implications for practice. The study contributes to the research because no previous studies were found to examine the alcohol related protective behaviors, within hashtags. Additionally, there is opportunity to search for additional alcohol related protective behaviors in the tweets. The social media sentiment shift, associated with Neknominate, was not initiated or led by a health-related entity (e.g., a health department). The findings corroborate the suggestions that public health efforts are lacking within the social media landscape to counter a pro-alcohol sentiment (Burton, Dadich, & Soboleva, 2013; Jernigan, 2011), providing an opportunity for public health practice.

Institutional and environmental factors. The institutional factors (i.e., NCAA divisional status, size of student population) explained less than 11% of the differences in the frequency of alcohol references in the tweets of IHE hashtags; the institutional factor, HBCU affiliation, and the environmental factor (i.e., alcohol sales) did not explain a significant amount of the difference. The statistical models demonstrated that institutional factors explained variance, for the following outcome variables: types of alcohol; the reference term, beer; brands of alcohol; and alcohol related risk behaviors. Two institutional factors, the NCAA division and the size of the student population, explained up to 11% of the variance, among tweets with either a type of alcohol; a brand of alcohol; an alcohol related risk behavior; or the term, beer; referenced in the tweet.

The NCAA Divisions, IA and IAA, were both associated with the frequency of tweets with a specific reference to the word, beer, but in different directions. The number of tweets with the alcohol reference term, beer, tended to be higher among NCAA Division IA IHEs and lower

among NCAA Division IAA IHEs. The NCAA Division IA IHEs were also associated with a higher frequency of tweets with an alcohol brand. The findings mirror the self-reported high-risk drinking at NCAA I IHEs along with the consistent association between the college alcohol culture and NCAA Division I IHEs (Weitzman et al., 2003). It is important to note that all NCAA Division IAA IHEs are also HBCUs which would be congruent with data to suggest a different alcohol culture at HBCUs compared to PWIs. The drinking rates and negative alcohol related consequences tend to be lower among students attending HBCUs compared to PWIs (Meilman et al., 1995). Tweets with an alcohol reference to risk behavior were also lower among IHEs labeled as NCAA Division IAA IHEs compared to non-NCAA Division IAA IHEs; again, an expected direction based on research that suggests HBCUs have a protective culture related to alcohol. A tradition of temperance and protection at HBCUs (Bridges, Cambridge, Kuh, & Leegwater, 2005; Fletcher & Epstein, 1996; Moore, 2000) suggests a more protective environment for students attending HBCUs.

The NCAA Division III IHEs were associated with the tweets with a type of alcohol, a brand of alcohol, and an alcohol related risk behavior. Tweets with a type of alcohol tended to be higher among NCAA Division III IHEs. Tweets with a brand of alcohol or an alcohol related risk behavior tended to be lower at NCAA Division III IHEs. The bi-directional relationship of NCAA Division III IHEs to factors associated with the college alcohol culture suggests opportunities for additional research. Interpersonal factors may be part of the explanation because alcohol use has been reported to be highest among student athletes at NCAA Division III IHEs compared to student athletes at the other NCAA Divisional IHEs (Green, Uryasz, Petr, & Bray, 2001).

Size of student population. Small student populations at IHEs explained a significant amount of variance among the tweets with an alcohol related risk behavior or tweets with the alcohol reference term, beer. Tweets with either an alcohol related risk behavior or the alcohol reference term, beer, tended to be lower at IHEs with a small student population. The findings are consistent with previous research that indicates lower drinking rates are more common among college students attending IHEs with smaller student populations compared to IHEs with larger student populations (Weitzman et al., 2003).

Research Question 2

The second research question examined the tweets to extrapolate the nuances of the contextual use of the most frequently used alcohol reference term, beer. Results indicated that 64% of IHEs had tweets with the alcohol reference term, beer, in the tweets of identified IHE hashtags. Most tweets with the reference term, beer, were coded in the default category for each of the three context categories (i.e., behavior, consequences, and environment). The only study found to code tweets for context was a study to monitor physical activity, among the general population, and most tweets were also coded as a default category (Zhang et al., 2013). Even though most tweets were coded in the default category, for this study, the patterns that emerged appear to reflect the college alcohol culture of high rates of alcohol risk related behavior, minimal negative consequences associated with alcohol, and the presence of environmental factors contributing to the college alcohol culture (Table 8).

Coded behaviors. The tweets with the alcohol reference word, beer, coded as alcohol related risk behaviors (18%, $n = 927$) were referenced twice as often as tweets coded as alcohol related protective behaviors (9%, $n = 473$) in the tweets with the reference term, beer (Table 8). The findings are similar to the results of research question one; compared to protective

behaviors, the alcohol risk related behaviors were more prevalent in all tweets. Tweets with the alcohol reference term, beer, were coded as an alcohol related risk behavior when the context included: consuming large amounts of beer in a short amount of time (e.g., shotgunned a beer for every TO @KapriBibbs scored tonight #GoRams) and combining multiple types of alcohol (e.g., Fire, rum, and beer. No complaints. #whitegirl #turnup #gocougs #johnnygmoney). The tweets with the term, beer, coded as a contextual reference to protective alcohol related behaviors typically included those with a mention of food (e.g., beer, burgers, and college football #HottyToddy #FinsUp), in this study. The default category included those tweets without a definitive alcohol related risk or protective behavior. One particularly interesting tweet with the term, beer, that was coded in the default category referenced a non-alcoholic beverage (i.e., root beer) along with a high-risk alcohol related behavior (i.e., Parents aren't home who do I do? Give all my brothers root beer and have them shot gun #StartingEarly #RTB).

Coded consequences. The tweets with the alcohol reference term, beer, included an equivalent percentage of coded references to institutional consequences (2%, *n* = 88) and consequences to others (2%, *n* = 84) compared to 1% (*n* = 34) of tweets referencing an individual consequence of alcohol. The findings are similar to another study, examining tweets and drug references, with approximately 2% of tweets referencing a negative consequence of hookah use (Krauss et al., 2015). Ninety-six percent of tweets (n=4,946) in this study referenced consequences as neutral or as a badge of honor, coded as default, regardless if the consequence was to self, other people, or the institution (Table 8). One example, of a tweet with the reference term, beer, coded as an institutional consequence was: Having to shower in between parties because your covered in beer because your football team is incredible #weare #pennstate. A tweet that was coded as including an individual consequence, highlighted a physical effect of

alcohol: A hangover on a Saturday when there is beer and college football to watch. #nobueno #thestruggleisreal #gameday #FSU #FSUvsWF. The tweets, coded as consequences to others appeared generally neutral even when describing a negative consequence of high-risk alcohol use (e.g., A guy in the back of an ambulance just poked his head out with this beer to say hi #Rutgers #trappedombruns @its_Lmillertime).

Reducing the negative consequences associated with high-risk alcohol use is a priority of many IHEs (American College Health Association, 2012; Hingson, 2010), yet many students do not view consequences of high-risk alcohol use as negative (Crawford & Novak, 2006), the tweets with the term, beer, tended to affirm a positive or neutral view towards the consequences of high-risk alcohol use. Only 1% (n = 34) of tweets with the term, beer, had a reference to an individual consequence. The finding is not particularly surprising considering the small number of negative consequences of other types of drugs being discovered among tweets. An examination of a popular marijuana related Twitter handle (i.e., @stillblazingtho) revealed less than 1% of the tweets referenced any negative consequences of marijuana (Cavazos-Rehg, Krauss, Grucza, & Bierut, 2014).

Coded environment. Based on the coding system described in Appendix E, tweets with the alcohol reference term, beer, also included references to alcohol access, advertising, and alcohol sales at college football stadiums – environmental factors associated with the college alcohol culture (Table 8). The context of tweets with the alcohol reference term beer included 17% (n = 861) of tweets referencing access to beer and 15% (n = 764) of tweets referencing a form of advertisement. Two percent (n = 100) of tweets with the term beer, referenced alcohol sales at college football stadiums and tended to be commentary about the policy (e.g., Nebraska AD Shawn Eichorst has “no interest in selling beer at #Huskers games”. Via @HuskerExtraBC Fans

will continue to just sneak it in). Additional examples of tweets for each category are highlighted in Table 11. The tweets coded as including an alcohol advertisement highlighted drink specials (e.g., $1 off all beer and wine #FSU #Tallahassee #beer #wine). The tweets referencing beer and access to the beer often included an appreciation to the host or hostess (e.g., What a night. Plenty of beer and whiskey as always. Thanks @huskflynn21 #shannonstrong #family #GoBucks). These types of tweets are worth noting, because an environmental approach to the college alcohol culture includes reducing access to alcohol along with alcohol advertisement to decrease the negative impact of the college alcohol culture (Anderson, Chisholm, & Fuhr, 2009; Weitzman et al., 2003). The infusion of social media into the college alcohol culture occurs at multiple levels of influence; in that, some local bars encourage customers to bypass their website and go directly to the establishments' social media accounts to learn about drink specials (Lyons et al., 2015).

Institutional and environmental factors. Amongst the tweets with the term, beer, that were coded for context, the institutional factors explained some of the difference, but the environmental factor (i.e., alcohol sales) did not explain a significant amount of the difference. Even though alcohol sales, the environmental factor, did not explain a significant amount of variance related to the differences in the context of the tweets with the term, beer, the coded context of the tweets did provide insight into the environment of the IHEs. The statistical models demonstrated that institutional factors (i.e., NCAA Division and the size of the student population) explained some of the variance in the context of the tweets with the alcohol reference term, beer, within the hashtags associated with IHEs. Specifically, the variance in tweets coded to reference alcohol access and alcohol advertisements was explained by NCAA Division and the size of the student population.

NCAA Division. Based on the frequency of tweets with the term, beer, the contextual references to access to alcohol were higher at NCAA Division I IHEs and lower at NCAA Division III IHEs. The findings are consistent with results from research question one because NCAA Division IA IHEs was associated with a higher prevalence of tweets with the term, beer, and brands of alcohol; not surprising that there may also be a higher prevalence of tweets with a reference to having access to alcohol. Additionally, the finding aligns with the consistent trend of a high-risk alcohol culture at NCAA Division I IHEs (Weitzman et al., 2003). The results from the second research question suggests references to alcohol access is lower in the tweets with the alcohol reference term, beer, among Division III IHEs. The findings appear to reflect the findings from research question number one: Tweets with a brand of alcohol or an alcohol risk behavior tended to be lower at NCAA Division III IHEs.

Size of student population. The additional institutional variable found to explain the variance among tweets with the alcohol reference term, beer, when the context is associated with access to alcohol, was the size of the student population. IHEs with a small student population had fewer tweets with the term, beer, referencing access to alcohol. The findings were not surprising given previous studies to suggest lower risk drinking at IHEs with smaller student populations (Weitzman et al., 2003). References to advertisements among tweets with the term, beer, were lower among IHEs with a student population defined as medium (i.e., 5,001 to 10,000). Previous findings (Weitzman et al., 2003) also appear to align with the outcome variable associated with references to advertisements.

