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The Association between Heavy Episodic Drinking and Gender Orientation among U.S. College Students: The Significance of Masculinity

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ABSTRACT

Background: Heavy episodic drinking (HED) remains a public health concern among college students. Sex differences are routinely reported in the literature although some evidence of convergence in drinking patterns has been observed. The association between sex and gender-orientation in HED remains unclear because sex and gender are often conflated. *Objective:* We examine the intersection of sex, gender-orientation and HED to determine if gender-orientation alone and/or in conjunction with sex play a role in HED among college students. *Methods:* Data were collected using a web-based self-administered survey made available to students enrolled in courses at a mid-sized Midwestern public university during the Fall of 2013 and the Spring of 2014 (N = 793). Multiple logistic regression was used to determine the relationship between HED, sex, and gender orientation (measured using the short-form Bem Sex Role Inventory). *Results:* Our findings indicate that, regardless of sex, a masculine gender-orientation was positively associated with HED. Those who were found to have a feminine gender-orientation appeared to be at decreased risk for HED. *Conclusions:* Our findings indicate that sex and gender-orientation should be taken into account in prevention and intervention protocols at colleges and universities. Future work should examine the role of gender orientation among LGBTQ and ethno-racial minority populations.

Introduction

Heavy episodic drinking (HED), defined as the rapid consumption of large amounts of alcohol in one setting (five or more for men and four or more for women), remains a public health concern in the general public and especially among college students (NIAAA, 2004). The Centers for Disease control recently reported that alcohol poisoning is contributing to the lowering of life expectancy for the non-Hispanic white population (Kochanek, Arias, & Bastian, 2016). In fact, these researchers report that increases in death rates due to chronic liver disease in addition to unintentional injuries and suicide (which are often alcohol-related) were large enough to increase all-cause non-Hispanic white death rates for ages 25–34, 35–44, and 45–54. While we recognize that there are many causes of chronic liver disease, it has been well established that alcohol use is often associated with both the onset as well as the progression of the disease (Liber, 2000; Liber, 2003; Wriden & Anderson, 2009)—though, it is important to note that alcohol is certainly not the lone cause of chronic liver disease. A recent review of HED correlates in the college population found 58% of male and 42% of female college students reported HED within the last two weeks

(Monauti & Bulmer, 2014). College students are more likely to drink than other non-college students their own age (59.8% vs. 51.5%) and furthermore, are more likely to binge drink than their non-college student peers (37.9% vs. 33.55%) (SAMHSA, 2016).

While college drinking rates have remained static over the last thirty years, negative outcomes associated with collegiate alcohol use are common and include failing grades, lower job pay rate upon college completion, interpersonal violence, sexual assault, overdose, and death (Wolaver, 2007; Hoeppner, Paskausky, Jackson, & Barnett, 2013; Pedersen, 2013; White & Hingson, 2014; Peralta, Callanan, Steele, & Wiley, 2011). Males, both in the general public and among college student populations, are at greatest risk for alcohol-related health and behavioral problems. A significant gap in the literature concerns an explanation for the sex gap in harmful drinking practices and health and behavioral outcomes. Why are males more likely to be at risk for HED behavior and its associated risks? Some scholars have suggested that masculine socialization is involved in risky health behavior (Courtenay, 2000). Could a traditional masculine gender orientation be—at least in part—responsible for alcohol-related health behavior differences between

males and females? This research aims to differentiate between sex-status (male versus female sex identification) and gender orientation (masculine versus feminine orientation) to better understand the factors associated with heavy episodic drinking among college students. Previous research has examined this question in the context of prescription drug use (Peralta, Stewart, Steele, & Wagner, 2016).

Differentiating sex from gender in alcohol research

Sex and gender are concepts that are too often taken-for-granted in the substance use and misuse literature and often used interchangeably: sex and gender are often perceived as innate states yet they are conceptually distinct (McKenna & Kessler, 1985; West & Zimmerman, 1987; Lorber, 1994; Ridgeway & Smith-Lovin, 1999; Risman, 2004). To be clear, sex is the biological classification of male or female and is based on genitalia, hormones, and/or chromosomes an individual possesses (West & Zimmerman, 1987). In contrast, gender refers to the social and cultural meanings attached to one's sex classification (McKenna & Kessler, 1985; Lorber, 1994). The meanings attached are based on normative conceptions of masculinity and femininity. Thus, gender orientation refers to the masculine and feminine characteristics or traits a person possesses or self-reports regardless of their sex. Of course, sex and gender orientation are more likely to align (e.g., men are more likely to have masculine characteristics than feminine characteristics) than not for a host of socio-cultural reasons, but scholars and treatment professionals should not expect this to be the case all of the time.

Research has consistently reported sex differences in HED (Wolaver, 2007; Colby, Swanton, & Colby, 2012; Geels et al., 2013; Hoeppner et al. 2013; Evans-Polce, Vasilenko, & Lanza, 2015; Menti, Lyrakos, & Soureti, 2015). Research suggests that because males are more likely to identify with a masculine gender orientation, they are expected to drink more often and in greater quantities compared to women as an expression of masculine prowess, risk-taking, strength and or resilience (Peralta, 2007; Dempster, 2011). Indeed, a significant literature has emerged linking gender, and in particiular masculinity, with an array of health risk behavior (Courtenay, 2000; Liu & Iwamoto 2007; Mahalik, Burns, & Syzdek, 2007;).

In very few instances women have been found to drink more often compared to men (Geels et al., 2013; Hoeppner et al. 2013; Pedersen, 2013). These studies appear to be outliers within the overall alcohol use literature whereby men continue to be found to drink more and drink more often than women (we note that this is

a broad statement: there are many methods for measuring alcohol use which range from the measurement of moderate to regular intoxication; further, international differences in sex comparisons are common - they may be a result of methodological differences in data collection) (Christie-Mizell & Peralta, 2009). Nevertheless, research suggests that drinking patterns stem from psychosocial factors related to personality, family history with alcohol, and proneness to deviance which may be similar between adolescent males and females compared to adults (Schulte, Ramo, & Brown, 2009).

