

Full length article

The influence of motives on alcohol- and sex-related behaviors among female college students



Brittany E. Blanchard^{a,*}, Angela K. Stevens^a, Ileana S. Acosta^a, Amelia E. Talley^a, Jennifer L. Brown^b, Andrew K. Littlefield^a

^a Department of Psychological Sciences, Texas Tech University, MS 2051 Psychological Sciences Building, Lubbock, TX, 79409-2051, USA

^b Addiction Sciences Division, Department of Psychiatry and Behavioral Neuroscience, University of Cincinnati College of Medicine, 3131 Harvey Ave, Suite 104, Cincinnati, OH 4522, USA

ARTICLE INFO

Keywords:

Alcohol use
Alcohol-related consequences
Risky sexual outcomes
Motivation
College students
Structural equation modeling

ABSTRACT

Purpose: Although previous studies have elucidated associations between motivations for drinking and sex as they relate to risky health outcomes among female college students, the utility of cross-domain motives (i.e., alcohol motives predicting sex-related outcomes and vice versa) in the prediction of specific alcohol- and sex-related behaviors has yet to be examined. The current study examined relations between drinking and sex motives with multiple risky alcohol- and sex-related outcomes (i.e., alcohol consumption, alcohol-related problems, alcohol consumption prior to sexual intercourse, number of sexual partners [vaginal, oral, anal], and emergency contraception use).

Procedures: Multiple structural equation models were used to examine univariate and multivariate associations among drinking and sex motives and specific outcomes in a sample of female undergraduates with lifetime histories of alcohol use and sexual activity ($N = 436$; 77% White, 21% Hispanic).

Results: Findings indicated differential associations between motives and specific outcomes across univariate versus multivariate analyses. Multivariate models indicated greater endorsement of enhancement and less endorsement of intimacy sex motives were significantly associated with heavy drinking and alcohol-related problems, whereas alcohol motives were less reliably linked to sex-related outcomes. When considered simultaneously, sex motives accounted for more variance in some alcohol outcomes relative to certain drinking motives. **Conclusions:** Cross-domain motives may be useful in predicting risky outcomes among female college students. Research implications include the importance of examining motive-behavior relations in univariate and multivariate contexts. Clinical implications include cross-domain motive assessment and use of emotion regulation strategies to reduce emotionally-motivated maladaptive alcohol- and sex-related behaviors.

1. Introduction

1.1. Drinking and Sex Motives

College students are at risk for excessive alcohol consumption (Johnston et al., 2016), related problems (e.g., academic difficulties, impaired driving; Perkins, 2002), and risky sexual behaviors (Cooper, 2002). Thus, motivational processes which relate to young adults' drinking and sexual behaviors are of interest to researchers and clinicians. Cooper et al. (2000) suggest similar underlying motivational processes for alcohol- and sexual-risk behaviors. Based on the motivational model of alcohol use by Cox and Klinger (i.e., consuming alcohol for either positive or negative reinforcement; 1988, 1990), drinking motives are defined by reinforcement source (i.e., self- versus other-

focused) and valence. Cooper (1994) demonstrated evidence for four drinking motives: 1) social, 2) coping, 3) enhancement, and 4) conformity (see Cooper et al., 2016 for a theoretical and empirical review of the motivational model). Cooper et al. (1998) then used this same framework to categorize motives for sexual behavior, which also include self-focused/positive reinforcement (i.e., enhancement), other-focused/positive reinforcement (i.e., need for intimacy), self-focused/negative reinforcement (i.e., self-affirmation and coping), and other-focused/negative reinforcement (i.e., peer and partner approval) motives.

1.2. Drinking Motives Associated with Drinking-related Outcomes

Although college students tend to endorse enhancement motives

* Corresponding author.

E-mail address: brittany.blanchard@ttu.edu (B.E. Blanchard).

(e.g., celebratory drinking) and social motives as reasons for drinking alcohol (Read et al., 2003), all four motives have been linked to alcohol-related outcomes among college students (Cooper, 1994; see Kuntsche et al., 2005, 2014). More broadly, Carey and Correia (1997) found positive- and negative-reinforcement drinking motives were univariately associated with consumption and alcohol-related problems, whereas only negative-reinforcement motives (i.e., coping, conformity) were predictive of problems in multivariate models after accounting for alcohol consumption levels. Overall, associations between specific drinking motives and alcohol outcomes tend to vary as a function of the outcome under examination.

1.3. Sexual Motives Associated with Sex-related Outcomes

Broadly, research indicates distinct sexual motivations predict various sexual risk behaviors (e.g., multiple partners, casual sex; Cooper et al., 1998; Cooper et al., 2011; Grossbard et al., 2007). Individuals high in coping motives report riskier sexual practices (e.g., multiple partners and lack of birth control methods) compared to their low-coping-motive counterparts (Cooper et al., 1998). However, previous work also suggests an inverse relation between intimacy motives and lifetime number of sexual partners, whereas this outcome is positively associated with mood-enhancement motives (Gebhardt et al., 2003). Thus, evidence indicates that specific sex motives may be protective against one sexual outcome and a risk factor for another.

1.4. Drinking Motives Associated with Sex-related Outcomes

Drinking motives have also been shown to be predictive of sexual outcomes. For example, Dvorak et al. (2016) found endorsement of coping motives for drinking was directly associated with sexual “hookups,” or sexual encounters without romantic commitment (Fielder and Carey, 2010), whereas social and enhancement motives were indirectly linked with hookups via alcohol consumption among college students. In univariate models, coping, conformity, social, and enhancement drinking motives have also been found to be associated with negative social and personal consequences related to sexual activity (Norberg et al., 2011).

