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Reducing sexual risk behaviors: secondary analyses from a randomized controlled trial of a brief web-based alcohol intervention for underage, heavy episodic drinking college women

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Abstract

Background—Alcohol use and sexual risk behaviors (SRBs) are significant problems on college campuses. College women are at particularly high risk for negative consequences associated with sexually transmitted infections (STIs) and unwanted pregnancy.

Methods—The current study ($n = 160$) examined the effect of a brief, web-based alcohol intervention ($n = 53$) for college women on reducing SRBs compared to an assessment only control ($n = 107$) with a randomized controlled trial. Outcome measures included condom use assertiveness and number of vaginal sex partners and data were collected at baseline and three-month follow-up.

Results—Regression analyses revealed that the alcohol intervention was associated with higher levels of condom use assertiveness at a three-month follow-up. Additionally, more alcohol use was associated with less condom use assertiveness for those with more significant sexual assault histories.

Conclusions—These findings suggest that alcohol interventions may impact college women's beliefs but not behavior, and future interventions should more explicitly target both alcohol and sexual risk to decrease risky behaviors.

Keywords

Web-based intervention; sexual risk behaviors; college; women; heavy episodic drinking

Introduction

Heavy episodic drinking (HED; four drinks or more in 2 h or fewer for women; NIAAA 2004) and related consequences are a significant problem on college campuses in this country (Wechsler et al. 1994; O'Malley & Johnston 2002). It is estimated that

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approximately 40% of college students engage in HED (Mitka 2009). An extensive body of research has demonstrated that HED on college campuses is associated with negative outcomes, including damage to self (e.g. academic impairment, personal injury) and others (e.g. interpersonal violence, sexual violence; Perkins 2002). HED also accounts for significant economic and social burden to the US including health care and judicial costs (CDC 2014). There is a need for brief alcohol interventions for college students that can impact drinking behavior as well as related risk behaviors across different domains of functioning.

Sexual risk behavior (SRB) is prevalent on college campuses. SRB is any behavior that increases the probability of negative consequences associated with sexual activity, including both risk for sexually transmitted infections (STIs) and unwanted pregnancy. The majority of college students have a lifetime history of multiple sexual partners (Cooper 2002), thereby increasing their risk of contracting STIs. The rates of STIs including chlamydia, gonorrhea, and syphilis are increasing and individuals under the age of 25 account for half of new STIs (CDC 2015). The negative consequences of SRB disproportionately affect young women, including the possibility of unintended pregnancy, infertility, and cervical cancer. A recent study found that only approximately 40% of college students always used a condom during vaginal sex (Buhi et al. 2010). College women also reported higher rates of STIs and higher rates of pregnancy versus men reporting getting a partner pregnant across all studies reviewed (Cooper 2002).

Alcohol use and sexual risk behaviors

Alcohol use during emerging adulthood often occurs with SRBs (Abma et al. 2010; Cho & Span 2010). Alcohol use can interfere with sexual decision-making, leading to higher rates of SRBs (e.g. Cooper 2002; Klanecky & McChargue 2012; Rehm et al. 2012). Alcohol consumption has been shown to relate to engaging in SRB in heavy drinking college students (Scott-Sheldon et al. 2010). Alcohol myopia theory (Steele & Josephs 1990) suggests that alcohol consumption results in cognitive impairment and attention narrowing to salient cues. For example, in a sexual situation, the salient cues might be sexual arousal and the distal cues might be negative consequences associated with SRB. According to this theory, alcohol use would narrow one's attention to only the salient cues, increasingly at higher levels of intoxication. Alcohol administration studies have revealed this effect on SRBs such that attention to impelling cues when intoxicated led to greater sexual risk taking intentions (Davis et al. 2007). Therefore, an intervention targeting alcohol use among college students might be an effective way to reduce SRBs.

Due to the increased negative consequences of SRB for women and the high rates of both alcohol use and sexual risk in college samples, the current study focuses on reducing SRBs among college women. There are also differences in alcohol use across college age groups, and first year college students are at particular risk for increased drinking at college entrance (Hartzler & Fromme 2003; Borsari et al. 2007). As such, the present investigation focused on 18–20 year old college women. Additionally, partner type has been shown to influence the effect of alcohol consumption on SRB for college students, such that alcohol consumption was related to riskier behavior for those engaging in a sexual encounter with a

non-steady partner whereas it was unrelated for those engaging in a sexual encounter with a steady partner (Brown & Vanable 2007). Therefore, as a secondary aim the present study examined college women who are not in a relationship.