Limitations

To date, this is the first known study to examine the tweets in hashtags to examine college alcohol culture within the social platform of Twitter. This study includes limitations

common in most social media research; that is, privacy settings limit the identification of individual users and data is time sensitive. Additionally, the limitations of this study include the utilization of a convenience sample of IHEs (i.e. those in the football tournaments), limiting the tweets to only include tweets with an alcohol reference term (i.e., no comparison of tweets in the hashtags without alcohol references), and identifying a selective list of alcohol reference terms instead of analyzing all tweets in a hashtag.

Verifying the identity of the person tweeting was a limitation observed in the pilot study and it was determined that a modification to the protocol was not realistic for this study. The use of public tweets in the pilot study and the current study means the person associated with the tweet cannot be verified as a student or non-student; demographic information was not compiled about the person generating the tweets. Privacy settings are typically a concern within social media research; that is, an account's tweets may only be viewed by followers of the account. Hashtags placed in in a tweet allow the tweet to be public and viewed within the collective category of the hashtag, reducing the barriers of privacy. By using publicly available tweets additional individual factors were unavailable (e.g., age, academic year in college, gender).

Like other social media research, the data is specific to the selected dates in which it is collected. Data collected via social media is potentially influenced by multiple factors (e.g., trending hashtags) or other cultural influences. The trendy nature of social media is indicative of the fact that no tweets were found to include the drinking game that originated on Twitter, Neknominate. The Neknominate challenge lost momentum after people shared stories, on social media, of their devastating loss of friends from the challenge (Mintz, 2014; Van den Berg, 2014).

The IHEs in this study were limited to those involved in a football championship tournament during the 2014-2015 football season, which may limit the generalizability of the

results to other IHEs. The fluid and emerging nature of social media also provides an inherent limitation because the hashtags used in this study were not from a verified list of hashtags from IHEs. The absence of a comprehensive list of hashtags used by IHEs suggests seminal hashtags may have been overlooked or not included. Additionally, the only manner of determining how often a hashtag was used during a specific amount of time is through a cost prohibitive paid service (i.e., about $500 per month to monitor up to 10 hashtags).

Some search words, and more specifically some phrases, are not conducive to the Twitter search function or perhaps tweets in general. It is possible some of the alcohol brands were not found within tweets because of the proper name is too long (e.g., E&J Gallo or Agwa de Bolivia) for a social media platform that is hallmarked by brevity and casual conversation. Similarly capturing different protective behaviors (e.g., eat before starting to drink) through the search function would require the exact phrase within a tweet. Expressing the utilization of protective behaviors associated with alcohol may be more complex than a single word or short phrase (i.e., sober driver or designated driver). Qualitative studies have elicited care-taking behaviors (i.e., being the designating sober friend for the entire night) of students that could be defined as protective behaviors (Howard, Griffin, Boekeloo, Lake & Bellows, 2007). The care taking behavior used to describe the protective behaviors may not always translate into a short and consistent phrase (e.g., designated driver). A mixed methods approach to data collection is ideal when examining tweets within a hashtag to be able to understand the nuances of any of the alcohol reference terms.

Conclusions

Each day, about 2,100 college students initiate alcohol use for the first time (Lipari & Jean-Francois, 2016) and the influence of the social media phenomenon on the college alcohol

culture is still emerging within the research. The hashtag has been described as, “the most valuable asset the Twitter users possess” because it allows a tweet to become searchable and aggregated as a conversation among millions of tweets (Lutrell, 2014). This study adds to the research by revealing aspects of the college alcohol culture within the tweets of identified IHE hashtags. Additionally, this study provides a foundation for further exploration to capitalize on the influence of the hashtag. The examination of tweets within hashtags associated with IHEs provided an opportunity to simultaneously examine multiple factors influencing the college alcohol culture: individual, institutional, and environmental. The college alcohol culture of glorifying high-risk drinking with minimal attention to the negative alcohol related consequences to an individual appears to be present within the tweets of identified IHE hashtags.

Alcohol reference terms were found in 10,851 tweets of identified IHE hashtags, during a college football season. The findings contribute to the research as the first known study to examine the college alcohol culture on the social media platform, Twitter, based on the tweets in hashtags associated with IHEs. Beer was the most common alcohol reference term in the tweets of identified IHE hashtags. Ten other types of alcohol (e.g., wine, alcohol, bourbon) were also found within the tweets of identified IHE hashtags. As expected alcohol related risk behaviors were more prevalent among the tweets compared to alcohol related protective behaviors. Less than 1% of tweets, within the hashtags of IHEs during a college football season, referenced a protective behavior (i.e., sober or designated driver). Even though brands of alcohol were found in a relatively small percentage of tweets the findings contribute to the larger body of alcohol research beginning to examine the role of using the names of alcohol brands to assess the prevalence of student drinking rates (Kerr et al., 2005). The institutional factors of NCAA division and size of student population explained some of the difference in the number of alcohol

reference terms in the tweets. The NCAA Division IAA may have revealed more about HBCUs because only HBCUs were represented among NCAA Division IAA IHEs. The NCAA Division IAA IHEs had tweets with fewer alcohol references to beer and alcohol related risk behaviors. The environmental factor, alcohol sales, did not account for any significant difference in the tweets with an alcohol reference.

Sixty-four percent of IHEs had an alcohol reference to beer in a hashtag with each institutional type having at least one tweet with the alcohol reference term, beer, in the tweet. The context of the tweets with the alcohol reference term, beer, revealed references to alcohol behavior, consequences, and the environment. Risk behaviors were referenced twice as often as protective behaviors associated with high-risk drinking. References to consequences when the tweet included the term, beer, were minimal and consistent with the glamorization of a college alcohol culture that consists of high-risk drinking with minimal consequences. Among tweets with the term, beer, the institutional factors of NCAA division and size of student population explained some of the variance within tweets; however, the environmental factor, alcohol sales, did not account for any significant difference in the tweets.

The prevalence of alcohol references within the tweets of identified IHE hashtagsaccompanies the trend of college students embracing social media (Chou et al., 2009; Greenwood et al., 2016). Social media provides opportunities for health communication during event-specific activities, typically associated with high-risk drinking on college campuses. A missing voice in the conversation is that of protective behaviors associated with alcohol and there may be opportunity for health communication during event-specific activities such as football games. The health communication research related to the role of social media and alcohol prevention is still in an infancy stage (Nicholls, 2012). Social media provides an

opportunity for health communicators to go beyond point to point communication and expand to a "one to many" communication channel, in an affordable manner (Centers for Disease Control and Prevention, 2012). IHEs could work more collaboratively on game day to support the alcohol policies of the home team.

College students have embraced social media and the college alcohol culture is mirrored in social media. Alcohol reference terms were found in the tweets of identified IHE hashtags. The advanced search function of Twitter provides an economical and efficient method for examining and discovering alcohol related references. The social ecological approach to the college alcohol culture highlights the need to address individual, institutional, and environmental factors; social media is a factor that needs to be included and hashtags provide a unique opportunity to examine the college alcohol culture.

Future Research and Implications for Practice

The college alcohol culture is a formed by a dynamic relationship among various factors. The findings from this study may help to inform future health promotion research and practice associated with the college alcohol culture.

Research

The college alcohol culture is pervasive within the hashtags associated with IHEs. Future research should examine the hashtags across different social media platforms and the differences of hashtags within an IHE. Most recently, Instagram, a photo based social media site, has grown in popularity with the increase in access to smartphones with cameras (Rainie, Brenner, & Purcell, 2012). Images and pictures within tweets were not examined in this study but should be considered in future research. Understanding the context of tweets would be enhanced if images

are a part of the analysis. An exploration of images may provide additional context for the tweets coded in the default category of this study.

Future research should expand the alcohol reference terms to include a more comprehensive list of risk and protective behaviors. Even though no tweets were found with the word, Neknominate, the Twitter search feature is ideal for finding trending words or phrases that are missing from national surveys. The content analysis for this study was limited to the tweets with a reference to the word, beer. Future content analysis of tweets with other alcohol reference terms would provide an opportunity to explore the subjective nature of students' experience with alcohol related behavior, consequences, and the environment.

Practice

Examining hashtags may provide innovative approaches to acquiring accurate and time sensitive population level data to inform health educators about an institutions' unique college alcohol culture. Social media is influencing the college alcohol culture and interventions need to address the college alcohol culture within social media (Steers, Moreno, & Neighbors, 2016). The fact that types of alcohol were found in more tweets than brands of alcohol suggests college students might be using hashtags generated by alcohol marketers to engage directly with the alcohol brands on social media. For example, the Don Equis, the newest alcohol sponsor for the College Football Bowl, has launched a marketing campaign specifically for the college football season #MostInterestingFanSearch (Oster, 2017). IHEs need to be part of the college alcohol culture within social media. In fact, social media may be able to assist IHEs in monitoring high-risk drinking events and in turn share protective behaviors to reduce risk (Moreno, Kacvinsky, Pumper, Wachowski, & Whitehill, 2013).

Alcohol references are part of the Twitter conversations taking place within the hashtags associated with IHEs. The advanced search function of Twitter provides an economical and efficient method for discovering alcohol related references. During event specific times of probable high-risk drinking among college students, IHEs could use hashtags to connect and engage with students. The lack of protective behaviors within the tweets of identified IHE hashtags suggests an opportunity to use event-specific hashtags to infuse health communication messages. Alcohol marketers typically uses hashtags to associate with events and other culturally relevant activities (Purves et al., 2014). In fact, the title of one blog is quite telling of the power of the hashtag because it states, "Miller Lite isn't putting a hashtag in its commercials…its putting a commercial in its hashtag" (Furubayashi, 2014). There is an opportunity for health entities to utilize similar approaches. Social media provides a platform for IHEs to communicate with students and capitalize on opportunities to be part of a conversation in real time or create the conversation. For example, IHEs could tweet about ride share programs (i.e., a protective behavior to reduce driving under the influence) within a hashtag associated with a football game or other events associated with high-risk drinking (e.g., spring break, Homecoming).

The environmental approach to address the college alcohol culture includes the communication of the policies set forth to address the physical environment. The versatility of Twitter, hashtags, and social media in general provides an opportunity for multiple forms of communication (i.e., text, images, and video). This study revealed the sentiment of the tweets associated with alcohol sales at college football stadiums were typically linked to news articles about the alcohol sales policy suggesting there could be an opportunity to share institution specific policy information within hashtags associated with IHEs. Social media and hashtags

associated with IHEs could be used to share alcohol related policies, enforcement, and consequences with college football fans on game day in a fun and positive light.

