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MAJOR ARTICLE

Gender orientation and alcohol-related weight control behavior among male and female college students

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ABSTRACT

Objective: We examine weight control behavior used to (a) compensate for caloric content of heavy alcohol use; and (b) enhance the psychoactive effects of alcohol among college students. We evaluate the role of gender orientation and sex. **Participants:** Participants completed an online survey ($N = 651$; 59.9% women; 40.1% men). **Method:** Weight control behavior was assessed via the Compensatory-Eating-and-Behaviors-in Response-to-Alcohol-Consumption-Scale. Control variables included sex, race/ethnicity, age, and depressive symptoms. Gender orientation was measured by the Bem Sex Role Inventory. The prevalence and probability of alcohol-related weight control behavior using ordinal logistic regression are reported. **Results:** Men and women do not significantly differ in compensatory-weight-control-behavior. However, regression models suggest that recent binge drinking, other substance use, and masculine orientation are positively associated with alcohol-related weight control behavior. **Conclusions:** Sex was not a robust predictor of weight control behavior. Masculine orientation should be considered a possible risk factor for these behaviors and considered when designing prevention and intervention strategies.

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Heavy episodic drinking (HED), defined as imbibing 4 or 5 drinks in a row in a single sitting for females and males, respectively, continues to present a major preventable health risk in the general population and in the college population.^{1,2} College students continue to be at particularly high risk for HED, which is frequently associated with physical and sexual violence, poor academic performance, injury, blackouts, overdose, and death.³ There are an estimated 1,700 deaths, 599,000 injuries, and 97,000 sexual assaults related to alcohol use annually among college students.⁴ A recent college health survey estimates that 44% of college students engaged in HED behavior.⁵ In addition to significantly higher rates of HED among collegiate men compared to women, men have significantly higher rates of alcohol-related violence perpetration and victimization compared to women.^{6,7} Thus, considerable individual and social harm is rooted in HED behavior.

A disturbing trend reported in the literature since the mid-1980s is the co-occurrence of substance use—especially alcohol use—and weight control behavior (henceforth WCB) and/or eating disorders.⁸ Much of this research has focused on women who are at greater risk for engaging in WCB in general⁹ and in conjunction with or as a result of alcohol use.^{10–14} For instance, a recent study found that high school girls who were trying to lose weight were at increased

risk for binge drinking.¹⁵ The concerns stemming from the association between WCB and HED revolve around the heightened risk for intoxication where eating is curtailed or meals are skipped altogether in order to avoid excessive calories. Eating less or skipping meals entirely among other WCBs such as self-induced purging prior to drinking quickens intoxication. One concern of intoxication is that it has been repeatedly found to be a risk factor for interpersonal and sexual violence victimization among women.¹⁴

Research on WCB and HED that focuses on both men and women has been lacking aside from Patte and Leatherdale's work and others.^{14,16,17} This omission is troublesome in that men are at greatest risk for HED. Patte and Leatherdale¹⁸ highlight the importance of including men in research on weight control behavior. They report gender differences in associations between drinking behavior, weight goals, and meal skipping. Women who were trying to control their weight had increased odds of problem drinking. Furthermore, Barry and Piazza-Garner⁸ note the counterintuitive yet positive association between physical activity and alcohol consumption.

While the majority of previous research on this topic has focused mainly on women and relied on clinical or preclinical populations,¹⁹ we advance the field by examining the intersection of weight control behavior and

alcohol use among male and female college undergraduates—an at risk population—by including measures of *gender orientation*. We move the field forward by examining the intersecting nature of sex (ie, female, male status) and gender identity (ie, feminine, masculine orientation) to better understand the sociocultural mechanisms involved in alcohol-related weight control behavior.

The behavior under investigation has been referred to as Drunkorexia, an informal term used to describe this form of health behavior in both the media and in published research.²⁰ We heed the call by Piazza-Gardner and Barry²¹ to not utilize the term Drunkorexia in the present study because of its inconsistent use in the literature and because it is behavior that has yet to be officially recognized by the medical community. Instead, we refer to the phenomena as “alcohol related weight control behavior.”

Background

Research continues to identify an association between substance use, WCB, and disordered eating among youth and young adults.^{14,16,22–24} Early scholarship identified the relationship but offered little in the way of explanation.^{25–28} Peralta²⁹ conducted qualitative interviews with college students whereby the social reconciliation of social norms encouraging alcohol use behavior with pressures to maintain a healthy weight theoretically explained the association. Among those in the latter category, in order to reduce caloric intake and to be “healthy,” participants reported (a) altering eating patterns by skipping meals and/or eating less than usual; (b) adopting altered drinking preferences such as drinking less or choosing alcoholic beverage assumed to contain fewer calories; (c) exercising before and/or after a drinking event; and (d) self-induced purging. Women were more likely to report these behaviors than men, and subsequent research supported these findings.^{23,25}

A more recent qualitative study suggests that college students may be behaviorally offsetting calorie intake—both retroactively and proactively—in response to a cognitive awareness that unwanted calories are associated with alcohol use.³⁰ Of note, this study reports a positive association between dieting severity and the intensity of alcohol use. Hunt and Gorbush³¹ report that college students demonstrated a positive association between disordered eating, alcohol use, and “inappropriate compensatory behaviors” such as vomiting and fasting in order to attempt to stem weight gain.