Sexual assault history, heavy episodic drinking, and sexual risk behaviors

One important factor to consider when examining HED and SRBs among women is sexual assault history, which can include childhood sexual abuse (CSA), adolescent/adult sexual assault (ASA), or both. Women with a sexual assault history have higher numbers of sexual partners than those without sexual assault histories and engage in more SRBs (e.g. Brener et al. 1999). Women with a sexual assault history are more likely to engage in SRBs compared to those without a sexual assault history (e.g. Stoner et al. 2007, 2008; Schacht et al. 2010; George et al. 2014). Further, women with a sexual assault history are more likely to engage in HED (e.g. Gidycz et al. 2007; Najdowski & Ullman 2009), thus increasing risk of engaging in SRBs. Therefore, when examining SRBs in the context of intervention effects, it is essential to examine the synergistic effects of sexual assault and alcohol use on SRBs and to control for the effects of CSA.

Brief interventions for alcohol use

Web-based, brief interventions for reducing alcohol use have been developed and widely studied in college populations (e.g. Cronce & Larimer, 2011; Donovan et al. 2014). These brief interventions typically include personalized normative feedback aimed at correcting misperceptions regarding peer drinking norms. They also include psychoeducation on alcohol, psychoeducation regarding alcohol's effects on thoughts, feelings and behavior, and provide potential strategies to reduce drinking. These interventions use motivational interviewing language to increase efficacy. Compared to face-to-face interventions, web-based interventions can be widely disseminated on college campuses at relatively easily and with a minimal financial burden. Two studies have examined the effectiveness of these brief alcohol interventions on SRB in the contexts of larger randomized clinical trials including interventions targeting SRBs (Dermen & Thomas 2011; Lewis et al. 2014). Both of these studies found that alcohol interventions for college students were not effective at reducing SRBs, perhaps because they targeted individuals who were at high risk for SRB. The first-mentioned study recruited participants who not only were heavy drinkers but who also had significant sexual risk (Dermen & Thomas 2011). The second study did not require significant sexual risk, but did require participants to have engaged in sex in the past year (Lewis et al. 2014). Therefore, it is unclear whether individuals who are at high risk due to factors associated with SRB (i.e. engaging in HED) but have not, or not yet, engaged in SRBs at high levels would benefit from an alcohol intervention.

Previous studies have not examined potential moderating factors by which an alcohol only intervention might be effective at reducing SRBs. It may be difficult to intervene with women who already engage in high levels of SRBs using an alcohol only intervention, as a targeted sexual risk intervention may be needed. However, due to the association between alcohol use and SRBs, it may be possible for an alcohol intervention to be effective at reducing SRBs for women who engage in HED that do not engage in elevated rates of SRBs.

Further, alcohol interventions are not always effective for women (Chang 2002) and it is important to understand if there are moderating factors (e.g. behaviors and experiences prior to participating in the intervention) that underlie these inconsistent findings for women.

While several brief alcohol interventions for college students are effective, most rely on in-person administration which is time and cost intensive. Previous interventions included individually delivered feedback and skills (BASICS; Dimeff 1999), a parent implemented prevention program for teens before entering college (Turrise et al. 2001, 2006), a combination of these two approaches (Turrise et al. 2009), and an in person motivational interviewing based intervention (Dermen & Thomas 2011). Consistent with Lewis and colleagues' intervention (2014), the present intervention is entirely web-based, presenting a less resource intensive approach to intervention that could be easily disseminated.

Current study

The current study examines the effectiveness of a brief, web-based intervention targeting alcohol use among college women under the age of 21 who engage in HED as a secondary data analysis from a larger randomized controlled trial (Gilmore et al. 2015). It was hypothesized that participants in the alcohol intervention will report less SRBs (i.e. less male vaginal sex partners and more condom use assertiveness) at a three-month follow-up compared to the assessment only control condition. The current study also extends previous examinations of alcohol interventions on SRBs which did not control for either CSA history or adolescent/ ASA history (Dermen & Thomas 2011; Lewis et al. 2014) by not only controlling for this CSA but also by examining the interaction between adolescent/ASA history and drinking within the same model of the main effects, thereby controlling for these effects. It is hypothesized that women with a sexual assault history (both CSA and ASA) and who engage in more frequent HED prior to the intervention will show higher levels of SRBs at follow-up despite condition. Finally, an exploratory aim examined these associations among women who reported not being in a relationship due because those women may be at higher risk of SRBs.