1.5. Sex Motives Associated with Drinking Outcomes

Specific sex motives have been shown to predict frequency of drinking before or during sexual episodes. For example, Grossbard et al. (2007) found greater levels of enhancement motives for sex were associated with an increase in drinking before or during sex, whereas intimacy motives were associated with significantly less drinking before or during sex among college athletes. However, Owen et al. (2014) found no significant associations between sex motives and alcohol/substance misuse in an all-female sample. Nevertheless, drinking prior to sexual activity may yield negative outcomes, and motivational influences driving these behaviors are important and need to be understood.

1.6. Rationale

Despite a myriad of research on drinking and sex motives, little is known about interrelations among motives for alcohol and sex or how these constructs simultaneously contribute to engagement in risky alcohol use, risky sexual behavior, or both. Previous theoretical and empirical work has established that certain drinking motives may relate to risky sexual outcomes (Cooper et al., 1998; Dvorak et al., 2016; Norberg et al., 2011). Further, the co-occurrence of alcohol consumption and risky sexual activity suggests that drinking and sex motives may be predictive of alcohol- and sex-related outcomes (Caldeira et al., 2009). Given evidence that alcohol-related consequences may be more negative for female college students (see Nolen-Hoeksema, 2004), and

some sexual consequences can exclusively impact females (e.g., pregnancy), investigating cross-domain motives among this population is warranted. To our knowledge, this has yet to be examined.

The current study examined the extent to which drinking and sex motives independently and multivariately relate to specific alcohol and sexual risk-taking outcomes among a sample of female college students. Because motives have been shown to differentially relate to alcohol consumption, related problems, and consumption prior to sexual activity, all three were examined. Risky sexual behavior can be operationalized several different ways (e.g., number of partners, use of emergency contraceptives), so multiple sex-related outcomes were examined. Finally, because drinking and sex motives are defined using the emotion-regulation two-dimensional motivational framework, it is plausible that cross-domain motives (i.e., sex motives predicting alcohol outcomes and vice versa) will be associated with outcomes in ways similar to domain-specific motives (i.e., positive- and negative-reinforcement motives will differentially relate to risky drinking- and sex-related outcomes).

2. Materials and Methods

2.1. Participants and Procedure

Participants ($N = 611$) were female undergraduate students from a large, Hispanic-serving southwestern university recruited from introductory psychology and communication courses. Participants completed a battery of demographic questions and self-report measures online. All procedures and measures were approved by the university's Institutional Review Board. Participants received research course credit for their participation.

2.2. Measures

2.2.1. Demographics

Participants self-reported demographic information, including age, race, ethnicity, sexual orientation, and relationship status, which was dichotomized (i.e., single/not dating/dating multiple individuals coded “casual,” and committed long-term relationships coded as “steady;” Brown and Vanable, 2007). Sexual orientation, assessed as “How would you describe your current sexual orientation?” was dichotomized into exclusively heterosexual (endorsed by 80%) versus other.¹

2.2.2. Motives

2.2.2.1. Drinking Motives Questionnaire – Revised. The Drinking Motives Questionnaire-Revised (DMQ-R; Cooper, 1994) is a 20-item measure with response options on a 6-point Likert-type scale, ranging from (1) *never* to (6) *almost always*, and four subscales: coping, conformity, social, and enhancement. Each subscale consists of five items. Cronbach's alphas ranged from .88 to .93 in this study.

2.2.2.2. Sexual Motives Scale. The Sexual Motives Scale (SMS) is a 29-item measure assessing six primary motives for sexual behavior: intimacy, coping, enhancement, self-affirmation, partner approval, and peer approval (Cooper et al., 1998). Each subscale consists of 4–5 items, assessed on a 5-point Likert-type scale, ranging from (1) *almost never/never* to (5) *almost always/always* (Cronbach's alphas = .87–.91).

2.2.3. Outcomes

2.2.3.1. Sexual Behavior History. Lifetime number of vaginal, oral, and anal sex partners (three separate items), as well as two items assessing

¹ Sexual orientation was dichotomized given the low base rates endorsed by individuals who identify as non-exclusively heterosexual (i.e., exclusively homosexual = 8%, primarily homosexual = 2%, equally homosexual and heterosexual = < 1%, primarily heterosexual = 8%, queer = < 1%, unlabeled/questioning = < 1%, and no sexual interest = < 1%).

emergency contraception and alcohol use before sex were utilized: “Have you or your partner ever used ‘morning after’ pills or emergency contraception?” (Yes/No) and “In the past month, how much of the time did you drink alcohol before you had sexual intercourse?” Response options ranged from (0) *never* to (4) *always*.

2.2.3.2. Young Adult Alcohol Problems Screening Test. The Young Adult Alcohol Problems Screening Test (YAAPST) is a measure of lifetime and past-year alcohol-related problems (Hurlburt and Sher, 1992). The past-year problems subscale (YAAPST-PY) was utilized, which consists of 27 items assessing interpersonal, physical, occupational, academic, legal, and psychological consequences of alcohol consumption with response options ranging from (1) *never* to (5) *3+ times in the past year* (Cronbach’s $\alpha = .90$).

2.2.3.3. The Alcohol Use Disorder Identification Test. The Alcohol Use Disorder Identification Test (AUDIT) is a 10-item measure of alcohol consumption and associated problems on a 5-point Likert-type scale (i.e., “Never” to “Daily or almost daily;” Babor et al., 2001). Only the hazardous use (i.e., AUDIT-C) subscale, which is composed of three items (i.e., drinking quantity, frequency, and frequency of heavy drinking), was used (Cronbach’s $\alpha = .77$).

2.3. Analytic Procedure

All data management and coding was conducted with SAS 9.4™ software (SAS Institute Inc),² and structural equations were modeled using MPlus 7.2 software (Muthén and Muthén, 1998–2012). Participants who reported no lifetime alcohol consumption, sexual activity (i.e., no reported oral, anal, or vaginal sex partners), or both, were removed prior to analyses ($n = 165$).³ Individuals who identified as transgender were excluded from analyses ($n = 3$). Only female participants between the ages of 18 and 25 were included ($n = 10$ excluded). The final sample ($N = 436$, M age = 19.97, $SD = 1.63$) largely identified as exclusively heterosexual (80%) and mostly White (77%), with a minority identifying as Hispanic (21%). Half of the sample (50%) were in committed relationships. This sample consisted of 33% freshmen, 17% sophomores, 25% juniors, and 25% seniors.