Because college students engage in high rates of HED, examining the comorbidity of HED and WCB is critical. Recent data suggest that 80% of students use alcohol and approximately 50% engage in HED. One of the most

rigorous nonclinical representative samples reported 39% of past 30 days drinkers restricted their calories on planned drinking days, and 67% of students reported restricting calories due to weight concerns.¹⁶ This behavior was associated with increased likelihood of getting drunk in a typical week and with increased likelihood of getting into a physical fight among men. Women, however, reported more health risks in this study compared to men in association with calorie cutting including memory loss, injury, sexual victimization, and having unprotected sex while drinking. Others report that the strongest predictor of binge drinking was vomiting or using laxatives.⁸ Roosen and Mills³ report that 47% college students in their study commonly changed eating behavior prior to alcohol use. Among a subsample of women in this study, women who were preoccupied with the caloric content of alcohol and who curtailed eating prior to drinking to avoid weight gain were more likely to present higher levels of disordered eating. Women who reduced food intake in order to hasten intoxication were more likely to present with alcohol problems. Because intoxication has been associated with college sexual violence,³² it is important to examine how WCB might be exacerbating college student intoxication and intoxication’s correlates.

A group of researchers¹⁷ developed the Compensatory Eating and Behaviors in Responses to Alcohol Consumption Scale (henceforth CEBRACS) based on Peralta’s²⁹ and Burke et al’s²⁵ findings. Items in the CEBRACS included behaviors performed before, during, and after drinking designed to offset the empty calories of alcohol use. Support was found for the theoretical rationale explaining the co-occurrence of alcohol use and WCB using CEBRACS in both the original paper and a follow-up study.¹⁹ Additionally, the CEBRACS has been replicated internationally and its reliability and validity confirmed.³³ We note that Ward and Galante³⁴ developed a “Drunkorexia Motives and Behaviors” scale. These scholars found that drunkorexia is a behavior that is separate from alcohol consumption and disordered eating behaviors. The use of this scale, however, is beyond the scope of the present study.

Gender socialization and health behavior

Health risk behaviors vary significantly by sex: men are at far greater risk for engaging in health-compromising acts compared to women,³⁵ while women are at greater risk for male-perpetrated health risk behavior (eg, physical and sexual assault).³² National data suggest a narrowing of alcohol use by sex—yet significant differences remain with men more likely to engage in HED compared to women.⁶ While sex category differences have been examined in the WCB and alcohol use literature, no research has observed the effect of masculine or feminine orientation on HED’s association with WCB.

A growing body of research has begun to critically evaluate masculine socialization as a key aspect of health. Researchers have documented how HED among male college students is symbolic of a tough/strong man and thus used to differentiate men from women and men who will not/cannot conform to traditional masculine norms. Health risk behaviors like HED become important facets of the social construction of masculinity.^{36–39} Women may drink less and less often compared to men for gendered reasons as well. Fear of date rape, weight gain, and stigmatization stemming from a double standard where women who drink heavily are more apt to be marginalized by their peers.⁴⁰ Interestingly, those who are more physically active and those who engage in sports activity, which are often gendered activities, are more likely to use alcohol.^{41,42}

A social constructionist theory of gender establishes a framework for understanding gendered risk status by positing that gender roles are learned and reinforced by sociocultural mechanisms. Men and women actively contribute to dominant gender norms through interaction with others. While masculine ideologies vary by culture and context, a dominant form of masculinity referred to as hegemonic masculinity informs expectations and stereotypes of men,^{43,44} which may drive individuals to engage in risk in order to adhere to gendered expectations.⁴⁵ HED is a gendered behavior that is symbolic of toughness, strength, virility, and heterosexuality and stereotypically associated with the male sex.^{43,45–47} We know little about whether female college students are at lower risk of HED and/or WCB due to their sex category or because of feminine orientation, and even less about whether male students are at risk due to masculine socialization processes.

Although sex category is uniform, masculine and feminine orientation can vary, which may explain why rates of health risk behavior differ both between and among men and women.³⁵ Theoretically, students that strongly conform to masculine constructs may be experiencing gender role strain, leading to health risk behavior.^{45,48} Alternatively, students who conform to feminine constructs may be protected from some risk behaviors regardless of sex category and at risk for other behaviors such as WCB (eg, eating disorders) in order to adhere to appearance norms. However, while women are more likely to be concerned about physical size and are more likely to be dissatisfied with their bodies,⁴⁹ a significant number of men have been found to engage in WCB.⁵⁰ Sexual objectification and attractiveness pressures have been examined among heterosexual and homosexual men and women and suggest that heterosexual women and gay men may be more prone to eating disorder syndromes due to pressures to conform to physical attractiveness expectations embraced by men regardless of sexuality.⁵¹

Accounting only for sex category might be problematic because a focus on sex only may yield incorrect data

interpretations. For example, young women who have a strong masculine orientation may engage in HED behavior and may not necessarily be concerned with conforming to appearance norms (eg, being thin). Using the conventional treatment of sex category, these women would be grouped with women who have a strong feminine orientation. In doing so, significance differences between the two types of women become masked by a faulty reliance on sex category. The same logic can be applied to men who have a feminine orientation. Thus, relying on sex category alone to analyze health behavior will not account for within-group differences and individual variability. Without examining sex category and gender orientation (ie, masculine or feminine orientation) simultaneously, the effect of sex category can be confounded with gender orientation. As a result, female sex can become an incorrectly specified target for intervention at the expense of masculine orientation.