Method

Participants

A total of 674 college women recruited for a larger study about 'drinking and sexual behaviors' from introductory psychology courses completed a screening survey for eligibility criteria (Gilmore et al. 2015). Of those, 264 (39.2%) were enrolled in the larger study and met the following eligibility criteria: 18-to 20- year old females who reported drinking four drinks over a 2-h period at least once in the previous 30 days.

The current study presents findings from subgroups of interest from the larger study. Specifically, the final sample for the current study included 160 participants to include those in the alcohol intervention condition ($n = 53$) or the assessment only control conditions ($n = 107$). Participants in other intervention conditions as part of the larger study (Gilmore et al. 2015) were excluded. The majority of participants identified as White (57.9%) and the remainder identified as Asian American/Pacific Islander (23.3%), multiracial (11.9%),

Black/African American (3.1%), other ethnicity/race (2.5%), or Native American (.6%)¹. The majority of participants were freshmen (66.3%) and were not members of a sorority (60.6%). Descriptive information pertaining to study variables can be found in Table 1.

Measures

Number of male vaginal sex partners—This construct was measured with a single question: ‘What is the number of male partners you have had vaginal intercourse with in the past three months?’ Participants indicated number of partners both at baseline and in the three-month follow-up. Because this variable was highly skewed (5.5) and kurtosis (44.8), it was square root transformed, with the resulting values of skew and kurtosis within acceptable limits (1.3 and 5.5, respectively).

Condom use assertiveness—Condom use assertiveness was assessed using the Pregnancy-STD Prevention subscale of the Sexual Assertiveness Survey (Morokoff et al. 1997). A sum of six items from this subscale assessed how assertive the individual is, with higher scores was created to indicate condom use assertiveness assertiveness (*1 = Never [0% of the time], 5 = Always [100% of the time]*). A sample item includes ‘I insist on using a condom or latex barrier if I want to, even if my partner doesn’t like them.’ Reliability for this subscale was good (0.9).

Heavy episodic drinking—HED frequency was assessed with a single question: ‘How often did you have four or more drinks containing any kind of alcohol within a 2 h period’. This information was assessed ‘in the past month’ at baseline and ‘in the past three months’ at follow-up. Answer choices ranged from 0 times in the past month to everyday (*0 = 0 times in the past month; 1 = once in the past month; 2 = 2–3 times in the past month; 3 = once a week; 4 = twice a week; 5 = 3–4 times a week; 6 = 5–6 times a week; 7 = everyday*).

Childhood sexual abuse—The revised CSA questionnaire (Finkelhor 1979) assessed sexual abuse perpetrated by someone who was five years or older than them or by someone who was of a similar age prior to their 14th birthday. The first was assessed by asking participants whether ‘anyone who was at least five years older than you touch or fondle your body in a sexual way or make you touch or fondle their body in a sexual way’. The second was assessed by asking participants whether ‘anyone close to your age touch sexual parts of your body or make you touch sexual parts of their body against your will or without your consent’. Participants were dichotomously categorized into having a CSA history (1) or not (0).

Adolescent/adult sexual assault severity—Using the sexual experiences survey (see Koss et al. 2007), participants indicated whether they experienced coerced sexual experiences at two time points: after their 14th birthday but before college and after entering college. For analyses, baseline experiences were combined. This behaviorally specific assessment tool assesses for experiences perpetrated by verbal coercion, incapacitation,

¹Because there were no differences between participants of different race/ ethnicities on either of the study outcomes (*p*’s NS within ANOVA), and because of the small number of participants who comprised many of these racial groups in the current study, race was not used a predictor in analyses that follow.

threats of physical force, and physical force. Sexual assault experiences include instances of sexual contact, completed penetration, and attempted penetration. Participants indicated the number of times that a tactic(s) was used for each of the experiences (0 times, 1 time, 2 times, or 3 times or more times). A 63-point scale (Davis et al. 2014) was used to determine sexual assault severity, wherein high scores indicate more severe sexual assault experiences and zeros indicate no sexual assault experiences. This scoring procedure is comprehensive through taking into account both the frequency and severity of participants' experiences as suggested by Davis et al. (2014) by multiplying a severity score by number of times each has been experienced. This item was highly skewed (2.2), but after a square root transformation, this score's skew was within acceptable limits (1.6).