2.3.1. Alcohol and Sex Outcomes

The distributions of lifetime number of partners were non-normal and appropriate transformations were applied.⁴ Continuous, single-indicator outcomes (i.e., number of vaginal partners, oral partners, and frequency of alcohol before sex) were z -transformed. Anal sex was coded such that endorsement equaled “1.” No participants endorsed having six or more drinks daily or almost daily on the AUDIT-C.

2.3.2. Motive Indicators

Distributions of the item responses for the DMQ-R and SMS indicated low endorsement frequencies for “usually/most of the time” and “almost always/always.” Items were rescaled such that low-endorsement categories (i.e., less than 5% of the total sample) were collapsed (similar to other DMQ-R studies; see Kristjansson et al., 2011), resulting in 20 rescaled items on the SMS and 10 rescaled items on the DMQ-R ranging from 3 to 5 categories. Motive indicators were specified as ordered-categorical, and a weighted least squares means and variances (WLSMV) estimator was used for all analyses due to robustness

² Copyright © [2002–2014] SAS Institute Inc. SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA.

³ More specifically, 33 participants were removed due to no alcohol use, 95 due to no sexual activity, and 37 due to both.

⁴ Numbers of lifetime vaginal, oral, and anal partners were Winsorized to correct for non-normality. This resulted in ranges of 0–11+ for vaginal and oral partners and 0–1+ for anal partners (skewness and kurtosis < 1.5 for all three variables).

against violations of normality for ordinal indicators (Muthén and Muthén, 2012). Listwise deletion was used for missing data (n removed = 10–49; see supplementary materials for number of observations used in each model).

2.3.3. Measurement Models and Structural Models

First, measurement models were created for drinking and sexual motives independently. Tested factor structures were based on previous literature (Cooper, 1994; Cooper et al., 1998; Kuntsche et al., 2005). Three factor structures were tested for both motive types (see supplementary materials). Measurement models were also tested for alcohol consumption (as assessed by the AUDIT-C subscale) and alcohol-related-consequences (as assessed by the YAAPST-PY subscale). Retained factor solutions (i.e., the two-factor drinking motives and four-factor sex motives models) were then used to construct separate structural equation models (SEMs) to assess motive-behavior relations. Specifically, each respective sex and drinking motive was first modeled as a latent variable, such that each motive predicted each outcome, respectively (resulting in 42 univariate models). We then examined effects of all motives predicting each alcohol and sex outcome (seven multivariate models). Partner type, age, and sexual orientation were adjusted for in all models. Refer to Fig. 1 for the conceptual multivariate model.

3. Results

3.1. Descriptive Statistics

Raw score means and standard deviations of summed drinking motives, sex motives, alcohol-related outcomes, and sex-related outcomes are provided in Table 1.

3.2. Drinking Motives, Sex Motives, and Alcohol Outcome CFAs

We retained the drinking-motives model, which combined social and enhancement motives, as well as conformity and coping motives, into higher-order factors of positive- and negative-reinforcement drinking motives, respectively (similar to reinforcement models proposed by Farber et al., 1980). Although this model exhibited slightly poorer fit compared to the four-factor model without higher-order factors (i.e., identical CFI of .97 but RMSEAs of .095 versus .094), this model was chosen due to the high correlations between coping and conformity motive-factors ($r = .79$) and between enhancement and social motive-factors ($r = .93$). All drinking-motive models exhibited mediocre fit based on RMSEA and good fit based on CFI (Hu and Bentler, 1999). Standardized factor loadings ranged from .78–.94.

Although all three sex-motive models tested fit the data identically well (i.e., CFI = .98, RMSEA = .05), significant correlations existed between specific motives (i.e., $r = .85$ for coping and self-affirmation motive factors; $r = .87$ for peer- and partner-approval motive factors), such as drinking motives. Therefore, the model with self-affirmation and coping motives as a higher-order factor of self-focused, negative-reinforcement sex motives and peer- and partner-approval motives as a higher-order factor of other-focused, negative-reinforcement sex motives was retained. Enhancement and intimacy (i.e., positively-reinforcing, self-focused sex motives) were not combined ($r = .54$). Standardized factor loadings for subscales of sex motives ranged from .72–.97. Global fit indices for drinking- and sex-motive models are provided in the Supplementary materials (Tables A, B, and C).

Regarding alcohol outcomes, the 3-item AUDIT-C subscale measurement model was just-identified, so model fit indices could not be meaningfully interpreted. However, one item (“How often do you have six or more drinks on one occasion?”) exhibited a standardized factor loading of greater than 1. Given this, heavy episodic drinking was subsequently modeled as categorical using this item alone. The YAAPST past-year subscale CFA demonstrated acceptable fit (i.e.,