Scholars have suggested that increased secularization in society and the decreased cost of alcohol has contributed to diminished sex differences in drinking patterns (see Wilsnack et al., 2000, for a review). Other scholars suggest that among some minority subgroups, women may be more acculturated to American drinking patterns than their older counterparts and may be increasingly likely to ignore traditional cultural norms that advocate for limited use of substances among females versus their male counter-parts (Lex, 2000). Others have hypothesized that as women's rights and social status improve relative to men's, women's drinking patterns becomes more similar to men's (Rahav, Wilsnack, Bloomfield, Gmel, & Kuntsche, 2006). Interestingly, less research has looked into the possibility that convergence in drinking is due to reductions in men's drinking. Neve, Drop, Lemmens, and Swinkels (1996) reported gender convergence was explained by a decline in more highly educated men's consumption. The focus on changes in women's drinking as opposed to men's drinking has been criticized as a framework that either directly or indirectly serves to blame women for social shifts in drinking patterns (Zhong & Schwartz, 2010). Nevertheless, the preponderance of science suggest men are more likely to drink, less likely to abstain, more likely to drink heavily, and more likely to encounter social and health problems associated with drinking compared to their female counterparts (Courtenay, McCreary, & Merighi, 2002; Christie-Mizell & Peralta, 2009).

In sum, alcohol consumption reflects behaviors that are connected to larger systems of social norms and gendered processes. Some scholars suggest that drinking in itself is a male-centered domain (Capraro, 2000; Geels et al., 2013). That is, alcohol consumption is still predominately male-dominated. In order for men to live up to cultural expectations of masculinity, they may engage in adverse health behaviors, including higher alcohol consumption (Courtenay, 2000; Peralta, 2007; Dempster, 2011). Men may be less likely to use protective strategies when they drink, such as spacing out drinks over a longer period of time, because peers may view this behavior as weak or "unmanly" (Delva et al., 2004). Further, in a review on the risk factors associated with men and

women's alcohol consumption and problems associated with drinking, Nolen-Hoeksema (2004) reports certain aspects of masculinity, such as aggression, are associated with more problematic alcohol use while certain aspects of femininity, such as nurturance, are association with less problematic alcohol use. Thus, it is important to understand how gender socialization affects men and women's alcohol consumption and this includes accounting for how much men and women identify with traditional masculine and feminine gender norms.

In the broader literature, gender and sex are frequently conflated thus hindering a careful understanding and analysis of how femininity and masculinity affect alcohol use and abuse (Kulis, Marsiglia, & Nagoshi, 2012). Studies focusing exclusively on the biological determinants of sex provide an incomplete approach to the issue, which inevitably excludes people who do not conform to traditional gender norms, as well as intersexed, transgendered and gender-queer individuals (Nagoshi, Nagoshi, & Bruzy, 2013). The assumption of equating males with masculine gender orientation and females with feminine gender orientation potentially obscures the importance of gender socialization on health behavior (Domurat Dreger, 1998).

Individuals learn what is acceptable gendered behavior that is in accordance with their sex at an early age (Thorne, 1993). This includes culturally prescribed characteristics of masculinity and femininity that are associated with being male or female. When we presume someone to be a man, we expect him to behave in masculine ways; when we presume someone to be a woman, we expect her to behave in feminine ways (Pascoe, 2012). There are consequences when men and women fail to live up to the normative expectations of masculinity and femininity (West & Zimmerman, 1987; Schur, 1984; Connell & Messerschmidt, 2005).

Many gendered norms have historically been centered around alcohol use. For example, men's use of alcohol has been historically acceptable and in many instances, heavy alcohol use has been normalized. In a study of college students, the inability to tolerate heavy amounts of alcohol resulted in negative sanctions, including being labeled a "'two-beer queer'" (Peralta, 2007: 751). The "two-beer queer" label is meant to depict a man (or woman) who cannot "handle" his (or her) liquor. This label further suggests that men who easily become intoxicated are somehow not "real men" and thus fail establishing a marker of hegemonic masculinity that is the ability to withstand heavy drinking (Connell & Messerschmidt, 2005) within a localized and gendered interaction centered on public alcohol use. The purpose of the present research is to examine the intersection of gender orientation and sex identity as mechanism through which gender differences emerge.

Hegemonic versus compensatory masculinity and femininity

Hegemonic masculinity is distinguished from other forms of masculinity in that it represents the 'ideal' masculine identity relative to subordinate masculinities. In so much that it is an ideal, very few (if any) can completely embody this characteristic. The ideal masculine man has been described as white, youthful, educated, able-bodied, wealthy, powerful, in control of his emotions, athletic, not given to displays of violence, and has social influence and/or power over others (Connell & Messerschmitt, 2005). However, since few can embody these strict criteria, men use different behaviors to display their masculinity in an attempt to attain or compensate for falling short of the hegemonic standard. Studies show college men utilize alcohol as a means of demonstrating hegemonic masculine standards; identifying drinking as an aspect of a 'manly' persona where other traditional markers of masculinity might be absent (e.g., fatherhood, marriage, employment) (Peralta, 2007; Dempster, 2011).

According to Babl (1979) compensatory masulinity is an extreme or otherwise exaggerated expression of masculinity exibited by men when encountering a direct sex-role threat. Compensatory masculinity is often associated with lower socioecnomic status, and relys on physical force or threat of force when a male individual feels their masculine identity has been challenged. Within the study of compensatory masulinity, HED is documented as a behavior demonstrating masculine prowess (Colby et al., 2012; Dumas, Graham, Bernards, & Wells, 2014). This masculine performance is especially important when in the company of other men. Being part of a male athletic team, for example, often informally requires members of the team to engage in HED with team members as a show of manliness and comradery due to the gendered makeup of the immediate audience (Green, Nelson, & Hartmann, 2014). Going out with friends is also more likely to lead to HED, because college students are more likely to engage in HED in a gendered and competitive atmosphere created and reinforced by peers (Clapp & Shillington, 2001).

Significant and important sex-based health differences that result from alcohol use continue to be of importance to public health professionals and scholars. We attempt to better understand these behavioral differences as a phenomenon that is structured by gendered processes. We do this by differentiating self-reported sex as a biological variable from gender orientation as measured by a psychosocial instrument.

Hypotheses

Based on previous findings indicating sex dispartiies in HED, the following hypotheses are tested to examine if

gender orientation, controlling for sex, is associated with HED.