Study conditions

Alcohol condition—A previously developed and empirically tested web-based personalized feedback intervention using gender specific feedback was used as the alcohol use reduction program in the current study (Neighbors et al. 2010). Psychoeducation on alcohol that included definitions of a standard drink, explanation of alcohol expectancies and alcohol myopia, gender differences in blood alcohol content, and personalized information about blood alcohol content and associated risks was included in this web-based program. This condition also provided participants with personalized feedback about drinking protective behavioral strategies and alcohol-related negative consequences. Based on tenets of the social norms approach, participants were given feedback regarding their drinking behavior compared to actual drinking norms at their university and their perceived drinking norms in order to correct misperceptions about normative drinking behavior.

Assessment condition—The assessment condition for the current study included two assessment only conditions from the larger study (i.e. full assessment and minimal assessment). Participants received no feedback for either of these conditions. A minimal assessment was included to account for changes that might occur due to an extensive assessment of alcohol use behaviors. These control conditions were combined because there were no differences on main outcomes. Therefore, the control groups represent two-thirds of the sample in the study.

In the current study, a dummy code was used to compare those in the assessment condition (1) to those in the alcohol condition (0).

Procedure—Before data collection began, all study procedures were approved by the university's IRB. Prior to consenting to participation, interested students were provided information regarding the study online and signed consent forms were not obtained due to the online nature of the study. Participants were recruited from psychology courses and received course credit for completing the baseline screening survey online. The entire study procedures were completed online. Participants were randomly assigned stratified by sexual assault history to either a minimal assessment (20%) or a full assessment (80%) once they were deemed eligible to participate in the larger study. The percentage in each condition was to reflect the needed sample for the larger study which had five total conditions. Stratification by sexual assault history was based on either having a history of sexual assault

(including either CSA or adolescent/ASA) or not having a sexual assault history. Participants assigned to complete the full assessment were then randomly assigned (stratified by sexual assault history) to: 1) Alcohol Only Condition, 2) Full Assessment Only Control Condition, or two other intervention conditions described elsewhere but not related to the current analyses (Gilmore et al. 2015). Participants in the Alcohol Intervention condition were presented with the web-based intervention immediately following survey completion. Participants were contacted three months after completing the survey, and they were given a \$25 electronic gift card for participation in the follow-up survey. The follow-up survey was the same for all conditions and participants were included in the study analyses if they were randomized to a condition using intent-to-treat analyses.

T-test results suggest no significant differences (i.e. p not <0.1) between the assessment and alcohol only conditions on age, history of CSA, severity of adolescent/adult assault, frequency of HED, number of partners, or condom use assertiveness (i.e. all study variables) at baseline. Thus, randomization was successful.

Data analysis

To reduce nonessential multicollinearity prior to conducting regression analyses, continuous predictors were centered (Cohen et al. 2003). Missing data on endogenous variables were estimated as a function of the observed exogenous variables under the missingness at random assumption (Schafer & Graham 2002). Data analyses were conducted using MPlus Version 7 (Los Angeles, CA) (Muthén & Muthén 1998–2011). Although there is no way to test whether missing at random holds in a dataset without following-up with non-responders (Schafer & Graham 2002), it is possible to examine whether earlier values on a construct predict missingness on that same construct at the next time point (which would suggest a missing not a random pattern). Thus, we used baseline covariates and predictors in the current study to test whether those values predicted who was lost between baseline and follow-up. No covariates or predictors, with the exception of baseline condom use assertiveness were associated with missingness at follow-up. Specifically, those who reported greater condom use assertiveness at baseline were more likely to be retained at follow-up. This significant difference is a small to medium effect (*Cohen's* $d = 0.3$).

Age and history of CSA were entered as covariates in predicting both outcomes. The main and interacting effects of ASA severity history and frequency of HED prior to the intervention, as well as treatment and earlier levels of the outcomes (i.e. number of partners, condom use assertiveness) were entered as predictors. Finally, all two-way interactions (i.e. between covariates or between covariates and predictors) were also entered into the model. Any interactions that were non-significant were trimmed.