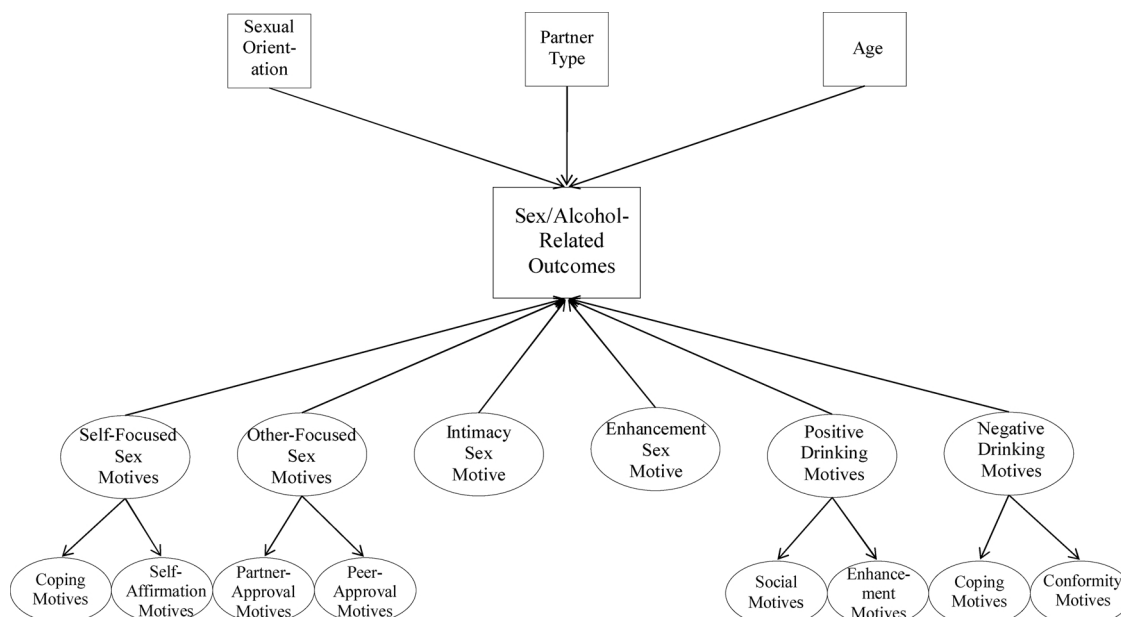


Fig. 1. Conceptual structural equation model with sex and drinking motives predicting sex and alcohol-related outcomes. Item-level indicators (i.e., measurement models) are not shown. As depicted, self-focused and other-focused sex motives are modeled as hierarchical latent variables, as are positive and negative drinking motives. For univariate models, only one type of latent motive was included, along with covariates, to predict a given outcome. For multivariate models, all latent motive variables were included, along with covariates, to predict a given outcome. Although outcomes are depicted as manifest in the figure, please note alcohol-related problems, as assessed by the YAAPST-PY, was modeled as latent.

Table 1
Descriptive Statistics for Motives and Risky Behavior Indicators.

	Range	Mean (SD)
Drinking Motives		
Coping	3–24	10.36 (5.01)
Conformity	4–21	8.76 (4.25)
Enhancement	4–30	16.54 (7.01)
Social	5–30	17.44 (6.99)
Sex Motives		
Coping	5–18	8.31 (3.46)
Self-Affirmation	5–20	9.04 (3.91)
Enhancement	5–25	17.41 (5.01)
Intimacy	5–25	16.94 (5.52)
Peer Approval	4–15	5.91 (2.19)
Partner Approval	4–12	5.57 (2.39)
Alcohol use prior to sex	0–4	1.28 (1.13)
Alcohol-related outcomes		
Heavy episodic drinking	0–4	4.45 (2.48)
YAAPST-PY	0–25	5.22 (4.56)
		Median (% sexually active)
Sex-related outcomes		
# of vaginal partners	0–100	4 (91% at least 1 partner)
# of oral partners	0–60	3 (91% at least 1 partner)
# of anal partners	0–4	0 (21% at least 1 partner)
Emergency contraception use (%)	–	48%

Note: Descriptive statistics of raw scores. Average of summed motive subscale scores provided. YAAPST-PY summed score descriptive statistics are provided. Although raw scores are shown here, numbers of lifetime vaginal, oral, and anal partners were truncated to correct for non-normality; see footnote 3.

$\chi^2(324) = 631.97, p < .001, CFI = .94, RMSEA = .047$ [95% CI = .042–.053]). Thus, alcohol-related consequences were modeled as a latent variable.

3.3. Univariate and Multivariate Structural Equation Models

For correlations between motives, covariates, and outcomes, refer to Table 2. Standardized estimates are presented for alcohol-related outcomes for both univariate and multivariate models in Table 3 and for sex-related outcomes in Table 4 with standardized covariate estimates

presented for all multivariate models. Effect sizes ranged from small to medium (Cohen, 1988).

3.3.1. Univariate Models

Univariate models fit the data well (i.e., CFI = .95–1.00; RMSEAs = .02–.08)⁵ apart from enhancement- and intimacy- sex motive models for all outcomes other than alcohol-related problems (i.e., CFI = .98, RMSEAs = .09–.11). Intimacy-motive models exhibited good fit when partner type was removed from the model (i.e., CFI > .98, RMSEAs < .07), though enhancement-motive models worsened with removal of covariates.⁵

3.3.2. Multivariate Models Predicting Alcohol-related Outcomes

Models using all motives to predict alcohol consumption and related consequences exhibited good fit (i.e., CFI = .96, RMSEAs = .05). Enhancement sex motives were positively associated with consumption and alcohol-related consequences, whereas intimacy motives were negatively associated with both. Intimacy motives were also negatively associated with alcohol use prior to sex. Positive-reinforcement drinking motives were predictive of alcohol use as well as alcohol use prior to sex, whereas negative-reinforcement drinking motives were predictive of alcohol-related problems. Effect sizes were small to large. Partner type was significantly associated with all three drinking outcomes, and age was positively associated with all but heavy episodic drinking.

3.3.3. Multivariate Models Predicting Sex-related Outcomes

All models predicting sex-related outcomes exhibited identical good

⁵ To achieve a positive definite covariance matrix, the residual variance for enhancement drinking motives were set to 0 in univariate models in which positive drinking motives predict heavy episodic drinking and alcohol-related consequences. Variance for coping sex motives were set to 1 in univariate models in which self-focused sex motives predicted number of vaginal partners, number of oral partners, and emergency contraceptive use. Variance for conformity drinking motives was also set to 1 in univariate models of negative drinking motives predicting number of vaginal partners, number of anal partners, and alcohol use before sex.