> H1: Men will have a higher rate of HED reporting compared to women.
> H2: Those who score higher on the masculine gender orientation scale will have an increased association with HED compared to those who have high scores on feminine gender orientation.
> H3: Those who score higher on the feminine gender orientation scale will have a decreased association with HED compared to those with high scores on masculine orientation.
> H4: When measures of gender orientation are included, the significance of sex will decrease in the association between sex and HED.

Methods

Recruitment for the study was conducted through promotion to Introduction to Sociology students at a mid-sized Midwestern public university. Data were collected during the Fall semester of 2013 and Spring semester of 2014 and students were offered extra credit for their participation in the online survey. Eligibility for participation was defined in an informed consent section at the opening of the survey. Students under 18 years of age were not eligible to participate in the study. Only college students attending the university in which the study was taking place were eligible to take part.

A description of the sociodemographic characteristics can be found in the results section (see Table 1). The overall sample was consistent with the demographics of the student body in which the study took place. Approximately 76% of respondents (n = 595) reported that they were white, while 24% (n = 198) of respondents indicated that they were a race other than white. A refined sample, controlling for missing data, resulted in 793 total respondents between 18 and 25 years.

Online survey

We utilized an online survey service provider, Survey Gizmo, which hosted both the online confidential survey and the electronic consent form. Both were completed by each participant: and a total of 1,026 students completed the survey, which produced a 44% response rate. The average response rate for an internal survey is between 30% and 40%. This indicates we had a robust response rate (Survey Gizmo 2016). Participants utilized a secure access portal, and only the primary investigator and members of the research team had access to the study data. Data were collected in such a manner that no personal information could be associated with those surveyed (e.g., home/email address; computer Internet Protocol addresses) save for

Table 1. Descriptive statistics of all study variables: Full sample (N = 793).

	Mean/%	STD	Range
Covariates			
Age (18 = 0, 25 = 7)	1.65	1.7	0-7
Sex			0-1
Male (1)	0.40		
Female (0)	0.60		
Race			0-1
White (1)	0.76		
Non-White (0)	0.24		
Father's Educatoin	2.12	1.10	0-4
Some High School or Less (0)	0.05		
Completed High School (1)	0.26		
Some College (2)	0.33		
Completed College (3)	0.23		
Graduate or Professional School (4)	0.13		
Mother's Education	2.31	1.09	0-4
Some High School or Less (0)	0.03		
Completed High School (1)	0.25		
Some College (2)	0.24		
Completed College (3)	0.34		
Graduate or Professional School (4)	0.14		
Off Campus Living			0-1
Yes (1)	0.39		
No (0)	0.61		
College Athlete			
Yes (1)	0.06		
No (0)	0.94		0-1
Work Hrs./Week	0.92	0.88	0-3
None (0)	0.38		
1–20 hours (1)	0.37		
21–39 hours (2)	0.20		
Full time (3)	0.05		
Out for Date	1.66	1.32	0-4
Never (0)	0.26		
1 time or less/mo. (1)	0.22		
2–3 times/mo (2)	0.23		
1 time/wk (3)	0.18		
2+times/wk (4)	0.11		
Out for Fun	2.05	1.13	0-4
0 times/wk (0)	0.10		
1 time/wk (1)	0.20		
2 times/wk (2)	0.33		
3 times/wk (3)	0.27		
4+ times/wk (4)	0.10		
Independent variables: Gender/BSRI short form			
Masculine BSRI	4.85	0.91	1-7
Feminine BSRI	5.37	0.94	1-7
Gender/Sex	2.89	1.16	1-4
Masculine Men (1)	0.18		
Masculine Women (2)	0.14		
Feminine Men (3)	0.23		
Feminine Women (4)	0.45		
Dependent variable			
Heavy Episodic Drinking (HED)			0-1
Yes (1)	0.43		
No (0)	0.57		
HED by Sex and Gender Orientation			
Sex			
Male (1)	0.49		0-1
Female (0)	0.39		
Gender/Sex			
Masculine Men (1)	0.56		0-1
Masculine Women (2)	0.43		0-1
Feminine Men (3)	0.44		0-1
Feminine Women (4)	0.37		0-1

standard demographic data. The survey was composed of questions assessing health behavior (HIV risk), mental health status (i.e., CES-D), HED, gender orientation (BEM), as well as sociodemographic characteristics.

Survey completion took approximately 50 minutes per participant. The study was approved by the University's Instituional Review Board.

Measures

Dependent variable

The dependent variable for this study was HED. This measure was constructed using items from the Monitoring the Future (MTF) alcohol use survey. Respondents were asked how many times in the last two weeks they engaged in HED behavior, defined here as five or more drinks for males and four or more drinks for females consumed in one setting. While some research does not differentiate between the number of drinks for men versus women for HED, many have argued in favor of the distinction and this has become standard practice among many alcohol researchers (Dawson, Grant, Stinson, & Chou, 2004; Jackson, 2008; Peralta, Callanan, Steele, & Wiley, 2011). Finally, because it has been "widely accepted as a valid measure of [HED]" (Montauti & Blumer 2014), HED was transformed into a dichotomous variable where 1 = yes (the respondent had engaged in HED over the last two weeks) and 0 = no (the respondent had not engaged in HED over the last two weeks) (Dawson et al., 2004). The responses were dichotomized by sex.

Main covariates of interest

Several covariates were controlled for in our analyses to isolate the independent effects of gender orientation on heavy episodic drinking (HED). The first set of covariates controlled for are student demographics. These covariates include age, race, sex, parental education, and on/off campus residency. We control for age with the expectation that older students will be more likely to engage in HED behavior due to exposure to drinking cultures. We also restricted age in our analysis to those from 18 to 25 years old; where 18 is coded as 0 and 25 is coded as 7 due to our focus on traditional college student age and experiences. We control for race in our analysis of HED behavior because HED varies by ethno-racial identity (Chartier & Caetano, 2009). Due to the low number of racial and ethnic minority participants, race was recoded as a dummy variable comparing white (coded as 1) and nonwhite respondents. It is critical to control for sex (1 = males) in alcohol use research because studies consistently show sex differences in excessive drinking behaviors (Wolaver, 2007; Colby et al., 2012; Geels et al., 2013; Hoeppner et al. 2013; Evans-Polce et al., 2015; Menti, et al. 2015).