Results

Correlations

Table 2 provides the zero-order correlations for constructs included in the final study model. In terms of relations between predictors and outcomes, those who engaged in heavy episodic drinking more frequently at baseline were likely to have more partners (medium to large

positive relation) at follow-up. Individuals with more partners at baseline reported less condom use assertiveness (small to medium negative relation) and were likely to have more partners at follow-up (large positive relation). Finally, individuals who reported more condom use assertiveness at baseline were more likely to report more condom use assertiveness at follow-up (medium positive relation).

Final study model

Table 3 provides the unstandardized model results. Per the suggestion of Cameron and Trivedi (1998), the Maximum Likelihood Robust (MLR) estimator was chosen for use with this one continuous and one count outcome. Using the MLR estimator provides robust standard errors, which is particularly important when predicting one continuous outcome and one count variable outcome.

In terms of the effect of the intervention on main study outcomes, we found a significant main effect on condom use assertiveness, such that those in the alcohol intervention were more likely to report higher levels of condom use assertiveness, compared to the assessment group. However, no main effect of the intervention on number of partners was found. Additionally, baseline number of partners and baseline condom use did not interact with treatment.

In terms of covariate main effects, individuals with more partners at baseline reported more partners at follow-up, as well as less condom use assertiveness at follow-up. Greater condom use assertiveness at baseline was associated with greater condom use assertiveness at follow up. Additionally, those with a history of CSA were more likely to report higher levels of condom use assertiveness at follow-up.

Finally, in predicting condom use assertiveness at follow-up, more frequent HED was associated with less condom use assertiveness for those one standard deviation above the mean on ASA severity ($b = -0.528, p < 0.01$). For those at the mean on adolescent/ASA severity ($b = -0.010$, NS) and those one standard deviation below the mean on sexual assault severity, the effect of baseline frequency of HED on condom use assertiveness was non-significant ($b = 0.204$, NS).

Exploratory analyses

We were curious about whether study findings would hold among women who were not in committed relationships (i.e. were single). The findings including only single women generally replicated the main study findings. That is, those with more partners at baseline had more partners at follow-up ($b = 0.147, p < 0.01$). Those in the alcohol treatment group reported more condom use assertiveness than those in the assessment group ($b = -2.135, p < 0.05$) and those with CSA history were more likely to report more condom use assertiveness than those without CSA ($b = 3.217, p < 0.01$). Additionally, the interaction between ASA and alcohol use was marginally significant ($b = -0.358, p < 0.1$). For those above the mean on ASA, more drinking was marginally significantly associated with less condom use assertiveness ($b = -0.479, p < 0.1$). However, for those at the mean ($b = -0.106$, NS) and below the mean ($b = 0.170$, NS), there was no association.

Additionally, because SRB was not a requirement for study inclusion, we were curious whether these findings would hold for those with two or more partners at baseline, with most of the study findings remaining. Specifically, those with more partners at baseline had more partners at follow-up ($b = 1.031, p < 0.001$). Those in the alcohol treatment group reported more condom use assertiveness than those in the assessment group ($b = -1.566, p < 0.1$) and those with CSA history were more likely to report more condom use assertiveness than those without CSA ($b = 3.844, p < 0.001$). Additionally, the interaction between ASA and alcohol use was marginally significant ($b = -0.527, p < 0.1$). For those above the mean on ASA, more drinking was associated with less condom use assertiveness ($b = -1.088, p < 0.1$). However, for those at the mean ($b = -0.306, NS$) and below the mean ($b = 0.075, NS$), there was no association.

Discussion

The present study is the first to our knowledge to examine a brief, web-based alcohol intervention on SRBs among college women who engage in HED but who were not screened in based on their SRBs. Further, it is the first study to control for both CSA and ASA severity history when examining effects of this type of intervention. Consistent with previous research, severity of sexual assault history was positively associated with frequency of HED (e.g. Gidycz et al. 2007; Najdowski & Ullman 2009) and with increased number of sexual partners (e.g. Brener et al. 1999) at baseline. These results are consistent with previous empirical findings, and suggest that the intervention is effectively targeted a potentially high-risk group. Results suggest that the alcohol intervention was associated with higher levels of condom use assertiveness, but the alcohol intervention was unrelated to number of sexual partners, partially supporting our hypotheses. This finding is promising and indicates that brief web-based interventions targeting alcohol use may have an impact on assertiveness behaviors associated with SRB but more targeted intervention is likely needed to have an effect on the number of sexual partners.