⁶ Despite this substandard fit, we retained all covariates in univariate enhancement and intimacy models to be consistent with other models tested.

Table 2
Correlations between Motives, Outcomes, and Covariates.

	P(D)	N(D)	E(S)	I(S)	S-F(S)	O-F(S)	#VAG	#ORAL	#ANAL	Contra	Alc-Sex	HED	YAAPST	Age	Partner
Positive (D)	1.00														
Negative (D)	.70**	1.00													
Enhance (S)	.36**	.17**	1.00												
Intimacy (S)	.11*	.02	.54**	1.00											
Self (S)	.28**	.64**	.41**	.17**	1.00										
Other (S)	.23**	.64**	.05	.03	.81**	1.00									
# Vaginal	.27**	.15**	.36**	.04	.18**	.09	1.00								
# Oral	.29**	.17**	.31**	.03	.21**	.08	.67**	1.00							
# Anal	.07	.08	.35**	.11	.21**	.10	.40**	.35**	1.00						
Contraceptive	.18**	.11	.26**	.16*	.08	.04	.32**	.17**	.32**	1.00					
Alcohol-Sex	.39**	.32**	.21**	-.05	.19**	.15**	.37**	.34**	.09	.17**	1.00				
HED	.47**	.41**	.21**	-.09	.19**	.22**	.33**	.37**	.17*	.17**	.49**	1.00			
YAAPST	.52**	.63**	.28**	.00	.35**	.34**	.26**	.31**	.15*	.25**	.42**	.50**	1.00		
Age	.03	.05	.05	.13	.05	.03	.24**	.10*	.17**	.18**	.15**	.06	.17**	1.00	
Partner	.18**	.19**	-.15*	-.41**	.12	.17*	.08	.17**	.04	-.05	.16**	.25**	.18*	-.10	1.00
Sexual Orient	-.15*	-.13	.03	.13*	.05	.03	-.08	-.06	-.05	-.10	.00	-.09	-.05	.02	.08

Note: * $p < .05$, ** $p < .01$. D = drinking motives; S = sex motives; Positive (P) = positive-reinforcement motives; Negative (N) = negative-reinforcement motives; E = enhancement; I = intimacy; S-F = self-focused; O-F = other-focused; # Vaginal = number of lifetime vaginal partners; # Oral = number of lifetime oral partners; # Anal = number of lifetime anal partners; Contraceptive = lifetime emergency contraceptive use; Alcohol-Sex = alcohol use prior to sex; HED = heavy episodic drinking; YAAPST = Young Adult Alcohol Problems Screening Test – past year subscale; Partner = partner type (dichotomous; casual coded '1'); Sexual Orient = self-reported sexual orientation (dichotomous; heterosexual coded '0'). Pearson product-moment correlations reported for continuous variables (i.e., motives, number of vaginal and oral partners, alcohol prior to sex YAAPST). Polyserial correlations reported for ordinal-continuous correlations (e.g., HED and continuous variables). Biserial correlations reported for binary-continuous relations (e.g., partner type, sexual orientation, anal partners, and contraceptive use and continuous variables). Polychoric correlations are reported for ordinal-binary relations (i.e., HED and partner type, sexual orientation, anal partners, and contraceptive use). Tetrachoric correlations reported for binary-binary relations (e.g., anal partners, emergency contraceptive use, partner type, and sexual orientation). Standardized correlation coefficients. Variance reported on the diagonal.

Table 3
Standardized Beta Coefficients for Models Predicting Alcohol-Related Outcomes.

Models	HED		YAAPST		Alcohol Prior to Sex	
	UV	MV	UV	MV	UV	MV
Sex Motives						
Enhancement.	.23**	.34*	.28**	.42**	.22**	.23*
Intimacy	-.03	-.21**	.03	-.15*	-.03	-.18**
Self-focused	.16**	-.37	.35**	-.44	.17**	-.07
Other-focused	.18**	.29	.35**	.22	.13*	.08
Drinking Motives						
Positive	.44**	.25	.48**	-.11	.38**	.26*
Negative	.37**	.21	.62**	.76**	.29**	.08
Covariates						
Age	-	.07	-	.18**	-	.16**
Partner type	-	-.07	-	-.04	-	-.01
Orientation	-	.20**	-	.16**	-	.14**

Note. * $p < .05$, ** $p < .01$; HED = Heavy episodic drinking, YAAPST-PY = Young Adult Alcohol Problems Screening Test – past-year problems; UV = univariate model; MV = multivariate model; Positive = positive-reinforcement motives; Negative = negative-reinforcement motives; Orientation = sexual orientation (heterosexual coded '0'); Partner = partner type (casual coded '1'). All tested models maintained simple structure. Univariate estimates represent the change in standard deviation for every one standard deviation increase in motives score, holding constant age, partner type, and sexual orientation. Multivariate coefficients are similarly interpreted, except these estimates are also adjusted for all other motive types.

fit (i.e., CFIs = .96, RMSEAs = .05). Sexual enhancement motives were significantly related to lifetime number of vaginal partners and emergency contraceptive use. Intimacy motives were negatively associated with number of vaginal and oral sex partners. Positive-reinforcement drinking motives were also predictive of number of oral sex partners. Age was positively associated with all sex outcomes, though partner type was only associated with number of oral sex partners.

4. Discussion

This study is the first, to our knowledge, to simultaneously examine the role of drinking and sex motives on multiple risky sex- and alcohol-related outcomes. Importantly, our results demonstrated that

differential relations between motives and outcomes emerge across univariate and multivariate analyses, suggesting the presumed relevance of motives to outcomes associated with alcohol use and risky sex may vary across contexts. Our results highlight the predictive utility of examining cross-domain motives, particularly sex motives on heavy episodic drinking and associated negative consequences.