We adopt a gender construction framework where gender is defined as active, performed and expressed in social interaction to investigate the WCB and HED association. We posit that HED and WCB are intersecting behaviors that serve to express gendered characteristics during emerging adulthood.⁴⁷ Emerging adulthood is a critical period in the life course that it is associated with identity formation.^{52,53}

College student and gender role orientation development

A significant literature on college student development suggests that older adolescents and young adults are faced with numerous intellectual, emotional, and relational tasks that frame the identity development process.^{54,55} Successful navigation through these tasks is important for developing a stable, intellectually robust, and confident identity during college. Moreover, emotional competence is an important aspect of college identity development, where college students learn how to understand and express their emotions with a myriad of social actors including peers, friends, romantic partners, and faculty. Research suggests that today's college students struggle with behavioral and emotional health problems at higher rates compared to previous generations.⁵ The college student development literature describes this current generation of college students as the "Millennial Generation" because of the distinctiveness of today's college students in terms of their ethnic diversity, their concerns with inequality, their relatively sheltered childhood experience, the increasing presence and power of women on college campuses, and their rule-oriented tendency toward conformity instead of rule-breaking.⁵

Contemporary college students face cognitive and emotional difficulties in balancing their career interests with current economic realities in an era of technologically infused

learning.⁵⁶ When college students are distressed by challenges associated with college development expectations, the management of emotions may be done in maladaptive ways, which include binge eating disorders.⁵⁷ Gender-specific normative perceptions may have an impact on substance abuse patterns that are sometimes also used to address college-related stressors.⁵⁸

Scholars have identified college involvement and extracurricular activity as an important buffer against maladaptive behaviors including heavy drinking.⁵⁹ Chao⁶⁰ reports that dysfunctional coping worsened the relationship between stress and well-being even for those with high social support. The emphasis contemporary students place on achievement and conformity along with the high value of friendships may consequently play a role in increased stress among today's college students. One national survey estimates that 90% of students believe that students use alcohol once a week or more,⁵ which is far above what students actually report using. The emotional costs of not fitting in or being excluded from perceived mainstream groups may create contexts where stress relief techniques (ie, HED) may also serve additional functions that align with conformity expectations (ie, weight control behavior used to conform to body image norms; HED).

College students may be additionally at risk for the co-occurrence of WCB and HED due to their contemporary student status where the transition into adulthood is likely delayed compared to their noncollege peers.⁶¹ Emerging adulthood involves experimentation with different behaviors that can pose risk to development and physical and psychological health.⁵ College students are less likely to be married, have parental responsibilities, or be employed full-time compared to their noncollege counterparts. Parenthood, marriage, and employment are critical components of adult roles and are identities that have been historically gendered (eg, father; mother; breadwinner; homemaker). These roles are protective against risky behaviors.^{52,61} Students may be engaging in behaviors that approximate gendered adult roles such as heavy drinking and WCB when marriage, full-time employment, and parenthood roles are absent.

Context of college student needs

A relevant development in the changing characteristics of college students is the growing number of gender nonconforming college students. This demographic change perhaps presents challenges to health specialists especially mental health providers on campus.⁶² This is especially of concern in that LGBT students use substances at higher rates than their non-LGBT counterparts often to address feelings of gender identity confusion, fears of self-expression, and

disclosure.⁶³ Similarly, sexual minority men may also be at heightened risk for eating disorder symptoms.⁵¹

The discussion above is centered on an overriding goal: college student health. The importance of promoting student achievement, enabling students to reach academic goals, and obtaining overall life satisfaction is contingent on college student health status. The psychosocial aspects of weight control behavior in combination with alcohol use behavior are important to consider when planning for overall student success, retention, and the graduation of college students.⁶⁴

We extend the theoretical literature on the co-occurrence of alcohol use and WCB by administering the CEBRACS on college students and incorporating gender identity measures to determine whether sex and gender socialization (eg, masculine orientation and feminine orientation) are predictive of the co-occurrence of WCB and alcohol use. We hypothesize: (H1) men will be more likely to engage in HED compared to women; (H2) women will be more likely to engage in WCB due to alcohol use compared to men; (H3) individuals with a feminine orientation will have higher odds of engaging in WCB due to alcohol use compared to individuals with a masculine orientation, net of demographic and behavioral controls. H2 is rooted in the literature that suggests women are more susceptible to beauty and alcohol use norms compared to men.⁵¹ H3 is rooted in the assumption that those with a feminine orientation are more likely to be concerned with body image norms compared to men and are thus more likely to engage in WCB due to alcohol use compared to men. This is an assumption that is not currently supported by research because this research question has never been tested.

Methods

Participants and procedure

We used data collected from a medium-sized Midwestern public university. Data were collected during the 2013–2014 academic year. SurveyGizmo, an online survey service provider, hosted our electronic consent for participation form and the confidential online survey. The survey included a variety of questions, including assessments of health behaviors, mental health status, and gender orientation among others. Recruitment was conducted via Introduction-to-Sociology courses. Extra credit for participation was offered as an incentive. Students turned into their instructor a copy of a thank you letter that concluded the survey as evidence of having taken part in the survey. Respondents completed the survey online with full confidentiality; neither names nor student IDs were collected. The survey took about 50 min to complete. Only college students aged 18 years and older attending the university were eligible for participation.

To focus on the period in the life course where adolescents transition into adulthood, the age range was limited to those between 18 and 25 years old. All descriptive statistics can be found in Table 1. Only the primary investigator and members of the research team had access to the study data. No personal identifying information was collected except for standard demographic information. Approval for this research was granted by the University's Institutional Review Board.

One thousand twenty-six students completed the survey. The analysis of the present study is based on 651 of the original 1026. Twenty-three cases were dropped due to incomplete information (ie, unfinished surveys) or answering positive on a screener question meant to eliminate those reporting use of a fictitious drug. One hundred sixty-two were dropped for being outside 18–25 years old. The remainder were dropped if they indicated that they had not initiated alcohol use. We analyze only those who have already initiated alcohol use because our focus is the study of those who engage in weight control behavior in response to their drinking behavior. Note, we ran analysis for the full sample and found similar findings—results available upon request.

Our study yielded a relatively large sample size and is thus useful for preliminarily establishing the existence of statistical relationships. Moreover, while the convenience sampling nature of our design limits generalizability, we made comparisons between those who completed the survey, the general population of Introduction to Sociology students, and the general population of students at

the institution to make assertions about the representativeness of our sample. We estimate a response rate of 44% ($N = 1,026$). This estimated response rate is higher than response rates found in similar Web-based protocols.¹⁶ Our overall sample and analytic sample were consistent with the demographics of the student body, adjusting for missing data. Table 1 provides the comparison across samples and the student population.