Effects of the alcohol intervention

Brief alcohol interventions are effective at reducing alcohol use (e.g. Crouce & Larimer 2011). Due to the association between alcohol use and SRBs, several have examined the effectiveness of an alcohol intervention on SRBs (Dermen & Thomas 2011; Lewis et al. 2014). However, these interventions focused on college men and women who had engaged in SRBs (Dermen & Thomas 2011) or who had engaged in sex in the past year (Lewis et al. 2014). Both of these previous studies did not find any effects of an alcohol-only intervention on SRBs. However, this is the first known study to examine the effectiveness of an alcohol intervention SRBs among individuals who have a risk factor associated with SRBs but not SRBs directly. Results revealed that the intervention was effective compared to the assessment only control group, in that it was associated with higher condom use assertiveness at three month follow up. This is an important finding because it may be possible to target condom use assertiveness by providing skills to manage risky alcohol use.

It is important to note that the alcohol intervention was not associated with reducing number of sexual partners, a significant limitation in providing alcohol only interventions without

direct targeting of reducing SRBs. It is important to note that alcohol misuse and engagement in SRB are widespread among undergraduates (e.g. Reinisch et al. 1995) and previous research has suggested college students who engage in HED are at heightened risk for engaging in SRB (e.g. Wechsler et al. 1995). Previous research suggests that different trajectories of alcohol use exist in which some young adults consistently binge drink over the transition from high school to early college while some demonstrate a significant increase in binge drinking once they begin college (e.g. Schulenberg et al. 1996). Similarly, it is possible that different trajectories of engagement in SRB may exist, and that early college may be a critical transition point for increased engagement in SRB for many women. As such, the present brief intervention appears to be associated with condom use assertiveness, thereby perhaps indirectly affecting SRB for college women engaged in HED.

Additionally, this intervention is entirely web based, as such is less time and resource intensive than other brief alcohol interventions which rely on in person delivery of the intervention (e.g. Dimeff 1999; Turrisi et al. 2001, 2006; Dermen & Thomas 2011). This suggests that the costs of this intervention are low and there is strong potential to reach a large number of college women, and the potential benefits associated with SRB without directly targeting condom use assertiveness is meaningful. However, findings do suggest that among the higher-risk groups with regard to SRB, targeted interventions with content specific to SRB are likely necessary.

Sexual assault history severity, frequency of heavy episodic drinking, and sexual risk behaviors

A second important finding, although unrelated to the intervention, was that among women with more severe ASA severity histories, a higher frequency of HED at baseline was associated with more SRBs at follow-up. However, this relation was not found among those with less severe ASA severity histories at baseline. This suggests that perhaps not all women who engage in HED are at risk for engaging in SRB, and targeted intervention for women who engage in HED and who have a sexual assault history may be warranted. This is consistent with some experimental findings suggesting that alcohol use and sexual assault history are associated with SRB (e.g. George et al. 2014) and it is imperative for future studies examining the association between alcohol interventions and SRB to include sexual assault history as a control variable.

It was also found that CSA history was associated with more condom use assertiveness at follow-up. This finding is inconsistent with the hypotheses that sexual assault history would be associated with more SRB at follow-up. It is not possible to answer why this association exists with the current study. However, one possibility may be that individuals with CSA histories may seek out more experiences in college that allow them to learn sexual assertiveness skills due to their previous experiences. Therefore, they may have more sexual assertiveness over time. Another possibility could be that individuals with CSA histories may be more likely to have STIs and may engage in condom use assertiveness to protect others and themselves from STI transmission. These possibilities are only speculation and further research is needed to determine why individuals with CSA histories may engage in more protective behavior while in college.

Strengths, limitations, and future directions

The current study has several strengths and limitations. Its strengths include the focus on a high-risk group of underage college women who engage in HED. Further, the current study examined the effect of a brief, web-based alcohol intervention on SRBs among individuals not screened in based on SRBs, thereby increasing the generalizability of the findings to individuals who do not already engage in SRBs. Further, this is the first study to control for sexual assault history in this context. The study also has several limitations. First, the sample was only from one university and cannot be generalized to all universities. Relatedly, the sample in the current study included a convenience sample of college women enrolled in psychology courses, thereby potentially limiting the generalizability of the findings. Second, the sample only focused on women and it is unclear if the same findings would remain consistent for men. Future research should examine the effect of a brief, web-based alcohol intervention on SRBs for men and women who do not screen in based on previous SRBs for a primary prevention focus. Third, the study had a small sample size and should only be considered a preliminary examination. Future research should replicate these findings in a larger sample of college students. Finally, the baseline and follow-up assessments only included self-report measures which are limited by self-report bias.