The college alcohol culture of high-risk drinking with minimal consequences, during a college football season, is not a new phenomenon. The individual, institutional, and community consequences associated with high-risk drinking are well researched and are documented throughout IHEs. The social ecological framework provides an ideal guide to examine social media as an emerging environment for the influence of the college alcohol culture. In this study, the alcohol reference words and contextual references found in the tweets of identified IHE hashtags confirms the existence of the college alcohol culture within Twitter. Additionally, the results of this study suggest the influence of institutional factors on the college alcohol culture are mirrored in the tweets of identified IHE hashtags. Alcohol advertisers have capitalized on the power of the hashtag to reach multiple audiences. Alcohol prevention researchers and practitioners can also utilize the hashtag to examine and influence the college alcohol culture.

Tables

Table 1

The Frequencies of Alcohol Reference Terms, Related to Types of Alcohol

Alcohol Reference Terms	n	%
Types of Alcohol		
Beer	5153	47.5
Alcohol	817	7.5
Wine	1169	10.8
Bourbon	625	5.8
Gin	80	0.7
Rum	136	1.3
Scotch	75	0.7
Tequila	153	1.4
Vodka	322	3.0
Whiskey	460	4.2
Liquor	459	4.2

Table 2

The Frequencies of Alcohol Reference Terms, Related to Brands of Alcohol

Alcohol Reference Terms	n	%
Brands of Alcohol		
Bud Light	122	1.1
Budweiser	82	0.8
Smirnoff (malt beverage and vodka)	24	0.2
Miller Lite	37	0.3
Natural Light	4	0.03
Keystone Light	7	0.1
Mike's	3	0.02
Grey Goose Vodkas	21	0.2
Heineken	23	0.2
Jack Daniels	25	0.2
Barefoot Wines	0	0
Captain Morgan Rums	1	0.009
Binge Brands of Alcohol		
Four Loko	5	0.05
Bacardi (rums and malt beverages)	38	0.4
UV Vodka	2	0.01
Malibu	4	0.03
Jose Cuervo	3	0.02
Patron tequilas	26	0.2
Hennessy cognac	33	0.3
E&J Gallo brandy	0	0
Popular Brands of Alcohol		
Coors	114	1.1
Corona (extra and extra light)	41	0.4
Natural Ice	1	0.009
Guinness	115	1.1
Agwa de Bolivia	0	0
Czechvar	0	0
Absolut Vodkas	3	0.02
Blue Moon	14	0.1

Table 3

The Frequencies of Alcohol Reference Terms, Related to Alcohol Protective and Risk Behavior

Alcohol Reference Terms	n	%
Protective Behaviors		
Sober driver	5	0.05
Designated driver	36	0.3
Risk Behaviors		
Drinking games	271	2.5
Beer pong	197	1.8
Keg stands	145	1.3
Neknominate	0	0

Table 4

Summary of Fixed Effects with Robust Standard Error: Types of Alcohol

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Intercept	.888***	.864***	.870***	.862***	.884***	.887***	.861***	.866***	.873***
Institutional									
NCAA division									
IA	-.027								
IAA		.038							
II			-.032						
III				.086***					
Population size									
Large					-.024				
Medium						-.001			
Small							.048		
HBCU								.003	
Environmental									
Sales									-.044
Random effects variance components									
Intercept	.005***	.005***	.005***	.004***	.070***	.005***	.069***	.005***	.005***
Level-1	.110	.110	.110	.110	.332	.110	.332	.110	.110

Note: *** indicates $p < .001$; ** indicates $p < .01$, * indicates $p < .05$. For each variable, 1 = yes. A model was not completed for the institutional factor, NCAA division, NAIA because of a small sample size (n=2).

Table 5

Summary of Fixed Effects with Robust Standard Error: Brands of Alcohol

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Intercept	.058***	.072***	.072***	.074***	.061***	.072***	.074***	.070***	.068***
Institutional									
NCAA division									
IA	.030*								
IAA		-.012							
II			-.010						
III				-.065***					
Population size									
Large					.014				
Medium						-.003			
Small							-.023		
HBCU								.010	
Environmental									
Sales									.019
Random effects variance components									
Intercept	.003**	.003***	.003***	.003**	.003**	.003**	.003**	.003**	.003**
Level-1	.063	.063	.063	.063	.063	.063	.063	.063	.063

Note: *** indicates $p < .001$; ** indicates $p < .01$, * indicates $p < .05$. For each variable, 1 = yes.

The robust standard errors could not be computed for the institutional factor NAIA.

Table 6

Summary of Fixed Effects with Robust Standard Error: Risk Behaviors

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Intercept	.057***	.060***	.054***	.059***	.045***	.057***	.061***	.059***	.054***
Institutional									
NCAA division									
IA	.001								
IAA		-.031*							
II			.045						
III				-0.033*					
Population size									
Large					.012				
Medium						.002			
Small							-.028*		
HBCU								-.014	
Environmental									
Sales									.023
Random effects variance components									
Intercept	.002***	.002***	.002***	.002***	.002***	.002***	.002***	.002***	.002***
Level-1	.051	.051	.051	.051	.051	.051	.051	.051	.051

Note: *** indicates p < .001; ** indicates p < .01, * indicates p < .05. For each variable, 1 = yes.

The robust standard errors could not be computed for the institutional factor NAIA.

Table 7

Summary of Fixed Effects with Robust Standard Error: Alcohol Reference Term, Beer

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Intercept	.460***	.560***	.450***	.440***	.408***	.420***	.474***	.443***	.444***
Institutional									
NCAA division									
IA	.113*								
IAA		-.223**							
II			-.069						
III				.014					
Population size									
Large					.051				
Medium						.103			
Small							-.211***		
HBCU								-.013	
Environmental									
Sales									-.021
Random effects variance components									
Intercept	.027***	.026***	.030***	.030***	.030***	.030***	.024***	.030***	.030***
Level-1	.236	.236	.236	.236	.236	.236	.236	.236	.236

Note: *** indicates $p < .001$; ** indicates $p < .01$, * indicates $p < .05$. For each variable, 1 = yes.

The robust standard errors could not be computed for the institutional factor NAIA.

Table 8

Frequency of Tweets with the Alcohol Reference Term, Beer, Coded by Alcohol-Related Context to Behaviors, Consequences and the Environment.

Content	n	%
Behavior		
Risk	927	18
Protective	473	9
Default	3753	73
Consequences		
Self	34	1
Institutional	88	2
Other	84	1
Default	4946	96
Environment		
Sales	100	1.9
Advertisement	764	14.8
Access	861	16.7
Default	3428	66.5

Note: The default category includes the tweets that did not contain a reference to behavior, consequences, or the environment.

Table 9

Examples of Tweets with the Alcohol Reference Term, Beer, Coded by Alcohol-Related Context to Behaviors.

Behavior	Example of tweets
Risk	Shotgunned a beer for every TD @KapriBibbs scored tonight #GoRams
	Fire, rum, and beer. No complaints #whitegirl #turnup #gocougs #johnnygmoney
	Got all the essential items packed for Dallas. Yes, the beer bong is an essential item #GoBucks
Protective	Beer, burgers, and college football #HottyToddy #FinsUp
	First Beer of the day.....The tailgate had Butt Light. Drank a lot of H20.....Very hot. #goducks @… http://instagram.com/p/uB--iZqJNq/
	Looking forward to a cold beer, room service and the #USC game on TV in a quiet hotel room #USCvsCal #FightOn #LikeABoss
Default	Second half reloaded #bluemoon #beer #usc #touchdown #fighton #drinkon http://instagram.com/p/sWEXQum1NJ/
	Having a beer close to Dana. Welcome to #WVU
	Parents aren't home what do I do? Give all my brothers root beer and have them shot gun #StartingEarly #RTB

Table 10

Examples of Tweets with the Alcohol Reference Term, Beer, Coded by Alcohol-Related Context to Individual, Other, and Institutional Consequences.

Consequences	Example of tweets
Individual	I woke up think beer bong'n Corona was the worst decision I made last night. Then I looked at my text history 🙈 #GoCougs #takemyphone
	A hang over on a Saturday when there is beer and college football to watch. #nobueno #thestruggleisreal #gameday #FSU #FSUvsWF
	Stayed up late, blacked out, woke up on the floor with empty beer cans, shotgun shells, and now K have to buy a new TV. #HOKIES
Other	And then beer was thrown in my hair. #olemissprobs #gameday #hottytoddy http://instagram.com/p/u4qT4JFAbm/
	A guy in the back of an ambulance just poked his head out with his beer to say hi #Rutgers #trappedombruns @its_Lmillertime
	Just saw three dudes stand on chairs and chug down beer while someone filmed #librarylife #college #USC
Institution	Stepped on a few beer cans and a drunk or 2 on walk to tiger stadium #lsu
	Only at #NCSTATE #GoPack...#Beer Bottle opener in a tree knot...
	Having to shower in between parties because you're covered in beer because your football team is incredible >>>>> 🍺🏈💙 #weare #pennstate
Default	Tonight's beer choice for the #Rams game. #GoRams!!
	My view from the pregame radio show. Beer garden filling up! #GoGriz http://instagram.com/p/v_wBU9xkXG/
	Today will be spent in front of the tele, beer in one hand, fist raised to the sky for the other! #GoDawgs

Table 11

Examples of Tweets with the Alcohol Reference Term, Beer, Coded by Alcohol-Related Context to the Environment: Alcohol Sales, Advertisements, or Accessibility.

Environment	Example of tweets
Sales	Yea or Nay- would you be in favor of #AState selling beer to the general public at home games? It's the @TBB_Jonesboro QOD.
	RT @MarkSandritter: I think there are more #WSU fans in beer line than watching the game. #GoCougs
	Nebraska AD Shawn Eichorst has "no interest in selling beer at #Huskers games." (via @HuskerExtraBC) Fans will continue to just sneak it in.
Advertisement	#ASU takes on #UCLA tonight at 7! We've got 90 TVs, beer, & $3 Margaritas! Go #SunDevils!
	Double feature this week tomorrow night- Mean Girls and Clueless! See you at 6 for $1 off all beer and wine #FSU #Tallahassee #beer #movie
	Bring your college id tonight for $7 cover, free mixed drinks till 1 am. Dj Willie inside, and @yamadeoband in the Beer Garden! #FSU #1
Access	Crappy beer in a crappy basement and I could be happier to be back at State. #WeAre
	What a night. Plenty of beer and whiskey as always. Thanks @huckflynn21 #shannonstrong #family #GoBucks
	I'll bring my Vampires to meet you And I'll buy you beer 💚aunt Beth 💚 #SDSU
Default	Mike Bobo-The Guy is going to work his ass off...He has a good sense of family..He has Southern Charm...I'll have a beer with him. #GoRams
	At #Brighton Beer Garden after tough #BCEagles loss
	When your little brother says "It's not beer thirty yet" to my dad at 11. #cougarfootballsaturday #GoCougs

Table 12

Summary of Fixed Effects with Robust Standard Error: Coded Alcohol Advertisement

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Intercept	.199**	.156***	.150***	.165***	.143***	.179***	.152***	.158***	.166***
Institutional									
NCAA division									
IA	-.049								
IAA		.067							
II			.118						
III				-.057					
Population size									
Large					.026				
Medium						-.082*			
Small							.084		
HBCU								.027	
Environmental									
Sales									-.040
Random effects variance components									
Intercept	.023***	.024***	.021***	.024***	.024***	.023***	.023***	.024***	.024***
Level-1	.110	.110	.110	.110	.110	.110	.110	.110	.110

Note: *** indicates $p < .001$; ** indicates $p < .01$, * indicates $p < .05$. For each variable, 1 = yes.