Research on parental education and their children's drinking habits are mixed (Kvaavik, Glymour, Klepp, Tell, & Batty, 2012; Kelly et al., 2012; Kendler et al., 2014), but it was the only measure in the survey that measures some aspect of students' social class. The last demographic covariate controlled for is whether students live on campus (coded as 0) or off campus (coded as 1 campus). Living on or off campus invites different social standards and expectations for heavy alcohol use, with those residing off campus having lower odds of engaging in HED behaviors (Dawson et al., 2004).

Additional covariates included in the analyses are athletic status, the average hours worked during the week, and the frequency in which students went out on dates or for fun during a typical month. The preponderance of research suggests that a positive association exists between being an athlete and risk for HED (Green et al., 2014), which is why we measure if students identify as a collegiate athlete (1 = yes). We include the average number of hours worked during the week because in general, research suggests that employment status is associated with greater odds of alcohol use (Kaestner, Lo Sasso, Callison, & Yarnoff, 2013). There are four categories for this covariate which includes a range of working zero hours (coded as 0) to working full-time (coded as 3). Finally, location and environment is an important element of HED and is a relevant part of gender-role expression. For this reason, measures of 'going out on dates' and 'going out for fun' were included in the analysis. Students were asked the frequency they went out on dates during a month and how many times they went out for fun (see Table 1 for coding).

Independent variables

We utilized the short-form Bem Sex Role Inventory (BSRI) to measure masculinity and femininity orientation. We refer to gender orientation and not gender identity in that we did not ask about gender identity specifically. We are only able to analyze our measurement of how students responded to the BSRI which we use to gauge respondent's gender orientation (e.g., masculine orientation versus feminine orientation).

The BEM is an interval scale from 1 to 7; 1 indicating low levels of masculinity/femininity and 7 indicating high levels of masculinity/femininity. These gender variables were constructed utilizing the short-form, 30-point, Bem Sex Role Inventory (Bem, 1981) to assess to what degree respondents identified with traditional gender roles (Holt & Ellis, 1998). Respondents identified themselves on a scale from 1 = never or almost never true to 7 = almost or always true. Both masculinity and femininity were measured using the short-form Bem Sex Role Inventory. A list

of the masculine and feminine gender characteristics can be found in Appendix 1. While some literature critiques use of the BSRI, its overall effectiveness is evident in previous studies (Schmitt & Millard, 1988; Choi, Fuqua, & Newman, 2009). Further, the short form BSRI has demonstrated greater internal consistency than the original 60-item scale (Bem, 1981) (see Appendix A).

Analysis

We utilized Stata/SE 12.0 and Multiple Logistic Regression to analyze the data. This model fulfills two primary functions: (1) it determines any associations existing between the variables and (2) indicates both strength and direction of the association between the variables (Khan, 2010). The regression of the multiple variables on the dependent variable allows the researcher to determine to what degree the variables can account for or explain the dependent variable outcome. We handled missing data by employing Multiple Imputation (MI) and the ICE command with 20 imputations. MI follows the Rubin Combination Rule to create multiple imputations in deriving estimates accounting for any missing data within the model, strengthening the multiple sampling and multiple imputation within samplings. Significant results were the same in both strength and direction, indicating missing data is due to random chance rather than any underlying bias in the data.

Results

Descriptive statistics are illustrated in Table 1. Out of the 793 respondents, 40% identified as male while 60% identified as female. In support of our first hypothesis, we found that men reported HED at a higher rate compared to women, 49% versus 39% respectively. Reports of HED (>5 for males and >4 for female drinks in one setting within the last two weeks), indicated that 43% of students had participated in HED overall. The average

age of respondents was between 18 and 19 years old and represents about 60% of the respondents. Students reported that about 31% of their fathers and 28% of their mothers had a high school education or less. The majority of students reported living on campus and worked either part or full time, were not college athletes, reported going on dates 1 to 3 times per month, and went out for fun with friends 1 to 3 times a week. The two explanatory variables, masculinity and femininity, are interval (scale) variables ranging from 1 to 7 in which 1 indicates low levels of masculinity/femininity and 7 represents higher levels of masculinity/femininity. The mean for masculinity was 4.85 while femininity had a mean of 5.37.

Bivariate correlations are shown in Table 2. Some of the significant correlations between HED and the covariates are low, but age (0.16**), sex (0.11**), out for fun (0.18**) are positively correlated with HED. Further, masculinity (0.14**) is positively correlated to HED, while femininity is negatively correlated to HED (−0.09**).

Crosstab analysis of HED revealed interesting patterns in HED by sex and gender. Fifty-six percent of masculine men reported engaging in HED while only 44% of feminine men reported in engaging in HED. Among women, 43% of masculine women reported engaging in HED, while 37% of feminine women reported HED behavior. While HED among masculine and feminine women is not as disparate as it is for men, the overall direction of the associations do indicate gender orientation plays a role in self-reported HED, partially supporting H1 and H2. Additionally, a Pearson chi-squared test indicated masculine men to be statistically different from feminine men and masculine women from feminine women. The complete results of the crosstab analysis are in Table 3.

Table 4 shows the four binomial logistic regression models. The odd ratios (OR) are reported for each variable used in analyses as well as their confidence intervals (CI). The first three models are partial models to help explain the relationships between the covariates and HED with and without the independent variable(s) in the

Table 2. Bivariate correlations.

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	HED Binge	1												
2	Age	0.16**	1											
3	Race	0.02*	−0.00	1										
4	Sex	0.11**	0.10**	−0.01	1									
5	Father's Ed	−0.00	−0.04**	0.01	0.04**	1								
6	Mother's Ed	−0.01	−0.07**	0.03*	−0.02*	0.35**	1							
7	Off Campus Living	−0.05**	0.40**	0.03**	−0.02**	−0.10**	−0.15**	1						
8	College Athlete	0.01	−0.02†	−0.03*	0.09*	0.05**	−0.00	−0.06**	1					
9	Work Hours	0.03*	0.40**	0.05**	−0.02*	−0.07**	−0.12**	0.38**	−0.15**	1				
10	Out on Date	0.02*	0.08**	0.13**	−0.02*	−0.03*	−0.02*	0.08**	0.01	0.05**	1			
11	Out for Fun	0.18**	−0.24**	0.04**	0.17**	0.06**	0.07**	−0.21**	−0.03*	−0.19**	0.15**	1		
12	Masculinity	0.14**	0.08**	−0.17**	0.10**	0.00	−0.03*	−0.02	0.07**	0.15**	0.07**	0.05**	1	
13	Femininity	−0.09**	−0.00*	−0.01	−0.28**	0.01	−0.01	0.02*	−0.07**	0.05**	0.11**	0.00	0.09**	1

†$p < .05$; *$p < .01$; **$p < .001$.