Consistent with previous research, positive-reinforcement drinking motives were more predictive of alcohol consumption, whereas negative-reinforcement motives were more closely associated with alcohol-related problems (e.g., Carey and Correia, 1997; Kuntsche et al., 2005). Self-focused sex motives (including coping) were significantly related to lifetime number of sexual partners in univariate models as found by Gebhardt et al. (2003). However, self-focused sex motives were not significant predictors of number of vaginal, oral, or anal sex partners when adjusting for other motives.

Our analyses indicate that considering motives in a multivariate context may unmask key relations between motives and behaviors. For example, suppressor effects (i.e., an increase in the predictive ability of a variable when including additional covariates; Conger, 1974) were exhibited regarding intimacy sex motives. That is, intimacy motives were positively associated with number of anal sex partners and emergency contraception use, but no other outcome, in univariate analyses. However, after adjusting for other sex motives and drinking motives, intimacy motives emerged as a significant negative predictor of lifetime number of vaginal and oral sex partners and alcohol outcomes, which is consistent with previous research (Gebhardt et al., 2003).

When considered simultaneously, certain sex motives may provide more predictive utility for alcohol-related problems than drinking motives. For example, in multivariate models, enhancement sex motives were more predictive of alcohol consumption and consequences than negative- and positive-reinforcement drinking motives, respectively. These findings are consistent with previous research indicating that sex motives influence drinking behavior, such as enhancement sex motives predicting sexual activities via alcohol consumption (Dvorak et al., 2016; Pedersen et al., 2009; Talley et al., 2017). These findings also reinforce the value of examining sex-related alcohol expectancies to advance understanding of risky behavior (e.g., Fromme et al., 1993).

Our findings indicated that positive-reinforcement drinking motives (i.e., enhancement and social) predicted lifetime number of oral sex

Table 4
Standardized Beta Coefficients for Models Predicting Sex-Related Outcomes.

Models	#LT Vaginal Sex Partners		# LT Oral Sex Partners		#LT Anal Sex Partners		LT Emergency Contraception	
	UV	MV	UV	MV	UV	MV	UV	MV
Sex Motives								
Enhancement	.36**	.42**	.32**	.23	.35**	.46**	.25**	.28
Intimacy	.04	-.21**	.07	-.13*	.10	-.21	.13*	.00
Self-focused	.17**	-.02	.19**	.22	.20**	-.03	.08	-.18
Other-focused	.07	.11	.06	-.07	.08	.10	.03	.13
Drinking Motives								
Positive	.25**	.19	.27**	.28*	.06	-.13	.18**	.07
Negative	.12*	-.13	.14**	-.18	.06	.02	.09	.03
Covariates								
Age	-	.25**	-	.11*	-	.18**	-	.18**
Partner Type	-	.09	-	.14**	-	.05	-	-.02
Orientation	-	-.06	-	-.04	-	-.05	-	-.07

Note: * $p < .05$, ** $p < .01$; LT = lifetime; UV = univariate model; MV = multivariate model; Positive = positive-reinforcement motives; Negative = negative-reinforcement motives; Orientation = sexual orientation (heterosexual coded '0'); Partner = partner type (casual coded '1'). All tested models maintained simple structure. Univariate estimates represent the change in standard deviation for every one standard deviation increase in motives score, holding constant age, partner type, and sexual orientation. Multivariate coefficients are similarly interpreted, except these estimates are also adjusted for all other motive types.

partners and alcohol consumption prior to sex, even after adjusting for sex motives among female students. In the college milieu, drinking and sexual opportunities are often intertwined, and individuals who drink alcohol “because it’s fun” (enhancement motive) or “because it helps you enjoy a party” (social motive) may be more likely to engage in casual sex acts, particularly oral sex. For example, among a large sample of college students ($N = 2147$), Chambers (2007) found young adults engaged in oral sex more frequently than vaginal intercourse, viewed oral sex as less intimate than intercourse, and cited pleasure as the most common reason for engaging in oral sex (Chambers, 2007). Thus, college-attending females with high levels of positive-reinforcement drinking motives, who are motivated to use alcohol to facilitate sexual activity, may choose to drink on occasions when they have greater desire for sex (e.g., Cooper, 2002; Dvorak et al., 2016). Further, our data indicated that those with casual partners had significantly higher numbers of oral sex partners, frequency of alcohol consumption prior to sex, heavy episodic drinking, and alcohol-related consequences compared to those in steady partnerships, and this is consistent with some previous work (e.g., Cooper and Orcutt, 2000). Age was positively associated with all outcomes (besides heavy episodic drinking), which may be a function of time or development period (i.e., emerging adulthood; Arnett, 2000).

The current findings highlight the importance of examining cross-domain motives in research and in clinical settings when aiming to decrease risky sex and alcohol misuse among emerging-adult female individuals. Although targeting domain-specific motivations for sex-related behaviors (Sanderson and Cantor, 1995) and problematic alcohol use (Conrod et al., 2011) has been recommended, targeting overarching motivations for drinking and sex by providing individuals with adaptive emotion regulation strategies may yield more effective prevention and intervention efforts. Indeed, the overlap between sex and drinking motives in the current study (e.g., negative-reinforcement drinking motives and self- and other-focused sex motives r 's = .63–.65; positive-reinforcement drinking motives and enhancement sex motives $r = .39$) provides evidence that overarching motivational systems may drive risky behavior across domains, which suggests that transdiagnostic approaches may be beneficial.

Although this study provides novel contributions to the literature, limitations exist. For example, the dichotomization of exclusively heterosexual versus other orientations is not ideal. Several limitations regarding measurement exist, including only assessing frequency of alcohol use prior to sex and not quantity or perceived level of intoxication. Another potential limitation was the variability in outcome time frames. Regarding use of the AUDIT to measure heavy drinking, this item asks about consuming 6 or more drinks on one

occasion, rather than using the accepted definition of binge drinking for females (4+ drinks in 2 hours for females; National Institute of Alcohol Abuse and Alcoholism, 2004). We also did not include the past-year time frame typically used on the AUDIT.