The robust standard errors could not be computed for the institutional factor NAIA.

Table 13

Summary of Fixed Effects with Robust Standard Error: Coded Accessibility to Alcohol

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Intercept	.109***	.160***	.161***	.161***	.158***	.155***	.162***	.160***	.159***
Institutional									
NCAA division									
IA	.056*								
IAA		-.038							
II			-.058						
III				-.075*					
Population size									
Large					.000				
Medium						.025			
Small							-.075*		
HBCU								-.036	
Environmental									
Sales									-.005
Random effects variance components									
Intercept	.003***	.003***	.003***	.004***	.003***	.003***	.004***	.003***	.003***
Level-1	.137	.137	.137	.137	.137	.137	.137	.137	.137

Note: *** indicates $p < .001$; ** indicates $p < .01$, * indicates $p < .05$. For each variable, 1 = yes.

The robust standard errors could not be computed for the institutional factor NAIA.

Table 14

Summary of Fixed Effects with Robust Standard Error: Coded Protective Behaviors

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Intercept	.095*	.112***	.115***	.115***	.119***	.116***	.108***	.113***	.114***
Institutional									
NCAA division									
IA	.021								
IAA		.039							
II			-.034						
III				-.049					
Population size									
Large					-.008				
Medium						-.015			
Small							.055		
HBCU								-.005	
Environmental									
Sales									-.005
Random effects variance components									
Intercept	.007***	.007***	.007***	.007***	.007***	.007***	.006***	.007***	.007***
Level-1	.080	.080	.080	.080	.079	.079	.079	.079	.079

Note: *** indicates $p < .001$; ** indicates $p < .01$, * indicates $p < .05$. For each variable, 1 = yes.

The robust standard errors could not be computed for the institutional factor NAIA.

Table 15

Summary of Fixed Effects with Robust Standard Error: Coded Risk Behaviors

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Intercept	.281***	.173***	.158***	.181***	.171***	.180***	.179***	.185***	.182***
Institutional									
NCAA division									
IA	-.129								
IAA		.092							
II			.254						
III				-.037					
Population size									
Large					.010				
Medium						-.011			
Small							-.005		
HBCU								-.054	
Environmental									
Sales									-.032
Random effects variance components									
Intercept	.019***	.022***	.018***	.023***	.023***	.023***	.023***	.022***	.022***
Level-1	.133	.133	.133	.133	.133	.133	.133	.133	.133

Note: *** indicates $p < .001$; ** indicates $p < .01$, * indicates $p < .05$. For each variable, 1 = yes.

The robust standard errors could not be computed for the institutional factor NAIA.

Table 16

Summary of Fixed Effects with Robust Standard Error: Coded Alcohol Sales

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Intercept	.012	.027***	.026***	.027***	.029**	.023***	.027***	.028***
Institutional								
NCAA division								
IA	.016							
IAA		-.017						
II			-.003					
III				-.027				
Population size								
Large					-.004			
Medium						.016		
HBCU							-.008	
Environmental								
Sales								-.011
Random effects variance components								
Intercept	.001***	.001***	.001***	.001***	.001***	.001***	.001***	.001***
Level-1	.018	.018	.018	.018	.018	.018	.019	.019

Note: *** indicates p < .001; ** indicates p < .01, * indicates p < .05. For each variable, 1 = yes. The robust standard errors could not be computed for the institutional factors NAIA and small student population.

Figure 1

Visual of Level-1 and Level-2 Variables

Level-1 Aggregated Tweets with associated alcohol reference term	Level-1 Context coded tweets, with the reference term beer
Types of alcohol	Coded behaviors
Brands of alcohol	Coded risk
Binge alcohol brands	Coded protective
Popular alcohol brands	Coded consequences
Risk behaviors	Individual consequences
Protective behaviors	Other consequences
	Institutional consequences
	Coded environment
	Coded sales
	Coded advertisement
	Coded accessibility

Level-2 Institutional	Level-2 Environmental
Size of student population	Game day alcohol sales
Small	
Medium	
Large	
NCAA division	
IA	
IAA	
NAIA	
II	
III	
HBCU affiliation	

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APPENDICES

Appendix A

A pilot study was conducted to confirm the presence of alcohol reference terms within the tweets of identified IHE hashtags. Two primary steps were necessary to begin and carry out the pilot study. The first step was to aggregate the Twitter accounts and hashtags associated with or endorsed by IHEs. The second step was to test the utility of using the Twitter search function to find alcohol reference terms within the tweets of identified IHE hashtags. All data for this study was publicly available, and the study was judged exempt by the Institutional Review Board at Georgia State University. Publicly available, English language, tweets within hashtags associated with IHEs, between August 1, 2014 and January 12, 2015 were reviewed for this pilot study.

Method

Procedure

The Twitter accounts and hashtags associated with or endorsed by IHEs were aggregated, as the first step of the pilot study. The Twitter accounts and hashtags associated with IHEs were determined by a multi-step process. First, the "Search for a School" website (National College Athletic Association, 2016) was used to find IHEs and the associated IHEs, athletic department, and football program websites. Second, the websites for IHEs, athletic departments, and football programs were used to determine if there was an associated Twitter account. For example, most websites will include the Twitter icon or another reference to a Twitter account (i.e., a social media reference page). Finally, Twitter accounts were verified by visiting the account and recording the Twitter handles (e.g., @GatorZoneFB) associated with the IHEs, athletic departments, and football programs. Hashtags associated with IHEs were defined as those

included in the biography section of the Twitter account or promoted on an institutional website. Twitonomy, a subscription-based analytics tool, was used to verify that hashtags were associated with Twitter accounts.

The second step of the pilot study was the search process to find alcohol reference terms in the tweets of identified IHE hashtags. The advanced search feature of Twitter was used to collect the tweets with an alcohol reference term. An alcohol reference term (e.g., beer) was paired individually with each hashtag (e.g., #LSU), along with a start and end date (i.e., August 1, 2014 start and January 12, 2015 end) in the advanced search function of Twitter. The search function compressed the search information to the following code: "beer" #lsu since:2014-08-01 until:2015-01-12. The complete name of an alcohol reference term (e.g., Hennessy Cognac), was entered first into the Twitter search function and then an abbreviated version of the brand (e.g., Hennessy) was used in the search function. Tweets retrieved from the Twitter search were copied and pasted into an excel spreadsheet.

Sample

The IHEs sampled for the pilot study include IHEs that participated in the championship tournaments during the 2014-2015 football season (see Appendix B tables B1-B4) for the complete list of IHEs and institutional factors). All IHEs (n = 140) that participated in the 2014-2015 HBCU Classics Football Schedule (n = 30; 2014 HBCU Classics Football Schedule, 2014), the College Football Bowl Schedule (n = 54; Kirk, 2014), Division II Football Championship (n = 24; 2014 NCAA Division II football season, 2014), and Division III Football Championship (n = 32; 2014 NCAA Division III football season, 2014) were assigned a number. The app, “RNG,” random number generator was used to retrieve 15 random numbers. The IHEs associated with the random numbers were used in this pilot study. The process was repeated for the institutional

factors of NCAA division and HBCU affiliation. Institutional factors were retrieved from the NCAA (2016) website. A random sample of 15 IHEs (i.e., five Division I IHE, four Division II IHE, three Division III IHE, and three HBCUs) were used in the pilot study, see Table A1 for a complete list of IHEs included in the pilot study.

The alcohol reference terms for the pilot study were categorized by: types of alcohol, brands of alcohol, along with risk and protective behaviors. See Tables A2-A4 for the complete list of alcohol reference terms used in the pilot study. The alcohol reference terms selected for this study were based on previous studies to examine the alcohol brand preferences among underage drinkers (Naimi et al., 2015; Siegel et al., 2013), alcohol risk behaviors within social media (Moreno, 2010; Primack et al., 2008; Wilkinson & Soares, 2014), and common protective behavioral strategies among college students to reduce high-risk drinking (Martens et al., 2005). The advanced search function of Twitter was used to enter an individual alcohol reference term (e.g., beer) along with a hashtag (e.g., #GoDawgs) within a specific range of dates.

Results

Existence of Twitter accounts

Each of the 140 IHEs had at least one Twitter handle associated with the institution. Sixty-one percent (n = 85) of IHEs had two Twitter accounts (n = 85). Ninety-eight percent (n = 137) of the IHEs had an institutional Twitter account, 98% (n = 137) of IHEs had a Twitter account associated with the athletic department, and 36% (n = 51) of IHEs had a Twitter account associated with the football program (see Appendix C tables C1-C4) for a complete list of Twitter handles associated with accounts).

Existence of hashtags

A total of 409 of hashtags were found during the process of searching for hashtags: 42% (*n* = 170) hashtags were associated with IHEs, 43% (*n* = 175) hashtags were associated with the athletic department, and 16% (*n* = 64) were associated with a football program. Thirteen (*n* = 53) percent of the hashtags were duplicates within an institution (i.e., the hashtag was the same for the institutional and athletic Twitter account).

Utility of data collection

The pilot study demonstrated the utility of collecting data using the search feature of Twitter. A total of 502, publicly available tweets with an alcohol reference term were retrieved from individual hashtags associated with IHEs. The tweets were retrieved, copied, and pasted into an excel spreadsheet within 15 minutes per alcohol reference term and hashtag combination.

Presence of alcohol reference terms

The pilot study confirmed the presence of 502 alcohol reference terms in the tweets of identified IHE hashtags, the list of alcohol reference terms and the frequency of terms in tweets can be reviewed in Table A2-A4. The alcohol reference terms are categorized by types of alcohol, brands of alcohol, along with risk and protective behaviors associated with alcohol.

Types of alcohol. Ninety-three (n=473) percent of the alcohol reference terms referenced a type of alcohol (Table A2). The most common type of alcohol and the most common alcohol reference term was beer 53% (*n* = 249) followed by alcohol 12% (*n* = 58), wine 11% (*n* = 53), and bourbon 8% (*n* = 39). The least common references to a type of alcohol were: whiskey 3% (*n* = 16), liquor 3% (*n* = 16), vodka 3% (*n* = 14), rum 3% (*n* = 14), scotch 1% (*n* = 6), tequila 1% (*n* = 6), and gin (*n* = 2). The expanded name of some types of alcohol were not found in the tweets (e.g., table wine, fortified wine).

Brands of alcohol. Three percent (n=14) of tweets included a brand of alcohol (Table A3). Less than one percent of alcohol references to brand of alcohol were exclusive to a binge or a popular brand of alcohol.