Independent variables

Quantitatively measuring gender orientation is a difficult task in that gender orientation results from a lifelong gender socialization processes. Moreover, gender orientation is a fluid concept in that expressions of gender can change over time and depend on context. A snapshot measure of gender orientation is a useful starting point by which to understand the association between gender orientation and alcohol-related WCB. Given the complexities of gender measurement, we approach the question of gender orientation quantitatively using three proxy measures of gender orientation: The *Bem Sex Role Inventory* (BSRI), the *Conformity to Masculine Norms Inventory* (CMNI), and the *Personal Attributes Questionnaire* (PAQ). Due to space limitations, we focus mainly on the BSRI in this manuscript and rely on the CMNI and PAQ to support our findings. Feminine orientation in addition to masculine orientation are captured by the BSRI and PAQ. Note that the CMNI only measures facets of masculine orientation. See the appendix for sample

Table 1. Descriptive statistics for total student population, total enrolled in introduction to sociology, study participants, and analytic sample Fall 2013/Spring 2014.

	Total undergrads ^A	Introduction to sociology ^A	Study participants ^B	Analytic sample ^B
Enrolled	≈20,000	≈2,000	1,026	651
Mean age	24.2	20.4	20.6	19.8
Athletes	2	3.3	5.8	5.7
Pell grant eligible	41	42	52	42.4
Female (%)	48	55	59.5	59.9
Male (%)	52	45	40	40.1
<i>Race/Ethnic Breakdown (%)</i>				
African-American	13	15	16	14.3
Two or more races	3	3	6	5.4
Other (Hispanic; Asian; Native American)	4.5	5	10	4
White	75	73	74	76.3
<i>Parental Education^B (%)</i>				
Less than HS	—	—	2.1	2.1
Completed HS	—	—	13.9	12.2
Some college	—	—	27.7	28.1
College graduate	—	—	36.2	35.6
Graduate/professional degree	—	—	20.2	21.9
<i>Gender scales (mean and SD)</i>				
BSRI	—	—	—	-.443 (1.22)
CMNI	—	—	—	.186 (.321)
PAQ	—	—	—	13.43 (3.69)

Note. We do not report precise number of undergraduate and introduction students for confidentiality purposes; 53 students took the course in Fall 2013 and repeated in Spring 2014.

^AProxy measure for social class: number/percent of parent w/out college degree.

^BParental education based on highest degree earned by mother or father.

items from each scale. All descriptive statistics for the gender orientation scales are given in Table 1.

Our independent variables of masculinity and femininity orientation are created from the short form of the BSRI word bank, which is a measure of gender orientation.⁶⁵ While the BSRI has been critiqued for being a dated measure and uses stereotypical aspects of gender,⁶⁶ it continues to be used in the health literature as a reliable and valid measure of gender orientation.^{67,68} This is a moderated 30-point scale composed from elements of the traditional 60-point scale, which has shown better reliability and validity than the original 60-point scale.⁶⁷ Respondents were asked to report to what degree they identified with each word or phrase (1 = never or almost never through 7 = almost always true). The masculine and feminine orientation scales combine 10 gendered outcomes. The scale demonstrated high reliability ($\alpha = .96$). Responses ranged from -4.5 (extremely feminine) to 4.5 (extremely masculine). The BSRI was normally distributed for both men and women, indicating that commitment to gendered norms varied significantly across and within each sex.

The CMNI⁶⁹ is an instrument used to measure conformity to masculine norms pertinent to the US population. We adopted the short form (46 item) version of the CMNI, which has exhibited reliability and overall psychometric support⁴⁸ and has been used in previous substance abuse research.⁷⁰ Responses for the CMNI ranged from -0.647 to 1.267 , with greater values indicating greater commitment to masculine norms. The scale had high reliability ($\alpha = .87$).

The PAQ is a 24-item instrument that asked respondents to indicate the extent to which they could be characterized by various adjectives.⁷¹ In particular, it assesses instrumentality and expressivity–personality attributes that are socially desirable in both men and women but are more typically associated with one sex.⁶⁷ reports satisfactory reliability and validity. There are eight items that make up each subscale. There are also eight items that comprise an additional androgyny scale. We used the combined PAQ for comparisons against the BSRI. The PAQ had values ranging from 1 to 27. Greater scores again indicated greater endorsement of masculine attributes, while lower scores indicated greater endorsement of feminine attributes. Overall, the scale had adequate reliability ($\alpha = .74$).

Control variables

We included several demographic, behavioral, and mental health covariates to account for possible confounding. Race was recoded as a dummy variable comparing white and nonwhite respondents (coded as 1) due to the low number of ethnic and racial minority participants ($n = 155$, 23.8%). Sex was a dummy variable with men coded

1 ($n = 260$, 40.1%). Sexual minority status (ie, gay, lesbian, bisexual) is a dummy code (coded 1) to include all those who identified as a sexual minority ($n = 44$, 6.9%). Parental education was treated as five categories (less than high school, high school or equivalent, some college, college graduate, and professional degree or more) with those whose parents have a college degree as the comparison group. Living on or off campus was a dichotomous variable with living off campus coded 1 ($n = 397$, 61.7%).

Controls for mental health and other risky behaviors were also included due to comorbidity among substance use, mood, and eating disorders.^{72,73} The Center for Epidemiological Studies Depression Scale (CES-D)⁷⁴ was included to account for possible depressive symptoms confounds (mean = 8.68, SD = 4.47, range = 0–21). Three dummy variables were used to control for other substance use including a dummy variable for smoking, with smokers coded 1 ($n = 47$, 7.6%), a dummy variable for any other drug use (ie, cocaine, marijuana, or prescription narcotics), with those who indicated any other drug use were coded 1 ($n = 272$, 41.8%), and a dummy variable indicating whether or not individuals had engaged in HED in the past 2 weeks ($n = 330$, 54.9%).