Table 3. Crosstab analysis of HED behavior by gender and sex.

Gender/Sex	Percent N	Percent Reporting HED
Masculine Men	18%	56%**
Feminine Men	23%	44%**
Masculine Women	14%	43%**
Feminine Women	45%	37%**

Pearson's chi² *p < .01; **p < .001.

equations. Model 4 is the full model and includes both independent variables in addition to the covariates. In all four models, students' age, living on campus, and going out for fun at least once a week had significant and positive effects on HED. Consistent with our second hypothesis, a higher score on the masculinity BSRI scale results in greater odds of having engaged in HED. Further, a lower score on the femininity BSRI scale is negatively associated with HED, which supports our third hypothesis. The OR for the femininity scale in Model 4 is .80 ($p < .05$), while the OR for the masculinity scale is 1.38 ($p < .05$). To make this a more meaningful interpretation, it is useful to calculate the percent change in the ORs. Thus, scoring higher on the femininity scale is associated with a 20% (0.80–1)∗100 decrease in the odds of engaging in HED, while scoring higher on the masculinity scale is associated with a 38% (1.38–1)∗100 increase in the odds of engaging in HED. While we hypothesized that the significance of sex on HED would decrease by including measures of gender orientation in the analyses, sex was not a significant predictor in any of the regression models. Importantly, these results indicate that the measures of masculinity and femininity in this study are stronger predictors of HED behavior than sex.

Discussion

Descriptive statistics and cross-tabulations indicate men reported higher rates of HED compared to women,

providing support for H1. We also found support for our second and third hypotheses, H2-H3, via correlation, cross tabulation, and regression analyses. Sex was only significantly correlated with HED in bivariate analysis but not in our regression models, which means hypothesis four is only partially supported.

The crosstab analysis indicates that a larger percentage of masculine men reported HED behavior compared to feminine men (56% vs. 44%). Moreover, masculine women were more likely than feminine women to report HED (43% vs. 37%). Additionally, a Pearson chi-squared test of those reporting instances of HED behavior, indicated masculine men to be statistically different than feminine men and masculine women from feminine women. This supports previous literature which suggests that gender, particularly masculinity, is associated with adverse health risk behaviors (Courtenay, 2000; Liu & Iwamoto 2007; Mahalik et al. 2007).

In regard to our regression analysis, age was highly significant in every model supporting previous research that indicates an escalation of HED during college years (Huang, Jacobs, & Derevensky, 2010; Evans-Polce et al., 2015). Those living off campus reported fewer instances of HED. This supports research indicating students residing off campus are subject to different social expectations, and are less likely to engage in HED behaviors than their on campus peers (Dawson et al., 2004). Going out for fun was positively associated and highly significant for reports of HED in all regression models. Both outcomes are supported by previous literature which asserts that environment or context may mediate how much an individual engages in HED (Clapp & Shillington, 2001; França, Dautzenberg, & Reynaud, 2010; Jackson et al., 2014). Lastly, both gender orientation measures were statistically significant within all models in which they were included. Masculinity showed a positive

Table 4. Multiple-imputation logistic regression analyses; outcome variable: heavy episodic drinking among college students.

	Model 1		Model 2 Masculine		Model 3 Feminine		Model 4 Full Model	
	OR	CI	OR	CI	OR	CI	OR	CI
Covariates								
Age	1.37***	(1.23, 1.53)	1.37***	(1.23, 1.53)	1.37***	(1.23, 1.53)	1.37***	(1.23, 1.53)
Race	1.12	(0.87, 1.88)	1.27	(0.86, 1.87)	1.12	(0.77, 1.64)	1.28	(0.87, 1.88)
Sex	1.20	(0.73, 1.42)	1.15	(0.83, 1.58)	1.08	(0.78, 1.51)	1.02	(0.73, 1.42)
Father's Ed	0.99	(0.85, 1.16)	0.99	(0.84, 1.15)	0.99	(0.85, 1.16)	0.99	(0.85, 1.16)
Mother's Ed	0.94	(0.81, 1.10)	0.95	(0.81, 1.10)	0.94	(0.81, 1.10)	0.94	(0.81, 1.10)
On Campus Living	0.60*	(0.43, 0.92)	0.62*	(0.43, 0.91)	0.60*	(0.42, 0.87)	0.63*	(0.43, 0.92)
College Athlete	1.10	(0.50, 1.90)	1.00	(0.51, 1.94)	1.08	(0.56, 2.07)	0.97	(0.50, 1.90)
Work Hours	1.02	(079, 1.20)	0.97	(0.79, 1.19)	1.03	(0.84, 1.27)	0.97	(079, 1.20)
Out on Date	0.96	(0.85, 1.08)	0.94	(0.84, 1.06)	0.97	(0.86, 1.10)	0.96	(0.85, 1.08)
Out for Fun	1.54***	(1.32, 1.80)	1.52***	(1.31, 1.78)	1.56***	(1.33, 1.82)	1.54***	(1.32, 1.80)
IV: Gender								
Masculinity			1.34*	(1.12, 1.61)			1.38*	(1.14, 1.66)
Femininity					0.83*	(0.69, 0.98)	0.80*	(0.67, 0.95)

*p < .01; **p < .05; ***p < .001.

relationship to HED, while femininity was negatively related to HED.

Perhaps an explanation for these findings is that there are different cultural expectations associated with HED, contingent on an individual's gender role (Schur, 1984; West & Zimmerman, 1987; Connell & Messerschmidt, 2005). Masculinity is traditionally associated with drinking alcohol and being drunk, a behavior viewed as 'manly' (Courtenay et al., 2002; Connell & Messerschmidt, 2005; Peralta, 2007; Christie-Mizell & Peralta, 2009; Dempster, 2011; Colby et al., 2012; Dumas et al., 2014) and associated with sexual prowess (Sánchez-López, Rivas-Diez, & Cuéllar-Flores, 2013). Masculinity is also associated with risk-taking (Bem, 1981; Courtenay, 2000; Liu & Iwamoto 2007; Mahalik et al. 2007), making health risks involved in HED attractive, rather than a deterrent.