Risk behaviors. Three percent (n=15) of tweets included an alcohol reference term associated with an alcohol related risk behavior (Table A4). The alcohol related risk behaviors found in the tweets of identified IHE hashtags included: drinking games 80% (*n* = 12) and 20% beer pong (*n* = 3). Neknominate was not found in any tweets. The term "drinking" was found in 71 tweets but was not aggregated as a risk behavior because most of the tweets were not associated with alcohol.

Protective behaviors. The alcohol related protective behaviors (i.e., sober or designated drivers) were not found in any tweets (Table A4).

Context for the coding system

Each of the 502 tweets were read to examine the context of the alcohol reference within the tweet. The context of the tweets revealed references to low or to no risk alcohol related behaviors (e.g., Not gonna lie, I was too turnt for the homecoming game. I swear I had no alcohol what-so-ever. Just a die hard brave. #bravenation) along with a specific reference to an alcohol prevention program (e.g., UNCP's National Pan-Hellenic Council at the Alcohol Awareness Seminar tonight. #uncp #nphc @UNCP_NPHC). Additionally, references to high-risk drinking behavior were evident in the context of the tweet (e.g., the search word was beer and the tweet included "beer pong"). The context of tweet suggested some inclusion of alcohol related consequences (e.g., friend got arrested or a reference to a fraternity in trouble with authorities). Alcohol advertising was also noted in the tweets by means of a local bar advertising specific prices (e.g., $5 rum buckets) or other specials associated with IHEs (e.g., Monday is

National #CollegeColors Day! Wear your college jersey, t-shirt or color and receive a free beer or glass of house wine! #collegecolors #RollTide).

Summary of Utility of Pilot Study

The pilot study indicated the breadth of Twitter accounts and hashtags associated with IHEs. The pilot study also demonstrated the utility of collecting data from Twitter hashtags, confirmed the presence of alcohol reference terms in the tweets of identified IHE hashtags, and provided context to examine the contextual nuances of the tweets with an alcohol reference term. Finally, it also served as the foundation for developing a codebook to examine the contextual nuances of tweets with the most referenced alcohol term.

Modifications based on pilot study

Twitter accounts. Based on the pilot study results, the final sample of IHEs for the study included 136 IHEs (see Appendix C tables C1-C4 for the IHEs along with the Twitter handle and hashtags) with a Twitter account and at least one unique hashtag associated with the Twitter account. Four IHEs were excluded because the hashtags associated with the account were too general (i.e., Concord University and #nationalsigningday; Hampden-Sydney College and #d3h, #GoTigers; Watburg College and #worthit; Wesley College and #givingtuesday). The range of unique hashtags per IHE was between one and six. The majority of IHEs, 43% (n = 58), had two unique hashtags associated with the Twitter accounts. Eighteen percent (n = 24) of IHEs had one hashtag and 27% (n = 37) had three unique hashtags associated with the Twitter account.

Hashtags. Based on the pilot results, the final sample of hashtags for the study included 324 unique hashtags (see Appendix D tables D1-D4 for the number of unique hashtags per IHE). The hashtags associated with an IHEs' institutional, athletic, or football Twitter account are listed in Appendix C tables C1-C4. A review of the hashtags was necessary to remove duplicate

hashtags along with hashtags that were too general. Hashtags were removed from the sample because they were general hashtags or were repeated amongst more than one IHE (i.e., #nationalsigningday, #constantcontact, #valuelibralarts, #worthit, #givingtuesday, #d3fb, #d3h, #ashe2014, #letsroll, #belegendary, #fafsa, #collegegoalsunday, #mecsb, #div2) or referenced a professional team (i.e., #12thman, #saintsnation).

Alcohol reference terms. Based on the pilot study, 45 alcohol reference terms were retained (Table A2; reference terms not retained are indicated in table by italics). The following short phrases were not included in the current study because they were not found in any hashtags or the term was not associated with alcohol: flavored alcoholic beverages, spirit-based energy drinks, grain alcohol, table wine, fortified wine, and cordials/liqueurs. Additional alcohol references were not included in the current study because the context of the tweet was not associated with alcohol: brandy was a person's name, cognac was a type of purse, spirits was an emotion, Grey Goose referred to a bird, and Miller referred to a person. The term, "drinking" was not retained because most of the tweets referred to drinking coffee or other non-alcohol related tweets. In addition, some brands (i.e., Smirnoff Malt Beverages, Smirnoff Vodkas, Jack Daniels Cocktails, Jack Daniels Bourbon, Corona Extra, Corona Extra Light, and Coors Light) were combined under the brand name (i.e., Smirnoff, Jack Daniels, Corona, and Coors, respectively) because no tweets included references to the distinction of the brand. Even though some alcohol brands were not found in the pilot study the complete list of alcohol brands were retained in the study to address the research questions. Finally, in terms of behaviors, even though Neknominate was not found in any tweets the alcohol reference was retained because it is a relatively new phenomenon that has not been researched. Keg stands was simplified to keg(s) because the specificity may have limited to search. Policies prohibiting beer kegs are suggested

to reduce large quantities of access to alcohol on college campuses (Toomey, Lenk & Wagenaar, 2007). The protective factors were also retained because they are part of the research questions.

Codebook. A result of the pilot study, was the development of a codebook (see Appendix E) to identify the existence of risk or protective behaviors (i.e., behavior factor) associated with an alcohol reference; the consequences of the alcohol reference term on the person, others, or the institution (i.e., consequence factor); and the presence of references to alcohol sales, availability, and advertisements (i.e., environmental factor). A default category was used if the tweet did not meet the criteria for inclusion in any of the categories for the factors. All tweets were first considered in the default category of the associated alcohol related factor. Tweets from the pilot study were used as examples in the codebook to inform the two-people coding the tweets in the current study. The variables created, represent the total number of tweets, based on the coding of factors (i.e., behavior, consequence, and environment).

Table A1

Pilot study IHE and the associated Twitter handles and hashtags

IHE	@Handle #Hashtag
Albany State University	IHE: @AlbanyStateUniv #albanystthdrys #albanystate Athletic: @AlbanyStateUniv #albanystate #besttu #scsu
Centre College	IHE: @CentreC #centrec #centreabroad Athletic: @CentreAthletics *#d3fb #d3h*
Concord University	IHE: @CampusBeautiful *#fafsa #collegegoalsunday* Athletic: @Cumountainlions *#mecsb #div2 #nationalsigningday*
Fayetteville State University	IHE: @Uncfsu #nohoe #fsuhomecoming Athletic: @FSUBroncos #BroncoPride #fsu #ciaasports
Florida Agricultural & Mechanical University	IHE: @FAMU_1887 #FAMUForward #famu Athletic: @FAMUAthletics #rattlerpride #letsgorattlers
Franklin College	IHE: @FranklinCollege #gogriz #grizproud *#collegcolors* Athletic: @FCAthletics #gogriz #getgrizzly
North Carolina State University	IHE: @NCState #ncstate #thinkanddo Athletic: @PackAthletics #Statement #Ironwolf Football: @PackFootball #1Pack1Goal
Northern Illinois University	IHE: @NIUlive #niu #niuhousing Athletic: @NIUAthletics #niu Football: @NIU_Football #thehardway
Oklahoma State University	IHE: @Okstate #okstate #gopokes Athletic: @OSUAthletics #okstate #gopokes Football: @CowboyFB #okstate
Ouachita Baptist University	IHE: @Ouachita Athletic: @OuachitaTigers #finishempty #gac
Rice University	IHE: @RiceUniversity #riceow14 #riceuniversity Athletic: @RiceOwlsdotcom Football: @RiceFootball1 #flywithus #riserising
Slippery Rock University of Pennsylvania	IHE: @slipperyrockU #sru19 #srubound Athletic: @Rock_Athletics #rocknation #srualska
University of North Carolina at Pembroke	IHE: @Uncpembroke #uncp #bravenation Athletic: @UNCP_Sports #HomeOfTheBrave #bravenation
University of South Carolina	IHE: @UofSC #uofsc Athletic: @GamecocksOnline #Gamecocks Football: @GamecockFB #HereSC
University of St. Thomas, Minnesota	IHE: @UofStThomasMN #GoTommies #tommies4life Athletic: @TommieAthletics #gotommies #gogusties

Note: Hashtags in italics were only used in the pilot study.

Table A2

Frequencies of alcohol reference terms, related to types of alcohol

Alcohol Reference Terms	n	%
Types of Alcohol		
Beer	249	53
Alcohol	58	12
Wine	53	11
Bourbon	39	8
Gin	2	.004
Rum	14	3
Scotch	6	1
Tequila	6	1
Vodka	14	3
Whiskey	16	3
Liquor	16	3
Flavored alcoholic beverages	0	0
Spirits	0	0
Spirits based energy drinks	0	0
Brandy	0	0
Cognac	0	0
Cordials / Liqueurs	0	0
Grain alcohol	0	0
Table wine	0	0
Fortified wine	0	0

Note: Words in italics were only used in the pilot study.

Table A3

Frequencies of alcohol reference terms, related to brands of alcohol

Alcohol Reference Terms	n	%
Brands of Alcohol		
Bud Light	5	62.5
Budweiser	1	12.5
Smirnoff (Malt Beverages & Vodkas)	0	0
Miller Lite	0	0
Natural Light	0	0
Keystone Light	0	0
Mike's	0	0
Grey Goose Vodkas	1	12.5
Heineken	1	12.5
Jack Daniels	0	0
Barefoot Wines	0	0
Captain Morgan Rums	0	0
Binge Brands of Alcohol		
Four Loko (binge)	1	100
Bacardi (Rums and Malt Beverages) (binge)	0	0
UV Vodka (binge)	0	0
Malibu	0	0
Jose Cuervo	0	0
Patron tequilas	0	0
Hennessy cognac	0	0
E&J Gallo brandy	0	0
Popular Brands of Alcohol		
Coors	5	100
Corona (Extra and Extra Light)	0	0
Natural Ice	0	0
Guinness	0	0
Agwa de Bolivia	0	0
Czechvar	0	0
Absolut Vodkas	0	0
Blue Moon	0	0

Note: Words in italics were only used in the pilot study.

Table A4

Frequencies of alcohol reference terms, related to alcohol protective and risk behaviors

Alcohol Reference Terms	n	%
Protective Behaviors		
Sober driver	0	0
Designated driver	0	0
Risk Behaviors		
Drinking games	12	80
Beer pong	3	20
Keg stands	0	0
Neknominate	0	0
Drinking	0	0

Note: Words in italics were only used in the pilot study.

Appendix B

IHEs by football tournament and the associated institutional factors.