Dependent variable

The CEBRACS scale is made up of 21 questions asking respondents how frequently they engage in various behaviors related to WCB in combination with alcohol consumption. Responses ranged in value from 1 (Never) to 5 (All of the time). A full list of CEBRACS questions can be found in Table 2. The items of this scale demonstrated very high reliability ($\alpha = .96$). Items were combined to create a composite score for how frequently students engaged in these behaviors. The majority of respondents indicated “never” engaging in these behaviors; thus, the use of the CEBRACS scale as a continuous outcome was not appropriate. Rather than collapsing the CEBRACS into a dichotomous outcome measuring those who do not engage in these behaviors versus those who do, we created an ordinal measure from the original scale. The new measure collapses respondents into those who do not report engaging in these behaviors ($n = 293$, 46.4%), those who engage infrequently (approximately 1–25% of the time; $n = 249$, 29.5%), and those who engage with some regularity (more than 25% of the time; $n = 89$, 14.1%). Because the decision to collapse those in the upper extremes had the possibility of influencing our results, we also ran each model with an ordinal CEBRACS item made up of four categories differentiating those who engage in these behaviors 26–50% of the time and those who engage in these behaviors more than

Table 2. Prevalence of weight control behavior (CEBRACS items) and HED ($N = 651$).

	%	
	Female	Male
<i>CEBRACS items*</i>		
I have eaten less than usual during one or more meals to get drunker	33.68	35.77
I have exercised before drinking to make up for the calories in alcohol that I anticipated consuming	30.85	37.31
I have eaten less than usual during one or more meals before drinking to feel the effects of alcohol FASTER	27.76	33.08
I have skipped one or more meals before drinking to make up for the number of calories in alcohol that I anticipated consuming	21.34	23.46
I have taken laxatives before drinking to make up for the calories in alcohol that I anticipated consuming	7.46	15.77*
I have skipped one or more meals before drinking to feel the effects of alcohol FASTER	20.05	28.46*
I have eaten less than usual while I was drinking because I wanted to feel the effects of the alcohol FASTER	21.85	28.46
I have taken diuretics while I was drinking to make up for the calories in alcohol that I was consuming	11.05	18.46*
I have not eaten at all while I was drinking because I wanted to feel the effects of the alcohol FASTER	20.31	25.38
I have eaten low-calorie or low-fat foods while I was drinking to make up for the calories that was consuming	20.57	22.69
I drank low-calorie beer or alcoholic drinks to get fewer calories that are in alcohol	27.51	27.31
I have eaten less than usual while I was drinking because I wanted to get DRUNKER	22.37	26.15
I have taken laxatives while I was drinking to make up for the calories in alcohol that I was consuming	10.54	17.69*
I have not eaten at all while I was drinking because I wanted to get DRUNKER	21.08	22.34
I have taken diuretics to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol	8.23	16.92*
I have eaten low-calorie or low-fat foods during one or more meals to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol	25.45	20.77
I have taken laxatives to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol	9.77	15.38*
I have exercised to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol	31.88	33.59
I have made myself vomit to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol	14.4	17.31
I have eaten less than usual during one or more meals to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol	23.39	20
I have skipped an entire day or more of eating to make up for the calories that I had consumed while I was under the effects of alcohol	12.08	18.85*
<i>Heavy episodic drinking**</i>		
Think back over the last 2 weeks. How many time have you had 4 (female)/5 (male) or more drinks in a row?	49.3	63.01*

Note. * $p < .05$.

**Percentages represent those who indicated engaging in these behaviors 25% of the time or more for CEBRACS or at all for HED.

50% of the time. These models yielded similar results to those presented below with less precise estimates and are available upon request.

Analytic strategy

Due to the extreme skew in the distribution of CEBRACS items, we chose to fit models using ordinal logistic regression. This allowed us to retain information on the different severity of CEBRACS items as opposed to simple dichotomization comparing those who do or do not report the behaviors. All analyses were conducted using Stata 14. Missing values were imputed using the *ice* command. The *ice* package (Imputation by Chained Equations) imputes values simultaneously for all variables included in the imputation model.⁷⁵ Comparison of models using listwise deletion to those using multiple imputation (MI) revealed near identical results, suggesting that missingness did not bias our estimates. We present models using MI because of the increased power. Results are presented in the odds ratios to determine both the significance and effect size of each item.

Results

We first report the descriptive breakdown of the CEBRACS and HED variables. Table 2 summarizes individuals who indicated *ever* engaging in WCB behaviors, by sex. For seven of the items, we see that—surprisingly—men engage in these behaviors more than women. This includes disordered

eating behaviors or the use of laxatives to make up for calories, which may be indicative of underlying eating disorders and are typically more prevalent among women.⁷² Men are also more likely to engage in HED in the past two weeks, which is expected. Overall, these descriptive statistics suggest male undergraduates are more likely to participate in risky behaviors. Moving on to the ordinal logistic models, we test whether these differences reflect merely a sex difference in behavior or whether gender orientation may be the mechanism through which these behaviors become more likely.

All results for the ordinal logit models are given in Table 3. Model 1 includes only demographic covariates. Compared to those with college-educated parents, individuals whose parents had less than high school education were significantly less likely to engage in WCB ($OR = .23, p < .05$). Model 2 includes the BSRI. The BSRI is both significant and positively associated with behaviors outlined in the CEBRACS ($OR = 1.22, p < .01$). Because the BSRI is coded so that higher positive scores indicate greater acceptance of masculine ideals, every unit increase on the scale is associated with an approximate 21% increase in endorsing these behaviors. The differences across sex, though not significant, are attenuated by the inclusion of the BSRI.