Additionally, masculinity is associated with the right to operate freely in public space, while conversely, gender norms associate femininity with private space, such as the home, and identify public space as a dangerous space for women (Day, 2000; Mansson, 2014). Femininity is further associated with controlled behavior, passivity, and demureness (Bem, 1981). These traits are at odds with the masculine behaviors associated with drinking and drunkenness, which women may avoid so not to appear manly or man-ish (Mansson, 2014). And in contrast to men, where drunkenness is viewed as sexual prowess, for women, this same behavior maybe associated with promiscuity and infidelity (Bernhardsson & Bogren, 2012; Sánchez-López et al., 2013). These differences may contribute to masculinities positive relationship to reports of HED, while femininity, having a negative relationship to HED, acts as a protective factor against HED.

Strengths and limitations

Because the data used in this study derive from a cross-sectional convenience sample, results must be interpreted with caution and cannot be taken to indicate a causal relationship between HED, sex, and gender orientation. There may be additional associations shared between other variables not indicated by our analysis. Additionally, while the BSRI is shown to be an effective test to measure gender, any statistical measure of gender must be done recognizing the fluid state of gender and the broad differences in how these roles may be interpreted by those surveyed (Schmitt & Millard, 1998). Also, our measure of race was limited by a small sample size of ethnic and racial minorities. We had to collapse all racial and ethnic minorities into a single non-white variable to be compared against whites. This may have contributed to a non-significant association between ethnoracial status and drinking behavior which is at odds with much of the college drinking literature (Antin, Lipperman-Kreda, Paschall, Marzell, & Battle, 2013).

Conclusions

Our findings show that gender orientation may be an important variable for understanding substance use and misuse. Results from our sample of U.S. college students suggest that taking sex into consideration without gender orientation in research design and prevention and intervention strategies may obscure our understanding of gender differences in substance use and treatment and prevention outcomes. If gender orientation is playing a key role in HED, this research and related studies offer intervention and prevention specialists as well as clinicians evidence to consider not only sex but also gender orientation in the planning and execution of alcohol misuse protocols. Moreover, our results may be useful to college administrators as they craft college policies and programs intended to address alcohol misuse among their male and female students. Finally, creating age-appropriate intervention is paramount to addressing HED drinking in the college population. (Huang et al., 2010; Evans-Polce et al., 2015).

Future research might seek to decipher further how and to what extent other social roles contribute to HED, which elements are shared or differ by sex, and to what degree different social elements act as protective factors. Next using other gender scales, such as the Personal Attributes Questionnaire (Helmreich & Spence, 1978), may also prove revealing for both the broader understanding of HED and gender's relationship to that behavior. A focus on homosexual and transgendered individuals would also serve to critically inform how sex and gender orientation might intersect with sexuality.

Conflicts of interest

The authors report that there are no conflicts of interest in the writing of this manuscript including financial, personal, or other relationships with other organizations or pharmaceutical/biomedical companies that may have inappropriately impacted or influenced this research or interpretation of the findings.

Disclosures and acknowledgments

Contributors' statement

Authors contributed in a significant way to the manuscript and that all authors have read and approved the final manuscript.

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References

Antin, T. M., Lipperman-Kreda, S., Paschall, M. J., Marzell, M., & Battle, R. (2013). The roll of drinking beliefs to explain ethnic variation in drinking practices among U.S. College students. *Substance Use & Misuse*, *49*(1–2), 95–102.

Babl, J. D. (1979). Compensatory masculine responding as a function of sex role. *Journal of Consulting and Clinical Psychology*, *47*(2), 252–257.

Bem, S. (1981). *Bem sex role inventory: Professional manual*. Palo Alto, CA: Consulting Psychologists Press.

Bernhardsson, J., & Bogren, A. (2012). Drink sluts, brats and immigrants as others: An analysis of swedish media discourse on gender, alcohol and rape. *Feminist Media Studies*, *12*(1), 1–160.

Capraro, R. L. (2000). Why college men drink: Alcohol, adventure, and the paradox of masculinity. *Journal of American College Health*, *48*(6), 307–315.

Chartier, K., & Caetano, R. (2009). Ethnicity and health disparities in alcohol research. *Alcohol Research & Health: The Journal of The National Institute on Alcohol Abuse and Alcoholism*, *33*(1-2), 152–160.

Choi, N., Fuqua, D., & Newman, J. (2009). Explanatory and confirmatory studies of the structure of the Bem sex role inventory short form with two divergent samples. *Educational and Psychological Measurement*, *69*(4), 696–705.

Chrisite-Mizell, C. A., & Peralta, R. (2009). The Gender gap in alcohol consumption during late adolescence and young adulthood: Gendered attitudes and adult roles. *Journal of Health and Social Behavior*, *50*(4), 410–426.

Clapp, J. D., & Shillington, A. M. (2001). Environmental predictors of heavy episodic drinking. *American Journal of Drug & Alcohol Abuse*, *27* (2), 301–313.

Colby, S. S., Swanton, D. N., & Colby, J. J. (2012). College students' evaluations of heavy drinking: The influence of gender, age, and college status. *Journal of College Student Development*, *53*(6), 797–810.

Connell, R., & Messerschmidt, J. (2005). Hegemonic masculinity: Rethinking the concept. *Gender and Society, 2005, 19*(6), 829–859.

Courtenay, W. H. (2000). Constructions of masculinity and their influence on men's well-being: A theory of gender and health. *Social Science & Medicine*, *50*(10), 1385–1401.

Courtenay, W. H., McCreary, D., & Merighi, J. (2002). Gender and ethnic differences in health beliefs and behaviors. *Journal of Health Psychology*, *7*(3), 219–231.

Dawson, D. A., Grant, B. F., Stinson, F. S., & Chou, P. S. (2004). Another look at heavy episodic drinking and alcohol use disorders among college and non-college youth. *Journal of Studies on Alcohol*, *65*(4), 477–488.