Table B1

HBCU Classics IHEs and the associated institutional factors (n=30)

Name of IHE	Size of Student Population			NCAA Division				
	Large	Medium	Small	IA	IAA	NAIA	II	III
Alabama A&M University			•		•			
Alabama State University			•		•			
Albany State University			•				•	
Benedict College			•				•	
Bethune-Cookman University			•		•			
Central State University, Ohio			•		•			
Edward Waters College			•			•		
Elizabeth City State University			•				•	
Fayetteville State University		•					•	
Florida Agricultural and Mechanical University		•			•			
Fort Valley State University			•				•	
Grambling State University			•		•			
Hampton University			•		•			
Howard University		•			•			
Jackson State University		•			•			
Johnson C. Smith University			•				•	
Kentucky State University			•				•	
Langston University			•			•		
Lincoln University, Missouri			•				•	
Morehouse College			•				•	
Morgan State University		•			•			
Norfolk State University		•			•			
North Carolina A&T State		•			•			
Prairie View A&M University		•			•			
South Carolina State University			•		•			
Southern University and A&M		•			•			
Stillman College			•				•	
Tennessee State University		•			•			
Texas Southern University		•			•			
Tuskegee University			•				•	

Note: All IHEs in the HBCU Classic had a HBCU affiliation and no alcohol sales.

Table B2

College Football Bowl IHEs and the institutional factors (n =54)

Name of IHE	Size of student population			Alcohol Sales
	Large	Medium	Small	
Arizona State University	•			
Arkansas State University		•		
Boston College		•		
Bowling Green State University	•			•
Brigham Young University	•			
Central Michigan University	•			
Clemson University	•			
Colorado State University	•			•
Duke University		•		
Florida State University	•			
Louisiana State University	•			
Louisiana Tech University		•		
Marshall University		•		
North Carolina State University	•			
Northern Illinois University	•			
Ohio State University	•			
Oklahoma State University	•			
Penn State University	•			
Rice University			•	
Rutgers University, New Brunswick	•			
San Diego State University	•			•
Stanford University		•		
Texas A&M University	•			
Texas Christian University		•		
United States Air Force Academy			•	
United States Naval Academy			•	
University of Alabama	•			
University of California, Fresno State	•			
University of Central Florida	•			
University of Cincinnati	•			•
University of Georgia	•			
University of Illinois, Champaign	•			
University of Louisiana	•			•
University of Louisville	•			•
University of Maryland	•			
University of Memphis	•			•
University of Miami	•			•

Table B2

College Football Bowl IHEs and the institutional factors (n =54)

Name of IHE	Size of student population			Alcohol Sales
	Large	Medium	Small	
University of Mississippi	•			
University of Nebraska	•			
University of Nevada, Reno	•			•
University of North Carolina, Chapel Hill	•			
University of Notre Dame	•			
University of Oregon	•			
University of South Alabama	•			•
University of South Carolina	•			
University of Southern California	•			
University of Texas at Austin	•			
University of Texas at El Paso	•			•
University of Utah	•			
Utah State University	•			
Virginia Tech	•			
West Virginia University	•			•
Western Kentucky University	•			•
Western Michigan University	•			

Note: All IHEs in the College Football Bowl were NCAA Division 1A IHEs and no HBCU affiliation.

Table B3

Division II Football Championship IHEs and the institutional factors (n =24)

Name of IHEs	Size of student population		
	Large	Medium	Small
Angelo State University			•
Bloomsburg University		•	
Colorado School of Mines			•
Colorado State University, Pueblo		•	
Concord University			•
Delta State University			•
Ferris State University	•		
Harding University			•
Lenoir-Rhyne University			•
LIU Post, C.W. Post Campus of Long Island University		•	
Michigan Technological University		•	
Minnesota State University, Mankato	•		
Northwest Missouri State University		•	
Ohio Dominican University			•
Ouachita Baptist University			•
Pittsburg State University		•	
Slippery Rock University of Pennsylvania		•	
University of Minnesota Duluth		•	
University of North Alabama		•	
University of North Carolina at Pembroke		•	
University of West Georgia	•		
Valdosta State University		•	
Virginia State University			•
West Chester University of Pennsylvania	•		

Note: All IHEs in the NCAA Division II Football Championship were NCAA Division II IHEs, no HBCU affiliation, and no alcohol sales.

Table B4

Division III Football Championship IHEs and the institutional factors (n =32)

Name of IHEs	Size of student population		
	Large	Medium	Small
Adrian College			•
Benedictine University			•
Centre College			•
Chapman University		•	
Christopher Newport University		•	
Delaware Valley University			•
Franklin College			•
Hampden-Sydney College			•
Hobart College			•
Husson University			•
Ithaca College		•	
John Carroll University			•
Johns Hopkins University		•	
Linfield College			•
Macalester College			•
Massachusetts Institute of Technology			•
Muhlenberg College			•
Rowan University	•		
St. John's University, Minnesota	•		
Texas Lutheran University			•
The College of St. Scholastica			•
University of Mary Hardin-Baylor			•
University of Mount Union			•
University of St. Thomas, Minnesota		•	
University of Wisconsin, Whitewater	•		
Wabash College			•
Wartburg College			•
Washington & Jefferson College			•
Wesley College			•
Wheaton College, Illinois			•
Widener University			•
Wittenberg University			•

Note: All IHEs in the NCAA Division III Football Championship were NCAA Division III IHEs, no HBCU affiliation, and no alcohol sales.

Appendix C

IHEs and the associated Twitter handles and hashtags

Table C1

HBCU Classics IHEs and the associated Twitter handles and hashtags

HBCU Classics IHEs	@Handle #Hashtag
Alabama A&M University	IHE: @aamuedu #startheregoanywhere Athletic: @aamubulldogs #aamu
Alabama State University	IHE: @asuhornetnation #asubuzz Athletic: @asubuzz #myasu
Albany State University	IHE: @albanystateuniv #albanystthdrys #albanystate Athletic: @albanystateuniv #albanystate #besttu #scsu
Benedict College	IHE: @benedictedu #benedictcollege Athletic: @benedict_tigers #bctigers
Bethune-Cookman University	IHE: @bethunecookman #bcu17 #hailwildcats Athletic: @bcuathletics #hailwildcats #bcu Football: @bcugridiron #hailwildcats
Central State University, Ohio	IHE: @centralstate87 #ihavemarauderpride Athletic: @go_marauders #wearecsu
Edward Waters College	IHE: @ewctigers #tigerpride
Elizabeth City State University	IHE: @ecsu #ecsu Athletic: @ecsuvikings #ecsu
Fayetteville State University	IHE: @uncfsu #nohoe #fsuhomecoming Athletic: @fsubroncos #broncopride #fsu #ciaasports
Florida Agricultural and Mechanical University	IHE: @famu_1887 #famuforward #famu Athletic: @famuathletics #rattlerpride #letsgorattlers
Fort Valley State University	IHE: @fvsu #fvsu Athletic: @teamfvsu #teamfvsu
Grambling State University	IHE: @grambling1901 #hbcuioweu #gramfam Athletic: @gsu_tigers #gramfam
Hampton University	IHE: @_hamptonu #hamptonnation Athletic: @huathletics1868 #piratepride #hamptonnation
Howard University	IHE: @howardu #howardu #hubison Athletic: @hubisonsports #howardwvb
Jackson State University	IHE: @jacksonstateu #rightnowatjsu Athletic: @jstatetigers #morethanagame
Johnson C. Smith University	IHE: @jcsuniversity #jcsuhc2014 Athletic: @jcsu_sports#go jcsu
Kentucky State University	IHE: @kystateu #kysuhc Athletic: @ksu_athletics #bredtowin
Langston University	IHE: @langstonu#fame Athletic: @ langstonsports #teamlu

Table C1

HBCU Classics IHEs and the associated Twitter handles and hashtags

HBCU Classics IHEs	@Handle #Hashtag
Lincoln University, Missouri	IHE: @lubluetigers #blueprint Athletic: @gobluetigers #trueblue #bluetigernation #truebluestars
Morehouse College	IHE: @morehouse #morehouse
Morgan State University	IHE: @morganstateu #morganstateu Athletic: @morganstbears #gobears
Norfolk State University	IHE: @norfolkstate80 #nsu Athletic: @nsuspartans #nsu
North Carolina A&T State University	IHE: @ncatsuaggies #ncat Athletic: @ncataggies #aggiepride
Prairie View A&M University	IHE: @pvamu #pvspit Athletic: @pvamupanthers #swacwbb
South Carolina State University	IHE: @scstate1896 #scstate Athletic: @scstateathletic #wearescstate
Southern University and A & M College	IHE: @southernu_br #wearesouthern #asksouthern #facesofsu Athletic: @southernusports #thisissouthern
Stillman College	IHE: @stillmancollege Athletic: @gostillman #gostillman
Tennessee State University	IHE: @tsuedu #tsu #tsufreshmenmovein2014 Athletic: @tsu_tigers #bigbluerising
Texas Southern University	IHE: @texassouthern #roadtocanton Athletic: @txsotigers #belegendary
Tuskegee University	IHE: @tuskegeeuniv #constantcontact Athletic: @mytuathletics #mytupride

Table C2

College Football Bowl Schedule IHEs and the associated Twitter handles and hashtags

College Bowl Schedule	@Handle #Hashtag
Arizona State University	IHE: @asu #pitchforksalute Athletic: @thesundevils #fearthefork Football: @footballasu #etg #sundevils #*pac12* #pt42
Arkansas State University	IHE: @arkansasstate #astate Athletic: @astateredwolves #astate #wolvesup Football: @redwolvesfball #buildingamonster #wolvesup
Boston College	IHE: @bostoncollege #wearebc #bostoncollege Athletic: @bcsportsnews #bceagles Football: @bcfootballnews #bceagles
Bowling Green State University	IHE: @bgsu #bgfalconpride Athletic: @bgathletics #talonsup Football: @bg_football #falconfast
Brigham Young University	IHE: @byu #gocougs Athletic: @byucougars #gocougs Football: @byufootball #byufootball
Central Michigan University	IHE: @cmuniversity #lifeatcentral Athletic: @cmuathletics #fireupchips Football: @cmu_football #fireupchips
Clemson University	IHE: @clemsonuniv #clemson Athletic: @clemsontigers #clemsonfamily Football: @clemsonfb #allin
Colorado State University	IHE: @coloradostateu #csuremo Athletic: @csuathletics #gorams
Duke University	IHE: @dukeu #goduke Athletic: @duke_athletics #goduke Football: @duke_fb #goduke
Florida State University	IHE: @floridastate #fsu Athletic: @seminoles_com #noles Football: @fsu_football #noles
Louisiana State University	IHE: @lsu #lplg Athletic: @lsusports #lsu Football: @lsufball #lsu
Louisiana Tech University	IHE: @latech #wearelatech Athletic: @latechsports #wearelatech Football: @latechfb #wearelatech
Marshall University	IHE: @marshallu #marshalluniversity Athletic: @herdzone #*weare* Football: @herdfb

Table C2

College Football Bowl Schedule IHEs and the associated Twitter handles and hashtags