Conclusions

The current study provides a preliminary examination of the effectiveness of an alcohol intervention on reducing SRBs among college women. It found that for those at lower risk, the intervention was effective at reducing SRBs. Due to the ease of dissemination of such a program, it could be used for primary prevention of SRBs among those who engage in HED. Further, it was found that frequency of HED only predicted later SRBs among those with more severe ASA severity histories and future research should examine the mechanisms to explain this association prospectively. Taken together, these findings suggest that a brief, web-based alcohol intervention may be effective for women at lower-risk for other problems, but interventions targeting each problem specifically (alcohol use and SRBs) may be better suited for women at high risk of multiple problems.

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Table 1

Descriptive information for study variables.

	Baseline mean (SD) or percentage in category	Follow-up mean (SD) or percentage in category
Alcohol intervention		
Age	18.67 (0.73)	—
History of child sexual abuse	13.2% with history of CSA	—
Severity of adolescent/adult sexual assault	9.88 (14.36)	—
Frequency of heavy episodic drinking	1.66 (1.30)	—
Number of partners	3.58 (6.44)	2.26 (1.77)
Condom use assertiveness	16.22 (4.12)	17.52 (4.14)
Assessment only		
Age	18.79 (0.74)	—
History of child sexual abuse	15.9% with history of CSA	—
Severity of adolescent/adult sexual assault	8.12 (12.24)	—
Frequency of heavy episodic drinking	1.67 (1.46)	—
Number of partners	3.18 (3.15)	1.84 (1.76)
Condom use assertiveness	16.42 (3.92)	16.16 (4.20)
Overall		
Age	18.75 (0.74)	—
History of child sexual abuse	15% with history of CSA	—
Severity of adolescent/adult sexual assault	8.71 (12.97)	—
Frequency of heavy episodic drinking	1.67 (1.41)	—
Number of partners	3.31 (4.49)	1.94 (1.75)
Condom use assertiveness	16.37 (3.98)	16.61 (4.27)

N = 160.

Table 2

Correlations between study variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Age	–								
2. History of child sexual abuse	0.050	–							
3. Severity of adolescent/adult sexual assault (Sq root transformed)	0.219*	0.049	–						
4. Dummy code comparing assessment group to alcohol intervention	0.077	0.037	0.019	–					
5. Baseline frequency of heavy episodic drinking	0.056	0.247*	0.190†	0.056	–				
6. Baseline Number of Partners (Sq root transformed)	0.019	0.264*	0.170†	0.019	0.442***	–			
7. Baseline condom use assertiveness	0.073	0.014	0.088	0.073	0.016	0.30212*	–		
8. Follow-up number of partners	0.113	0.248*	0.179†	0.113	0.454**	0.543**	0.099	–	
9. Follow-up condom Use assertiveness	0.015	0.176†	0.194†	0.090	0.30159	0.30151	0.303**	0.30248*	–

N= 160,

†
 $p < 0.1$,*
 $p < 0.05$,**
 $p < 0.01$,***
 $p < 0.001$.

Table 3Results of path model ($N = 160$) predicting number of partners and condom use assertiveness.

Predictor	Number of partners (follow-up)		Condom use assertiveness (follow-up)	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Age	−0.487	0.344	−0.124	0.409
History of child sexual abuse	−0.215	0.878	3.323***	0.845
Severity of adolescent/adult sexual assault	0.066	0.165	−0.396	0.250
Dummy code comparing assessment group to alcohol intervention	−0.405	0.463	−1.767*	0.734
Baseline frequency of heavy episodic drinking	−0.445	0.311	−0.010	0.337
Baseline number of partners	0.899***	0.764	−0.252**	0.061
Baseline condom use assertiveness	−0.391	0.764	3.634*	1.424
ASA X baseline drinking	—	—	30.459*	0.212

*
 $p < 0.05$,**
 $p < 0.01$,***
 $p < 0.001$.*B* = Unstandardized regression coefficient. *SE*: standard error.