Model 3 includes a dummy variable for living off campus. The BSRI remains significant and is virtually unchanged. Once again, the coefficient for differences across sex is reduced though sex differences are still not significant. The final model including the BSRI can be seen in Model 4. Model 4 adds controls for smoking,

Table 3. Ordinal logistic regression models for total cebracs scale ($n = 651$).

	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6
BEM	—	1.22 (1.05, 1.41)**	1.21 (1.05, 1.40)**	1.12 (0.96, 1.31)	—	—
CMNI	—	—	—	—	2.24 (1.22, 4.13)**	—
PAQ	—	—	—	—	—	1.05 (1.00, 1.10)*
MALE	1.18 (0.87, 1.60)	1.03 (0.75, 1.42)	1.02 (0.74, 1.40)	0.80 (0.57, 1.12)	0.64 (0.43, 0.95)*	0.93 (0.66, 1.30)
PARENTAL EDUCATION†						
LESS THAN HS	0.23 (0.06, 0.89)*	0.21 (0.54, 0.82)*	0.22 (0.06, 0.85)*	0.31 (0.07, 1.31)	0.32 (0.07, 1.37)	0.30 (0.07, 1.31)
HS OR EQUIVALENT	1.43 (0.89, 2.29)	1.45 (0.89, 2.34)	1.47 (0.91, 2.37)	1.51 (0.92, 2.50)	1.51 (0.91, 2.49)	1.50 (0.91, 2.48)
SOME COLLEGE	0.95 (0.65, 1.39)	0.93 (0.64, 1.36)	0.93 (0.63, 1.35)	0.94 (0.63, 1.40)	0.92 (0.61, 1.37)	0.95 (0.64, 1.42)
MASTERS OR GREATER	1.11 (0.75, 1.66)	1.12 (0.75, 1.68)	1.10 (0.74, 1.65)	1.18 (0.77, 1.80)	1.13 (0.74, 1.74)	1.14 (0.74, 1.74)
WHITE	0.94 (0.66, 1.33)	1.01 (0.71, 1.45)	1.02 (0.71, 1.46)	1.13 (0.77, 1.66)	1.15 (0.79, 1.70)	1.05 (0.72, 1.55)
AGE	1.00 (0.92, 1.09)	1.00 (0.92, 1.08)	1.03 (0.94, 1.13)	0.98 (0.89, 1.08)	1.00 (0.90, 1.10)	0.99 (0.89, 1.09)
SEXUAL MINORITY	1.68 (0.93, 3.05)	1.65 (0.91, 3.00)	1.71 (0.94, 3.10)	1.73 (0.93, 3.23)	1.90 (1.01, 3.56)*	1.74 (0.93, 3.26)
LIVE OFF CAMPUS	—	—	0.77 (0.54, 1.09)	0.99 (0.69, 1.43)	1.00 (0.69, 1.45)	0.99 (0.68, 1.42)
CES-D	—	—	—	1.03 (0.99, 1.07)	1.02 (0.99, 1.06)	1.02 (0.98, 1.06)
SMOKER	—	—	—	0.54 (0.28, 1.05)	0.56 (0.29, 1.09)	0.54 (0.28, 1.04)
OTHER DRUG USE	—	—	—	1.84 (1.32, 2.57)***	1.90 (1.37, 2.64)***	1.90 (1.37, 2.64)***
HED	—	—	—	5.82 (4.08, 8.32)***	5.66 (3.96, 8.10)***	5.90 (4.13, 8.43)***
THRESHOLD 1	-0.10	-0.22	0.24	—	1.26	1.66
THRESHOLD 2	1.73*	1.63*	2.10*	3.10**	3.45**	3.85***

Note. Results presented as odds ratios with 95% confidence intervals in parentheses. Significant results bolded for ease of display.

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

†College (BA/BS) education as omitted category.

other substance use, HED, and depressive symptoms. The effect of the BSRI is reduced ($OR = 1.12$, $p > .05$) and is no longer significant. Instead, other forms of substance use including both HED ($OR = 5.82$, $p < .001$) and illicit substance use ($OR = 1.84$, $p < .001$) are associated with greater odds of engaging in the behaviors in the CEBRACS. These results suggest that the relationship observed between the BSRI and the CEBRACS in previous models may be a reflection for greater overall substance use among those who endorse masculine traits and beliefs. We examine additional measures of gender orientation to determine if the earlier results of the BSRI are robust.

Model 5 replaces the BSRI with the CMNI. As with the BSRI, greater scores indicate greater association with masculine norms and ideals. In addition, as with the BSRI, the CMNI is positively and significantly associated with the CEBRACS ($OR = 2.24$, $p < .01$), though the effect for the CMNI is stronger. This adds to our confidence in the results of previous models. All the covariates in Model 4 that were significantly associated with WCB are nearly identical in Model 5. The only changes are that the sex differences ($OR = .64$, $p < .05$) and differences across sexuality ($OR = 1.90$, $p < .05$) become significant in Model 5, indicating that men have about 35% lower odds and sexual minorities have 90% greater odds of engaging in these behaviors. The final model, Model 6, includes the PAQ. Again, greater scores indicate greater levels of masculine orientation. This scale is also positively associated with WCB ($OR = 1.05$, $p < .05$), reinforcing the results from both the BSRI and CMNI. However, looking at the effect size of the PAQ compared to either the BSRI or the CMNI, we see that its impact is very small.

Even with some slight differences, these final models add to the finding that gender orientation and specifically masculinity are positively associated with WCB.