College Bowl Schedule	@Handle #Hashtag
North Carolina State University	IHE: @ncstate #ncstate #thinkanddo Athletic: @packathletics #statement #ironwolf Football: @packfootball #1pack1goal
Northern Illinois University	IHE: @niulive #niu #niuhousing Athletic: @niuathletics #niu Football: @niu_football #oneway #thehardway
Ohio State University	IHE: @ohiostate #buckeyeforlife! Athletic: @ohiostathletics #gobucks
Oklahoma State University	IHE: @okstate #okstate #gopokes Athletic: @osuathletics #okstate #gopokes Football: @cowboyfb #okstate
Penn State University	IHE: @penn_state #pennstate Athletic: @gopsusports #weare Football: @pennstatefball #psunrivaled
Rice University	IHE: @riceuniversity #riceow14 #riceuniversity Athletic: @riceowlsdotcom Football: @ricefootball1 #flywithus #riserising
Rutgers University, New Brunswick	IHE: @rutgersu #rutgers Athletic: @ruathletics #rfootball Football: @rfootball #rfootball #b1g #thebirthplace
San Diego State University	IHE: @sdsu #sdsu Athletic: @goaztecs #aztecfb Football: @aztec_football #goaztecs
Stanford University	IHE: @stanford #atstandford Athletic: @gostanford #gostanford #nerdnation Football: @stanfordfball #partyinthebackfield #gostanford
Texas A&M University	IHE: @tamu #tamu #*12thman* *Athletic: @12thman #12thman* Football: @aggiefootball #*12thman*
Texas Christian University	IHE: @tcu #getstarted #tcugrad Athletic: @tcu_athletics #gofrogs Football: @tcufootball #provethemright
United States Air Force Academy	IHE: @af_academy #youracademy Athletic: @af_falcons #powerofblue Football: @affootball #powerofblue
United States Naval Academy	IHE: @navalacademy #usna #charactermatters #midshipmen Athletic: @navyathletics #navyfootball

Table C2

College Football Bowl Schedule IHEs and the associated Twitter handles and hashtags

College Bowl Schedule	@Handle #Hashtag
University of Alabama	IHE: @uofalabama *#ashe2014* Athletic: @ua_athletics #rolltide #bamagameday #builtbybama Football: @alabamaftbl #rolltide
University of California, Fresno State	IHE: @fresno_state #fresnostate Athletic: @fsathletics #godogs #bebold #redwave Football: @fresnostatefb #godogs #mwfb #bulldogbornbulldogbred
University of Central Florida	IHE: @ucf #ucf Athletic: @ucfknights #chargeon Football: @ucf_football #chargeon
University of Cincinnati	IHE: @uofcincy #cincinnatismart Athletic: @gobearcats #bearcats Football: @gobearcatsfb #bearcats #bearcatpride
University of Georgia	IHE: @universityofga #uga Athletic: @ugaathletics #godawgs #committotheg #ringthebell Football: @footballuga #committotheg
University of Illinois, Champaign	IHE: @illinois_alma #ilinois #illini Athletic: @illiniathletics #illin Football: @illinifootball #illini
University of Louisiana	IHE: @ullafayette #ulgetinvolved Athletic: @ulragincajuns #geauxcajuns #raginspirit
University of Louisville	Athletic: @gocards #uofl Football: @uoflfootball #l1c4
University of Maryland	IHE: @uofmaryland #umd Athletic: @umterps #feartheturtle
University of Memphis	IHE: @uofmemphis *#dormdecor* Athletic: @tigersathletics #gotigersgo Football: @memphisfb
University of Miami	IHE: @univmiami Athletic: @miamihurricanes #socialcanes #istandwithu Football: @canesfootball #itsallabouttheu
University of Mississippi	IHE: @olemissrebels #hottytoddy #olemiss #rebels Athletic: @olemisssports #hottytoddy Football: @olemissfb #hottytoddy
University of Nebraska	IHE: @unlincoln #unl Athletic: @huskers #huskers

Table C2

College Football Bowl Schedule IHEs and the associated Twitter handles and hashtags

College Bowl Schedule	@Handle #Hashtag
University of Nevada, Reno	IHE: @unevadareno #unr Athletic: @nevadawolfpack #battleborn #borntobeone
University of North Carolina, Chapel Hill	IHE: @unc #unc Athletic: @goheels #goheels Football: @tarheelfootball #uncfb
University of Notre Dame	IHE: @notredame #notredame Athletic: @fightingirish #goirish Football: @ndfootball #ndvslsu
University of Oregon	IHE: @univ_of_oregon #uoregon #goducks Athletic: @goducks #goducks Football: @wintheday #wtd #goducks
University of South Alabama	IHE: @uofsouthalabama #gojags Athletic: @usajaguarsports #jagnation
University of Southern California	IHE: @usc #usc Athletic: @usc_athletics #fighton
University of South Carolina	IHE: @uofsc #uofsc Athletic: @gamecocksonline #gamecocks Football: @gamecockfb #gamecocks #heresc #*nflgamecocks*
University of Texas at Austin	IHE: @utaustin #whatstartshere #hookem Athletic: @texassports #whatstartshere #hookem Football: @longhorn_fb #longhorns
University of Texas at El Paso	IHE: @utepnews #utep Athletic: @utepathletics #minerstrong
University of Utah	IHE: @uutah #goutes Athletic: @utahathletics #goutes
Utah State University	IHE: @usuaggies #usuaggies Athletic: @usuathletics #usuaggies #usugameday

Table C2

College Football Bowl Schedule IHEs and the associated Twitter handles and hashtags

College Bowl Schedule	@Handle #Hashtag
Virginia Tech	IHE: @virginia_tech #virginiatech
	Athletic: @hokiesports #hokies #thisishome
	Football: @vt_football #hokies
West Virginia University	IHE: @westvirginiau #wvu
	Athletic: @wvusports #hailwv
	Football: @wvufootball #hailwv
Western Kentucky University	IHE: @wkunews #wku
	Athletic: @wkusports #gotops
	Football: @wkufootball #gotops
Western Michigan University	IHE: @wmunews #wmu
	Athletic: @wmubroncofans #wmu #thepowerofgold
	Football: @wmu_football #rtb

Note: The hashtags in italics were removed after the pilot study because they were too general, were duplicated, or referenced a professional football team.

Table C3

Division II Football Championship IHEs and the associated Twitter handles and hashtags

Division II Championship	@Handle #Hashtag
Angelo State University	IHE: @angelostate #ramshometurf Athletic: @angelosports #gorams #gobelles
Bloomsburg University	IHE: @bloomsburgu #huskylife! #huskyunleashed Athletic: @gobuhuskies #unleashed
Colorado School of Mines	IHE: @coschoolofmines #mineslife
Colorado State University, Pueblo	IHE: @csupueblo #backthepack Athletic: @gothunderwolves #backthepack
Concord University	IHE: @campusbeautiful *#fafsa #collegegoalsunday* Athletic: @cumountainlions *#mecsb #div2 #nationalsigningday*
Delta State University	IHE: @deltastate #dsufamily Athletic: @dsustatesmen #dsufamily #unitedingreen
Ferris State University	IHE: @ferrisstate #ferr1s Athletic: @ferrisathletics Football: #ferrisfootball
Harding University	IHE: @hardingu #hulectureship Athletic: @hardingsports #hubisons
Lenoir-Rhyne University	IHE: @lenoirrhyne #lru Athletic: @bearssports #gobears #lrbears
LIU Post, C.W. Post Campus of Long Island University	IHE: @liupost #weareliu Athletic: @liupostpioneers #pioneernation Football: @liupfb #liupfb
Michigan Technological University	IHE: @michigantech #bronzeblizzard Athletic: @mtuhuskies #followthehuskies
Minnesota State University, Mankato	IHE: @mnsumankato #mnsu Athletic: @msumavericks #hornsup
Northwest Missouri State University	IHE: @nwmostate #bearcatsconnect Athletic: @bearcatsports #oabaab
Ohio Dominican University	IHE: @ohiodominican #iamodu Athletic: @oduathletics #odupanthers
Ouachita Baptist University	IHE: @ouachita Athletic: @ouachitatigers #finishempty #gac
Pittsburg State University	IHE: @pittstate #gorillanation Athletic: @pittstgorillas #gorillanation
Slippery Rock University of Pennsylvania	IHE: @slipperyrocku #sru19 #srubound Athletic: @rock_athletics #rocknation #srualska

Table C3

Division II Football Championship IHEs and the associated Twitter handles and hashtags

Division II Championship	@Handle #Hashtag
University of Minnesota Duluth	IHE: @umnduluth #umdproud Athletic: #bulldogcountry
University of North Alabama	IHE: @north_alabama #myuna Athletic: @unaathletics #roarlions #1roar
University of North Carolina at Pembroke	IHE: @uncpembroke #uncp #bravenation Athletic: @uncp_sports #homeofthebrave #bravenation
University of West Georgia	IHE: @univwestga #uwg Athletic: @uwgathletics #gowolves
Valdosta State University	IHE: @valdostastate #vstate19 #valdostastate Athletic: @blazerathletics #blazernation
Virginia State University	IHE: @vsutrojans #vsu Athletic: @vsusports #govsutrojans
West Chester University of Pennsylvania	IHE: #rampride

Note: The hashtags in italics were removed after the pilot study because they were too general, were duplicates, or referenced a professional football team.

Table C4

Division III Football Championship IHEs and the associated Twitter handles and hashtags

Division III Championship	@Handle #Hashtag
Adrian College	IHE: @adriancollege #adriancollege Athletic: @adrianbulldogs #bulldogproud
Benedictine University	IHE: @benu1887 #hailbenu Athletic: @benueagles #hailbenu
Centre College	IHE: @centrec #centrec #centreabroad Athletic: @centreathletics *#d3fb #d3h*
Chapman University	IHE: @chapmanu #chapmanu #pantherpride #chapmanstories Athletic: @chapmansports #chaptown #pantherpride
Christopher Newport University	IHE: @cnucaptains #cnu18 Athletic: @cnuathletics #mantheship
Delaware Valley University	IHE: @delval #delval Athletic: @delvalaggies
Franklin College	IHE: @franklincollege #gogriz #grizproud *#collegecolors* Athletic: @fcathletics #gogriz #getgrizzly
Hampden-Sydney College	IHE: @hsc1776 *#gotigers* Athletic: @hscathletics *#d3h*
Hobart College	IHE: @hwscolleges #hwshomecoming Athletic: @hwssid *#d3fb* Football: @hobartfootball #gobart
Husson University	IHE: @hussonu Athletic: @hussoneagles #flyeagles
Ithaca College	IHE: @ithacacollege #icmovein Athletic: @bombersports #gobombers Football: @ithacabomberfb #proveit
John Carroll University	IHE: @johncarrollu #onwardon Athletic: @jcusports #streaknation Football: @jcufootball *#d3fb*
Johns Hopkins University	IHE: @johnshopkins #gohop Athletic: @hopkinssports #gohop Football: @jhu_football #jhufb
Linfield College	IHE: @linfieldcollege #linfieldcollege Athletic: @linfieldsports #rallycats
Macalester College	IHE: @macalester #heymac Athletic: @macathletics #goscots