Available data precluded analysis of past-year sexual outcomes; however, considering the average participant age (19.97 years) is close to the average age of initial sexual interaction for females (i.e., 17 years; Center for Disease Control and Prevention, 2015), as well as the low endorsement of past-month outcomes, we maintain that lifetime sexual outcomes were more comparable to past-year alcohol-related problems than past-month sexual outcomes. An important limitation is the cross-sectional nature of this data, which makes distal predictors of specific outcomes difficult to elucidate. Further, the exploratory nature of our analyses resulted in multiple examinations; however, post-hoc binomial probability calculation indicated that, assuming an alpha of .05, the probability of finding 50 significant effects or more out of 105 tests is less than .000001. Finally, the retrospective nature of this data may introduce memory bias, and future work should aim to use longitudinal, timeline follow-back, or ecological momentary assessment when possible.

Researchers are encouraged to explore drinking and sex motives via mixture analysis to determine whether individuals with certain motive-based profiles are likely to engage in risky health behaviors. For example, it is possible that individuals who endorse higher negative-reinforcement drinking and sex motives who are also lower in intimacy sex motives engage in riskier behaviors (e.g., heavy episodic drinking and subsequent unprotected sexual encounters with casual partners). Future work could incorporate relevant personality features within models that simultaneously consider alcohol- and sex-related motives. For example, associations between positive urgency (i.e., the tendency to act rashly when in a positive mood; Cyders and Smith, 2007) and risky alcohol- or sex-related outcomes may be mediated by specific sex motives, drinking motives, or both (e.g., enhancement; see Cooper et al., 2000). Further examination of the impact of relationship status on motive-outcome relations is warranted. Given research indicating some college students endorse multiple motives for risky behaviors, the importance of considering motivations for alcohol- and sex-related behaviors in future work cannot be overstated (e.g., Cooper et al., 1998).

In sum, this study simultaneously examined the role of sex and drinking motives on behavioral outcomes across both domains among female college students. These findings highlight the importance of assessing sex motives to obtain a more complete understanding of alcohol consumption and related problems from a motivational framework. Our cross-domain motivational findings suggest potential utility

of a transdiagnostic approach in the prevention of risky drinking- and sex-related outcomes.

Funding source

Nothing declared.

Contributors

BEB and ISA conceptualized the study design. BEB, AKS, and ISA conducted the literature review. BEB, AKS, and AKL conducted the analyses. AKL, AET, and JLB collected the data and provided critical revisions. All authors approve the final manuscript.

Conflict of interest

None.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.drugalcdep.2017.11.039>.