One interesting pattern that emerged was the insignificant threshold between those indicating never and infrequently engaging in WCB. With all other covariates in the model being equal, there are no base differences in the odds of being someone who never or infrequently engages in WCB. For this reason, we reran our analyses using a dichotomized version of the CEBRACS comparing those who engaged in these WCB more regularly (more than 25% of the time) to all others using logistic regression. Overall, the results were similar, though the effects of each measure of gender orientation were *stronger*. The change in probabilities for the model using the BSRI as a measure of gender orientation can be seen in Figure 1. When comparing only the frequent category to all others, gender orientation demonstrates a strong association with the probability engaging in WCB. Results from these additional analyses support our earlier findings with the added nuance that while gender orientation may be important in these behaviors, it has a stronger influence at the more extreme end of alcohol-related WCB.

Comment

Research has demonstrated the association between WCB and alcohol use. Engagement in potentially dangerous WCBs in the context of alcohol use can have damaging consequences for college student's physical and mental health. While most of the literature has focused on women, our research examines this behavior

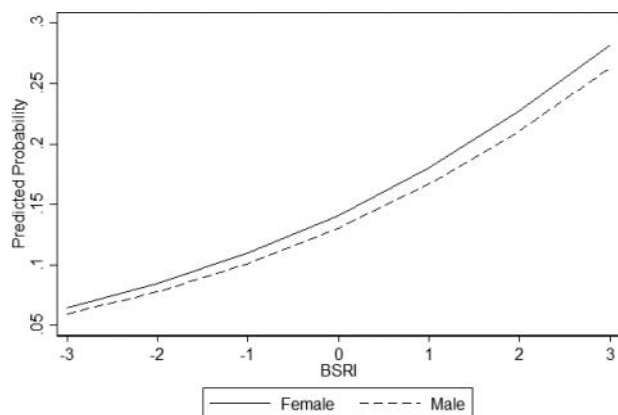


Figure 1. Change in probability of engaging in frequent WCB across BSRI.

among men and women, and we are the first to examine gender orientation alone and in addition to sex. We hypothesized that men would be more likely to engage in HED compared to women and that women would be more likely to engage in alcohol-related WCB compared to men. We found empirical support for the first supposition. However, looking across the items in the CEBRACS, we found that men were more likely to engage in alcohol-related WCB disconfirming our second hypothesis. We also hypothesized that individuals with feminine orientations would be more likely to have higher odds of alcohol-related WCB compared to masculine-oriented individuals. We found that the opposite was true. Individuals with a masculine orientation had higher odds of self-reporting alcohol-related WCB compared to feminine-oriented respondents. A significant contribution that this research makes is that regardless of sex, masculine-oriented individuals are at greater risk for alcohol related WCB. In other words, men and women who are oriented as masculine may be at greater risk for this specific and troubling health behavior. Feminine orientation may in fact provide protection against alcohol-related WCB.

Why might masculinity emerge as a significant finding? Late adolescence/early adulthood is a critical period of development where individuals often have not yet transitioned into gendered-adult-roles (eg, marriage, parenthood, full-time employment). Because hallmarks of masculine-gender-identity (eg, being a husband, a father, and/or gainfully employed) correspondingly have not been met among male college students experiencing late adolescence/early adulthood, this young men may be turning to health risk behavior as a manifestation of masculine gender-role-stress.^{76,77} Gender-role-stress occurs when men who rigidly adhere to traditional role norms become psychologically and sociologically distressed by violations of such norms.⁷⁸ Regaining a sense of control via HED and WCB may be indicative of accounting for gender norm violations due to

their developmental stage. Women who have a masculine-gendered orientation may have been socialized to engage in risky behavior such as alcohol use and skipping meals because of a rugged self-image. Masculine ideals of competition and winning may also be involved in alcohol-related WCB for women who are masculine oriented. Another possible explanation for the association between men, masculinity traits, and alcohol-related weight control behavior might be trait urgency. Trait urgency, a facet of impulsivity, has been associated with excessive exercise and alcohol use among men in recent work.⁷⁹

Based on our research that is the first to examine gender orientation, sex, and alcohol-related weight control behavior, we suggest that the student wellness community, college health educators, and clinicians check for alcohol use behavior among students presenting with disordered eating behavior or extreme weight control behavior. Excessive alcohol use may be important for treating students with or at risk for potentially harmful types of weight control behavior. Our findings also challenge stereotypes about weight control disturbances. The stereotype of the person suffering from weight control disturbances centers on young heterosexual women.⁸⁰ Those who do not fit this stereotype may be overlooked by health educators, on campus medical practitioners, college counselors, and psychologists and overlooked in campus prevention and intervention strategies.

Focusing on gender orientation and sex status is an important step in informing health service delivery for students. The present study suggests that men are in fact at risk for body image disturbance and unhealthy compensatory behaviors. Our work is commensurate with the work of Nelson et al⁸⁰ who found that all men (including gay, questioning, and heterosexual men) had high rates of serious body shape dissatisfaction. This is especially important in that men (especially minority men) are less likely to seek psychological help compared to women even though they are at greater risk for developing substance abuse problems.⁸¹ Scholars suggest that this has to do with traditional masculine norms.^{81,82} Campus counselors and clinicians should be on the lookout for how alcohol use and weight control behavior may be hidden behaviors among the men they are treating. Moreover, ethnic minority women and sexual minority women may be experiencing disturbances involved in the alcohol use and weight control behavior nexus in that sexual and ethnic minority women are not immune to eating and body image concerns.⁸⁰ Clinicians may not be looking for such disturbances in that stereotypes preclude the ability to recognize their presence among stereotype-incongruent groups.