Day, K. (2000). The ethic of care and women's experiences of public space. *Journal of Environmental Psychology*, *20*(2), 103–124.

Delva, J., Smith, M. P., Howell, R. L., Harrison, D. F., Wilke, D., & Jackson, D. L. (2004). A study of the relationship between protective behaviors and drinking consequences among undergraduate college students. *Journal of American College Health*, *53*(1), 19–27.

Dempster, S. (2011). I drink, therefore I'm man: Gender discourses, alcohol and the construction of British undergraduate masculinities. *Gender & Education*, *23*(5), 635–653.

Domurat Dreger, A. (1998). Ambiguous sex or ambivalent medicine? *The Hastings Center Report*, *28*(3), 24–35.

Dumas, T. M., Graham, D., Bernards, S., &Wells, S. (2014). Drinking to reach the top: Young adults' drinking patterns as a predictor of status within natural drinking groups. *Addictive Behaviors*, *39*(10), 1510–1515.

Evans-Polce, R. J., Vasilenko, S. A., & Lanza, S. T. (2015). Short communication: Changes in gender and racial/ethnic disparities in rates of cigarette use, regular heavy episodic drinking, and marijuana use: Ages 14 to 32. *Addictive Behaviors*, *41*, 218–222.

França, L. R., Dautzenberg, B., & Reynaud, M. (2010). Heavy episodic drinking and Alcohol consumption in French colleges: The role of perceived social norms. *Alcoholism: Clinical & Experimental Research*, *34*(1), 164–174.

Geels, L. M., Vink, J. M., Van Beek, J. H. D. A., Bartels, M., Willemsen, G., & Boomsma, D. (2013). Increases in alcohol consumption in women and elderly groups: Evidence from an epidemiological study. *BMC Public Health*, *13*, 207–220.

Green, K., Nelson, T. F., & Hartmann, D. (2014). Binge drinking and sports participation in college: Patterns among athletes and former athletes. *International Review for the Sociology of Sport*, *49*(3-4), 417–434.

Helmreich, R. L., & Spence, J. T. (1978). Work and family orientation questionnaire: An objective instrument to assess components of achievement motivation and attitudes toward family and career. *Journal Supplement Abstract Service, American Psychological Association*, *2*(5), 1–28.

Hoeppner, B., Paskausky, A., Jackson, K., & Barnett, N. (2013). Sex differences in college student adherence to NIAAA drinking guidelines. *Alcoholism: Clinical & Experimental Research*, *37*(10), 1779–1786.

Holt, C., & Ellis, J. (1998). Assessing the current validity of the Bem Sex-Role Inventory. *Sex Roles*, *39*(11–12), 929–941.

Huang, J-H., Jacobs, D., & Derevensky, J. (2010). Sexual risk-taking behaviors, gambling, and heavy drinking among U.S. college athletes. *Archives of Sexual Behavior*, *39*(3), 706–713.

Jackson, K. M. (2008). Heavy episodic drinking: Determining the predictive utility of five or more drinks. *Psychology of Addictive Behaviors*, *22*(1), 68–77.

Jackson, K. M., Robert, M. E., Colby, S. M., Barnett, N. P., Abar, C. C., & Merrill, J. E. (2014). Willingness to drink as a function of peer offers and peer norms in early adolescence. *Journal of Studies on Alcohol and Drugs*, *75*(3), 404–414.

Kaestner, R., Lo Sasso, A., Callison, K., & Yarnoff, B. (2013). Youth employment and substance use. *Social Science Research*, *42*(1), 169–185.

Kelly, A. B., O'Flaherty, M., Toumbourou, J. W., Homel, R., Patton, G. C., White, A., & Williams, J. (2012). The influence of families on early adolescent school connectedness: Evidence that this association varies with adolescent involvement in peer drinking networks. *Journal of Abnormal Child Psychology*, *40*(3), 437–447.

Kendler, K. S., Gardner, C. O., Hickman, M., Heron, J., Macleod, J., Lewis, G., & Dick, D. M. (2014). Socioeconomic status and alcohol-related behaviors in mid to late adolescence in the Avon Longitudinal Study of Parents and Children. *Journal of Studies on Alcohol & Drugs*, *75*(4), 541–545.

Khan, A. (2010). *Model building using logistic regression*. St Lucia, QLD: University of Queensland.

Kochanek, K., Arias, E., & Bastian, B. (2016). The effect of changes in selected age-specific causes of death on non-Hispanic White life expectancy between 2000 and 2014. *NCHS Data Brief*, *250*, 1–8.

Kulis, S., Marsiglia, F. F., & Nagoshi, J. (2012). Gender roles and substance use among mexican american adolescents: A relationship moderated by acculturation? *Substance Use & Misuse*, *10*(3), 214–229.

Kvaavik, E., Glymour, M., Klepp, K-I., Tell, G. S., & Batty, G. D. (2012). Parental education as a predictor of offspring behavioural and physiological cardiovascular disease risk factors. *European Journal of Public Health*, *22*(4), 544–550.

Lex, B. W. (2000). Gender and cultural influences on substance abuse. In R. M. Eisler (Ed.), *Handbook of gender, culture, and health* (pp. 255–297). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Liber, C. S. (2000). Alcohol: Its metabolism and interaction with nutrients. *Annual Review of Nutrition*, *20*, 395–430.

Liber, C. S. (2003). Relationships between nutrition, alcohol use, and liver disease. *Alcohol Research & Health*, *27*(3), 220–231.

Liu, W. M., & Iwamoto, D. K. (2007). Conformity to masculine norms, Asian values, coping strategies, peer group influences and substance use among Asian American men. *Psychology of Men & Masculinity*, *8*(1), 25–39.

Lorber, J. (1994). *Paradoxes of gender*. New Haven, CT: Yale University Press.

Mahalik, J. R., Burns, S. M., & Syzdek, M. (2007). Masculinity and perceived normative health behaviors as predictors of men's health behaviors. *Social Science & Medicine*, *64*(11), 2201–2209.

Masnsson, E. (2014). Drinking as a feminine practice: Postfeminist images of women's drinking in swedish women's magazines. *Feminist Media Studies*, *14*(1), 56–72.