References

- Arnett, J.J., 2000. Emerging adulthood: a theory of development from the late teens through the twenties. *Am. J. Psychol.* 55, 469–480.
- Babor, T.F., Higgins-Biddle, J.C., Saunders, J.B., Monteiro, M.G., 2001. AUDIT: The Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care, 2nd ed. World Health Organization, Geneva.
- Brown, J.L., Vanable, P.A., 2007. Alcohol use partner type, and risky sexual behavior among college students: findings from an event-level study. *Addict. Behav.* 32, 2940–2952.
- Caldeira, K.M., Arria, A.M., O'Grady, K.E., Zarate, E.M., Vincent, K.B., Wish, E.D., 2009. Prospective associations between alcohol and drug consumption and risky sex among female college students. *J. Alcohol Drug Educ.* 53, 71–92.
- Carey, K.B., Correia, C.J., 1997. Drinking motives predict alcohol-related problems in college students. *J. Stud. Alcohol* 58, 100–105.
- Center for Disease Control and Prevention, 2015. Key Statistics from the National Survey of Family Growth. Centers for Disease Control and Prevention, Atlanta.
- Chambers, W.C., 2007. Oral sex: varied behaviors and perceptions in a college population. *J. Sex Res.* 44, 28–42.
- Cohen, J., 1988. *Statistical Power Analysis for the Behavioral Sciences*, 2nd ed. Erlbaum, New Jersey.
- Conger, A.J., 1974. A revised definition for suppressor variables: a guide to their identification and interpretation. *Educ. Psychol. Meas.* 34, 35–46.
- Conrod, P.J., Castellanos-Ryan, N., Mackie, C., 2011. Long-term effects of a personality-targeted intervention to reduce alcohol use in adolescents. *J. Consult. Clin. Psychol.* 79, 296–306.
- Cooper, M.L., Orcutt, H.K., 2000. Alcohol use: condom use and partner type among heterosexual adolescents and young adults. *J. Stud. Alcohol* 61, 413–419.
- Cooper, M., Shapiro, C.M., Powers, A.M., 1998. Motivations for sex and risky sexual behavior among adolescents and young adults: a functional perspective. *J. Pers. Soc. Psychol.* 75, 1528–1558.
- Cooper, M.L., Agocha, V.B., Sheldon, M.S., 2000. A motivational perspective on risky behaviors: the role of personality and affect regulatory processes. *J. Pers.* 68, 1059–1088.
- Cooper, M.L., Barber, L.L., Zhaoyang, R., Talley, A.E., 2011. Motivational pursuits in the context of human sexual relationships. *J. Pers.* 79, 1333–1368.
- Cooper, M.L., Kuntsche, E., Levitt, A., Barber, L.L., Wolf, S., 2016. Motivational models of substance use: a review of theory and research on motives for using alcohol, marijuana, and tobacco. In: Sher, K. (Ed.), *The Oxford Handbook of Substance Use and Substance Use Disorders Volume One*. Oxford University Press, New York, pp. 375–421.
- Cooper, M.L., 1994. Motivations for alcohol use among adolescents: development and validation of a four-factor model. *Psychol. Assess.* 6, 117–128.
- Cooper, M.L., 2002. Alcohol use and risky sexual behavior among college students and youth: evaluating the evidence. *J. Stud. Alcohol. Suppl.* 14, 101–117.
- Cox, W.M., Klinger, E., 1988. A motivational model of alcohol use. *J. Abnorm. Psychol.* 97, 168–180.
- Cox, W.M., Klinger, E., 1990. Incentive motivation, affective change, and alcohol use: a model. In: Cox, W.M. (Ed.), *Why People Drink: Parameters of Alcohol as a Reinforcer*. Gardner Press, New York, pp. 291–314.
- Cyders, M.A., Smith, G.T., 2007. Mood-based rash action and its components: positive and negative urgency. *Pers. Individ. Differ.* 43, 839–850.
- Dvorak, R.D., Kuvaas, N.J., Kilwein, T.M., Wray, T.B., Stevenson, B.L., Sargent, E.M., 2016. Are drinking motives associated with sexual hookups among college student drinkers? *J. Am. Coll. Health* 64, 133–138.
- Farber, P.D., Khavari, K.A., Douglass, F.M., 1980. A factor analytic study of reasons for drinking: empirical validation of positive and negative reinforcement dimensions. *J. Consult. Clin. Psychol.* 48, 780–781.
- Fielder, R.L., Carey, M.P., 2010. Predictors and consequences of sexual hookups among college students: a short-term prospective study. *Arch. Sex. Behav.* 39, 1105–1119.
- Fromme, K., Stroot, E., Kaplan, D., 1993. Comprehensive effects of alcohol: development and psychometric assessment of a new expectancy questionnaire. *Psychol. Assess.* 5, 19–26.
- Gebhardt, W.A., Kuyper, L., Greunsven, G., 2003. Need for intimacy in relationships and motives for sex as determinants of adolescent condom use. *J. Adolesc. Health* 33, 154–164.
- Grossbard, J.R., Lee, C.M., Neighbors, C., Hendershot, C.S., Larimer, M.E., 2007. Alcohol and risky sex in athletes and nonathletes: what roles do sex motives play? *J. Stud. Alcohol Drugs* 68, 566–574.
- Hu, L.T., Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct. Equ. Model.* 6, 1–55.
- Hurlburt, S.C., Sher, K.J., 1992. Assessing alcohol problems in college students. *J. Am. Coll. Health* 41, 49–58.
- Johnston, L.D., Bachman, J.G., O'Malley, P.M., Schulenberg, J.E., Miech, R.A., 2016. *Monitoring the Future: A Continuing Study of American Youth (12th-grade Survey)*, 2014. Inter-University Consortium for Political and Social Research, Ann Arbor.
- Kristjansson, S.D., Agrawal, A., Littlefield, A.K., Pergadia, M.L., Lessov-Schlaggar, C.N., Sartor, C.E., Bucholz, K.K., Madden, P.A., Cooper, M.L., Sher, K.J., Heath, A.C., 2011. Drinking motives in female smokers: factor structure alcohol dependence, and genetic influences. *Alcohol Clin. Exp. Res.* 35, 345–354.
- Kuntsche, E., Knibbe, R., Gmel, G., Engels, R., 2005. Why do young people drink? A review of drinking motives. *Clin. Psychol. Rev.* 25, 841–861.
- Kuntsche, E., Gabbai, S.N., Roberts, C., Windlin, B., Vieno, A., Bendtsen, P., Hublet, A., Tynjala, J., Valimaa, R., Dankulinova, Z., Aasvee, K., Demetrovics, Z., Farkas, J., van der Sluis, W., de Matos, M.G., Mazur, J., Wicki, M., Aasvee, 2014. Drinking motives and links to alcohol use in 13 European countries. *J. Stud. Alcohol Drugs* 75, 428–437.
- Muthén, L.K., Muthén, B.O., 1998–2012. *Mplus User's Guide*. Seventh Ed. Los Angeles, CA: Muthén and Muthén.
- National Institute of Alcohol Abuse and Alcoholism, 2004. Council Approve Definition of Binge Drinking. National Institute of Alcohol Abuse and Alcoholism Winter Newsletter., pp. 1–3.
- Nolen-Hoeksema, S., 2004. Gender differences in risk factors and consequences for alcohol use and problems. *Clin. Psychol. Rev.* 24, 981–1010.
- Norberg, M.M., Olivier, J., Alperstein, D.M., Zvolensky, M.J., Norton, A.R., 2011. Adverse consequences of student drinking: the role of sex social anxiety, drinking motives. *Addict. Behav.* 36, 821–828.
- Owen, J., Quirk, K., Fincham, F., 2014. Toward a more complete understanding of reactions to hooking up among college women. *J. Sex. Marital Ther.* 40, 396–409.
- Pedersen, E.R., LaBrie, J.W., Kilmer, J.R., 2009. Before you slip into the night: you'll want something to drink: exploring the reasons for prepartying behavior among college student drinkers. *Issues Ment. Health Nurs.* 30, 354–363.
- Perkins, H.W., 2002. Surveying the damage: a review of research on consequences of alcohol misuse in college populations. *J. Stud. Alcohol Suppl.* 14, 91–100.
- Read, J.P., Wood, M.D., Kahler, C.W., Maddock, J.E., Palfai, T.P., 2003. Examining the role of drinking motives in college student alcohol use and problems. *Psychol. Addict. Behav.* 17, 13–23.
- Sanderson, C.A., Cantor, N., 1995. Social dating goals in late adolescence: implications for safer sexual activity. *J. Pers. Soc. Psychol.* 68, 1121–1134.
- Talley, A.E., Cook, M.A., Schroy, C.A., 2017. Motivations and experiences related to women's first same-sex sexual encounters. *Psychol. Sex* 8, 132–147.