Table C4

Division III Football Championship IHEs and the associated Twitter handles and hashtags

Division III Championship	@Handle #Hashtag
Massachusetts Institute of Technology	IHE: @mit #aroundmit #mit Athletic: @mitengineers #gotech
Muhlenberg College	IHE: @muhlenberg #mulementum Athletic: @muhl_sports #ccfb14
Rowan University	IHE: @rowanuniversity #rowanproud Athletic: @rowanathletics #profnation
St. John's University, Minnesota	IHE: @csbsju #csbsju Athletic: @sjujohnnies #*d3fb* Football: @sjufootball #gacliardtrophy
Texas Lutheran University	IHE: @txlutheran #tlu Athletic: @tluathletics #tlubulldogs
The College of St. Scholastica	IHE: @stscholastica #*saintsnation* Athletic: @csssaints #saintsriseup
University of Mary Hardin-Baylor	IHE: @umhb Athletic: @crusports #umhb #crunation #gocru
University of Mount Union	IHE: @mountunion #mountunion Athletic: @purpleraiders #gomountgo
University of St. Thomas, Minnesota	IHE: @uofstthomasmn #gotommies #tommies4life Athletic: @tommieathletics #gotommies #gogusties
University of Wisconsin, Whitewater	IHE: @uwwhitewater #bleedpurple Athletic: @uwwathletics #poweredbytradition #uwwnation
Wabash College	IHE: @wabashcollege #*valueliberalarts* Athletic: @wabashathletics #wabash
Wartburg College	IHE: @wartburgcollege #*worthit* Athletic: @knightssid #*d3fb*
Washington & Jefferson College	IHE: @wjcollege #beapresident #whichicoax Athletic: @wjathletics #rip5
Wesley College	IHE: @wesleycollegede #*givingtuesday* Athletic: @gowesley #*d3fb*
Wheaton College, Illinois	IHE: @wheatoncollege #wheatonmag Athletic: @wheaton_thunder #*letsroll*
Widener University	IHE: @wideneruniv #widenerpride Athletic: @widenersports #widenerpride Football: @widenerfb #maciii
Wittenberg University	IHE: @wittenberg #wittenberg Athletic: #tigerup Football: #wittfb

Note: The hashtags in italics were removed after the pilot study because they were too general, were duplicated, or referenced a professional football team.

Appendix D

Names of IHEs in the 2014-2015 football championship tournaments

Table D1

HBCU Classics IHEs and the number of unique hashtags associated with the IHEs

HBCU IHEs	Number of unique hashtags (#)
Alabama A&M University	2
Alabama State University	2
Albany State University	4
Benedict College	2
Bethune-Cookman University	3
Central State University, Ohio	2
Edward Waters College	1
Elizabeth City State University	1
Fayetteville State University	5
Florida Agricultural and Mechanical University	4
Fort Valley State University	2
Grambling State University	2
Hampton University	2
Howard University	3
Jackson State University	2
Johnson C. Smith University	2
Kentucky State University	2
Langston University	2
Lincoln University, Missouri	4
Morehouse College	1
Morgan State University	2
Norfolk State University	1
North Carolina A&T State University	2
Prairie View A&M University	2
South Carolina State University	2
Southern University and A & M College	4
Stillman College	1
Tennessee State University	3
Texas Southern University	1
Tuskegee University	1

Table D2

College Football Bowl IHEs and the number of unique hashtags associated with the IHEs

Division I IHEs	Number of unique hashtags (#)
Arizona State University	5
Arkansas State University	3
Boston College	3
Bowling Green State University	3
Brigham Young University	2
Central Michigan University	2
Clemson University	3
Colorado State University	2
Duke University	1
Florida State University	2
Louisiana State University	2
Louisiana Tech University	1
Marshall University	1
North Carolina State University	5
Northern Illinois University	4
Ohio State University	2
Oklahoma State University	2
Penn State University	3
Rice University	4
Rutgers University, New Brunswick	4
San Diego State University	3
Stanford University	4
Texas A&M University	1
Texas Christian University	4
United States Air Force Academy	2
United States Naval Academy	4
University of Alabama	3
University of California, Fresno State	6
University of Central Florida	2
University of Cincinnati	3
University of Georgia	4
University of Illinois, Champaign	2
University of Louisiana	3
University of Louisville	2

Table D2

College Football Bowl IHEs and the number of unique hashtags associated with the IHEs

Division I IHEs	Number of unique hashtags (#)
University of Louisville	2
University of Maryland	2
University of Memphis	1
University of Miami	3
University of Mississippi	3
University of Nebraska	2
University of Nevada, Reno	3
University of North Carolina, Chapel Hill	3
University of Notre Dame	3
University of Oregon	3
University of South Alabama	2
University of Southern California	2
University of South Carolina	3
University of Texas at Austin	3
University of Texas at El Paso	2
University of Utah	1
Utah State University	2
Virginia Tech	3
West Virginia University	2
Western Kentucky University	2
Western Michigan University	3

Table D3

Division II Football Championship IHEs and the number of unique hashtags

Division II IHEs	Number of unique hashtags (#)
Angelo State University	3
Bloomsburg University	3
Colorado School of Mines	1
Colorado State University, Pueblo	2
Concord University	0
Delta State University	2
Ferris State University	1
Harding University	2
Lenoir-Rhyne University	3
LIU Post, C.W. Post Campus of Long Island University	3
Michigan Technological University	2
Minnesota State University, Mankato	2
Northwest Missouri State University	2
Ohio Dominican University	2
Ouachita Baptist University	2
Pittsburg State University	1
Slippery Rock University of Pennsylvania	4
University of Minnesota Duluth	1
University of North Alabama	3
University of North Carolina at Pembroke	3
University of West Georgia	2
Valdosta State University	3
Virginia State University	2
West Chester University of Pennsylvania	1

Table D4

Division III Football Championship IHEs and the number of unique hashtags

Division III IHEs	Number of unique hashtags (#)
Adrian College	2
Benedictine University	1
Centre College	2
Chapman University	4
Christopher Newport University	2
Delaware Valley University	1
Franklin College	3
Hampden-Sydney College	0
Hobart College	2
Husson University	1
Ithaca College	3
John Carroll University	2
Johns Hopkins University	2
Linfield College	2
Macalester College	2
Massachusetts Institute of Technology	3
Muhlenberg College	2
Rowan University	2
St. John's University, Minnesota	2
Texas Lutheran University	2
The College of St. Scholastica	1
University of Mary Hardin-Baylor	3
University of Mount Union	2
University of St. Thomas, Minnesota	3
University of Wisconsin, Whitewater	3
Wabash College	1
Wartburg College	0
Washington & Jefferson College	3
Wesley College	0
Wheaton College, Illinois	1
Widener University	2
Wittenberg University	3

Appendix E

Codebook

The codebook provides examples of tweets to assist with coding tweets for: risk or protective behaviors (i.e., behavior factor), consequences of the alcohol reference term on the person, others, or the institution (i.e., consequence factor), and the presence of references to alcohol sales, availability, and advertisements (i.e., environmental factor). A default category was used if the tweet did not meet the criteria for inclusion in any of the categories for the factors. All tweets were first considered in the default category of the associated alcohol related factor.

Behavior: Used to classify a tweet according to the behaviors referencing protective or risk factors (i.e., to self or others) associated with the alcohol reference.

Default behavior (0): Used unless the tweet meets the criteria for inclusion in one of the two categories: reference to a protective or risk behavior.

Protective behavior (1): Actions that assist with the reduction of alcohol consumption and the negative consequences associated with alcohol use. A tweet is also a protective behavior if there is an expression of consuming alcohol in a low risk manner (i.e., no more than 4 drinks for men or 2 drinks for women). Examples of protective behaviors include:

- Eat food before or while drinking/food and beer combination
- Pace drinks to one or fewer per hour
- Set a drink limit
- Alternate alcoholic with non-alcoholic drinks
- Keep track of the number of drinks
- Make your own drinks to control amount of alcohol
- Not accept drinks form a shared source (e.g., punch bowl)
- Make plans to avoid driving after drinking
- Limit the amount of money you bring to spend on alcohol
- Hold a drink so people stop bothering you about drinking
- Avoid drinking games
- Know where your drink has been the entire time

- Stop drinking at a certain time / Don't drink
- Monitor BAC (Blood Alcohol Content)

Risk behavior (2): Actions that contribute to high-risk drinking and associated negative consequences. Binge drinking is an example and is defined as a pattern of drinking that brings a person's BAC to 0.08 or above. This typically happens when men consume 5 or more drinks, and when women consume 4 or more drinks, in about 2 hours. Drinking games are risk behaviors associated with the consumption of large amounts of alcohol. Examples of risk behaviors include:

- Chugging alcohol
- Drinking before going out (pre-gaming)
- Drinking games (e.g., beer pong, flip cup)
- Competition games (e.g., keg stand)
- Endless supply (e.g., day of drinking, purpose of the day is to drink)
- Drunk, wasted, toasted, sauced
- Drinking alcohol combined with risky activity (e.g., burn couches)
- Beer combined with any other drug including other alcohol
- Reference to a lot of beer or an endless supply

Consequences: Alcohol-related consequences associated with general alcohol use and those more specific to college students

Default (0): Used unless the tweet meets the criteria for inclusion in one of the three categories listed below.

Individual (1): Consequences resulting in (or with the possibility of) damage to an individual, because of high-risk drinking. Examples of individual consequences include:

- Academic impediments
- Missed classes
- Late assignments
- Lower grades
- Less engagement with faculty
- Impaired driving

- Driving after drinking
- Unprotected sexual activity
- Hangover or other physical ailment

Other (2): Consequences resulting in (or with the possibility of) damage to others. Consequences to others may be more likely reported by non-drinkers experiencing secondary alcohol-related consequence. Examples of consequences to other include:

- Noise violation
- Property damage
- Sexual violence
- Sleep disturbances
- Study disruption
- Spilled alcohol
- Throwing beer

Institutional (3): Consequences resulting in (or with the possibility of) an institutional cost or damage. Examples of consequences to the institutions include:

- Poor "town gown" relationship; campus to community relationship
- Policy violations
- Litter or trash
- Storming the field
- Beer showers or running of the beer mile
- Observations from other people about any institutional consequences (e.g., students trashed the quad with beer cans)

Environmental: Alcohol availability and accessibility contribute to the college alcohol culture.

Default (0): Used unless the tweet meets the criteria for inclusion in one of the three categories listed below.

Sales (1): Specific reference to alcohol sales during the football game at the stadium

- Real schools sell beer

Advertisement (2): An inclusion of drink specials or alcohol prices from bar, restaurant, or alcohol vendor

- Miami bowl specials
- $5 drafts or other price reference
- Free beer
- Specific to the company
- Reference to bar, restaurant, or other vendor

Access (3): Alcohol is available for consumption by individuals or groups; references being able to access beer.

- Beer in our room
- Come over for drinks
- 60 places to buy beer but only 4 places to buy an apple
- I know where I'm getting my next beer