Institutions within college campuses need to be cognizant of alcohol-related weight control behavior. Ward et al⁸³

found that Greek affiliation was positively associated with alcohol-related weight control behavior. Future research and intervention efforts should focus on Greek communities and those individuals that gravitate toward social organizations on campus.⁸⁴ Next, the role of university counseling centers is crucial to the health and well-being of college students. Counseling and other health providers should be aware of the differences between gay, transgender, genderqueer, and transsexual status to provide the most effective services possible for a changing college student body.⁶² Therapists and other health professionals should be careful to check for body image disturbances with all students not just heterosexual white young women.

One suggestion for evidence-based practice involves modifying existing efficacious Web-based alcohol prevention efforts to include normative feedback on specific alcohol-related weight control behaviors. Web-based prevention and intervention strategies have been shown to be low cost, easily administered, and empirically effective protocols⁸⁵ and may be particularly effective for millennial generation college students.

Limitations

The CEBRACS is a relatively new scale developed in 2012 and thus has limited validity information. The CEBRAC items raise questions regarding their validity due to the fact that several behaviors/attributes are combined in single item, namely weight control behavior and drinking or drunkenness. Items may be ambiguous for people who could endorse one but not the other aspect of the item. For example, a person could engage in weight control behavior but not usually drink. Because of this potential problem and for conceptual reasons (the research questions focuses on how *drinkers* use weight control behavior to account for their drinking behavior), we limited the scale to people who report drinking alcohol on a regular basis.

Caution must be used in generalizing our results given our reliance on a convenience sample. Variables not considered in our models constitute further limitations. First, while gender-role-stress is one possible mechanism through which gender orientation influences WCB, we have no direct measures of stress. Future research should include both gender orientation scales as well as measures of stress to see if this is the main theoretical mechanism through which gender orientation influences WCB. Second, while we did control for behavioral, psychological, and other demographic factors, there are other key factors that were not included. Psychosocial and coping resources such as social support and mastery were not available in the current data set. Understanding how these resources may buffer stress is key for developing interventions to mitigate the harm caused by these risky behaviors. Of concern is that the

survey was long and may have caused survey fatigue and may have influenced our results. Finally, we do not address Greek-involved versus non-Greek-involved students. Understanding this distinction matters in that a growing body of research suggests male hegemony and its specific expression in heavy drinking among fraternities is not similarly present among non-Greek populations. Similarly, the significance of weight management and body image behavior among sorority members is not as common in non-Greek populations. While Greek/non-Greek status are important distinctions that should be studied in the future, they are currently outside of our focus.

Nevertheless, our study has several strengths and offers albeit cautiously a nuanced path to understanding how gender orientation in tandem with sex category might be associated with a troubling substance use problem: alcohol-related WCB. Second, because the CEBRACS has now been tested in a Midwest population, results can be compared to previous reports of WCB and replicated in future studies. Our sample, while not a representative sample, does mirror the demographic profile of the university from which data were derived. Next, our survey was offered in a general education course consisting of students with diverse interests. Comparing our sample to that of the university, enrollment figures demonstrates this. In addition, our response rate was relatively high for a Web-based protocol. Furthermore, online surveys have advantages over standard paper-and-pencil measures including more favorable psychometric qualities, greater completeness of data, and enhanced comfort among participants to disclose sensitive information. Moreover, many of our findings (ie, HED) are consistent with those of other studies, which lends support to the validity of our results. Because the impact of gender orientation on alcohol-related WCB has never been examined, this research fills a significant gap in the literature and moves the field forward by analyzing sex difference *and* gender orientation simultaneously.

Conclusions

Future research should examine the link between misuse of prescription stimulants, alcohol, and disordered eating among college student in light of recent research associating these maladaptive behaviors.⁸⁶ The role of social media in transmitting information about alcohol use and weight control activities should also be taken into account.⁵⁶ Finally, sexual orientation should be considered in future efforts to understand weight control and alcohol use among lesbian, gay, and bisexual youth given the findings of Austin et al,⁴⁹ which suggest that lesbian, gay, and bisexual youth are at greater risk for purging and diet pill use.

Research on alcohol-related WCB would benefit from research designs based on representative samples. Data collected should include gender orientation as well as sex category. Biomarkers of sex category should be collected to further specify sex category. Next, including sexuality in conjunction with sex category and gender identity would further clarify the role of critically important identity statuses on alcohol-related WCB. Further qualitative research on the meaning of alcohol-related WCB among men and women is recommended. This is an especially important need in relation to the question of how gender orientation influences alcohol-related WCB given our findings on the role of masculinity.

In summary, future analytical approaches to WCB and other forms of substance-use behavior should take into consideration the distinct differences between sex and gender orientation in data collection and analysis. American college health prevention, intervention, and treatment approaches for health concerns beyond alcohol-related weight control behavior might also be improved by differentiating between sex category and gender orientation.

Conflict of interest disclosure

The authors have no conflicts of interest to report. The authors confirm that the research presented in this article met the ethical guidelines, including adherence to the legal requirements, of the United States and received approval from the Institutional Review Board of The University of Akron.

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Appendix A

Instructions and Sample Items from BSRI, PAQ, and CMNI

Short-form Bem Sex Role Inventory (BSRI): Rate yourself on each of the following items on a scale from 1 (never or almost never true) to 7 (almost always true)

Masculine items	Feminine items	Neutral items
I defend my own beliefs	I am affectionate	I am conscientious
I am independent	I am sympathetic	I am moody

Personal Attributes Questionnaire (PAQ): The items below inquire about what kind of person you think you are. Each item consists of a PAIR of characteristics, with the letters A-E in between. For example, Not at all artistic A.....B.....C.....D.....E Very artistic. Choose a letter

Masculine	Feminine	Masculine-Feminine
Not at all aggressive	Not at all emotional	Very submissive
Not at all independent	Very rough	Never cries

The Conformity to Masculine Norms Inventory-46: choose 0 (strongly disagree) to 3 (strongly agree) for each statement

Masculine
I hate asking for help
I enjoy taking risks