McKenna, W., & Kessler, S. (1985). Asking taboo questions and doing taboo deeds. In K. Gergen & K. Davis (Eds.), *The social construction of the person. Springer Series in Social Psychology*. New York, New York: Springer.

Menti, D., Lyrakos, G., & Soureti, A. (2015). The effect of gender on drinking patterns of Greek young adults. *European Psychiatry*, *30*(1), 520. doi:10.1016/S0924-9338(15)30408-9.

Montauti, S. B., & Bulmer, S. M. (2014). A research update on correlates of heavy episodic drinking among undergraduate college students. *American Journal of Health Education*, *45*(3), 142–150.

Nagoshi, J., Nagoshi, C. T., & Bruzy, S. (2013). Intersectionality and narratives of Lived Experiences. In J. Nagoshi, C.T. Nagoshi, S. Bruzy (Eds.), In *Gender and sexual identity* (pp 107–125). New York, NY: Springer.

National Institute on Alcohol Abuse and Alcoholism (NIAAA). (2004). NIAAA council approves definition of binge drinking. *NIAAA Newsletter*, *3*, 3.

Neve, R. J., Drop, M. J., Lemmens, P. H., & Swinkels, H. (1996). Gender differences in drinking behaviour in the Netherlands: Convergence or stability? *Addiction*, *91*(3), 357–373.

Nolen-Hoeksema, S. (2004). Gender differences in risk factors and consequences for alcohol use and problems. *Clinical Psychology Review*, *24*(8), 981–1010.

Pascoe, C. J. (2012). *Dude You're a Fag: Masculinity and sexuality in high school*. Berkeley: University of California Press.

Pedersen, D. E. (2013). Gender differences in college binge drinking: Examining the role of depression and school stress. *Social Science Journal*, *50*(4), 521–529.

Peralta, R. L. (2007). College alcohol use and the embodiment of hegemonic masculinity among European American men. *Sex Roles*, *56*(11-12), 741–756.

Peralta, R. L., & Steele, J. L. (2009). On drinking styles and race: A consideration of the socio-structural determinants of alcohol use behavior. *Journal of Ethnicity in Substance Abuse*, *8*(2), 146–162.

Peralta, R. L., Callanan, V., Steele, J. L., & Wiley, L. (2011). The effects of gender identity and heavy episodic drinking on alcohol-related violence. *Gender Issues*, *28*(3), 111–133.

Peralta, R. L., Stewart, B. C., Steele, J. L., & Wagner, F. A. (2016). Nonmedical use of prescription drugs in emerging adulthood: Differentiating sex from gender. *Addiction Research & Theory*, *24*(5), 389–397.

Rahav, G., Wilsnack, R., Bloomfield, K., Gmel, G., & Kuntsche, S. (2006). The influence of societal level factors on men's and women's alcohol consumption and alcohol problems. *Alcohol Suppl*, *41*(1), 47–55.

Ridgeway, C., & Smith-Lovin, L. (1999). The gender system and interaction. *Annual Review of Sociology*, *25*, 191–216.

Risman, B. J. (2004). Gender as a social structure: Theory wrestling with activism. *Gender & Society*, *18*(4), 429–450.

Sánchez-López, M. P., Rivas-Diez, R., & Cuéllar-Flores, I. (2013). Masculinity and femininity as predictors of tobacco and alcohol consumption in Spanish university students. *Health and Addictions*, *13*(1), 15–22.

Schmitt, B., & Millard, R. (1988). Construct validity of the bem sex role inventory (BSRI): Does the BSRI distinguish between gender-schematic and gender-Aschematic Individuals? *Sex Roles*, *19*(9-10), 581–588.

Schulte, M., Ramo, D., & Brown, S. (2009). Gender differences in factors influencing alcohol use and drinking progression among adolescents. *Clinical Psychology Review*, *29*(6), 535–547.

Schur, E. M. (1984). *Labeling women deviant: Gender, stigma, and social control*. New York: Random House.

Substance Abuse and Mental Health Services Administration (SAMHSA) an agency of the U.S. Department of Health and Human Services (DHHS). (2016). http://www.samhsa.gov/newsroom/press-announcements/201608160100

SurveyGizmo. (2016). Retriever from https://www.surveygizmo.com/survey-blog/survey-response-rates/

Thorne, B. (1993). *Gender play: Girls and boys in school*. New Brunswick, NJ: Rutgers University Press.

West, C., & Zimmerman, D. (1987). Doing Gender. *Gender & Society*, *1*(2), 125–115.

White, A., & Hingson, R. (2014). The burden of alcohol use: Excessive alcohol consumption and related consequences among college students. *Alcohol Research*, *35*(2), 201–218.

Wilsnack, R. W., Vogeltanz, N. D., Wilsnack, S. C., & Harris, T. R. (2000). Gender differences in alcohol consumption and adverse drinking consequences: Cross-cultural patterns. *Addiction (Abingdon, England)*, *95*(2), 251–265.

Wolaver, A. (2007). Does drinking affect grades more for women? Gender differences in the effects of heavy episodic drinking in college. *The American Economist*, *51*(2), 72–88.

Wriden, W. L., & Anderson, A. S. (2009). Measurement of food and alcohol intake in relation to chronic liver disease. *Statistical Methods in Medical Research*, *18*(3), 285–301.

Zhong, H., & Schwartz, J. (2010). Exploring gender-specific trends in underage drinking across adolescent age groups and measures of drinking: Is girls' drinking catching up with boys'? *Journal of Youth and Adolescence*, *39*(8), 911–926.

Appendix A

Short-form Bem Sex Role Inventory (BSRI)

Masculine Items	Feminine Items	Neutral Items
1. I defend my own beliefs	11. I am affectionate	21. I am conscientious
2. I am independent	12. I am sympathetic	22. I am moody
3. I am assertive	13. I am sensitive to the needs of others	23. I am reliable
4. I have a strong personality	14. I am understanding	24. I am jealous
5. I am forceful	15. I am compassionate	25. I am truthful
6. I have leadership abilities	16. I am eager to soothe hurt feelings	26. I am secretive
7. I am willing to take risks	17. I am warm	27. I am adaptable
8. I am dominant	18. I am tender	28. I am conceited
9. I am willing to take a stand	19. I love children	29. I am tactful
10. I am aggressive	20. I am gentle	30. I am conventional