Reducing Heavy Episodic Drinking, Incapacitation, and Alcohol-Induced Blackouts: Secondary Outcomes of a Web-Based Combined Alcohol Use and Sexual Assault Risk Reduction Intervention

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Abstract

Heavy episodic drinking, alcohol-induced blackouts, and incapacitation are associated with sexual assault among college women. Therefore, reducing heavy episodic drinking, alcohol-induced blackouts, and incapacitation among college women may reduce sexual assault victimization risk. The current study examined the indirect effect of a combined alcohol use and sexual assault risk reduction program on sexual assault severity through heavy episodic drinking, alcohol-induced blackouts, and incapacitation (*n*=264). An alcohol use reduction program, sexual assault risk reduction program, and combined alcohol use and sexual assault risk reduction program were compared to a control condition. The sexual assault risk reduction content reduced alcohol-induced blackouts and incapacitation and the combined alcohol use and sexual assault risk reduction program reduced alcohol-induced blackouts. Only incapacitation was associated with reduced sexual assault severity at follow-up. Reducing incapacitation and alcohol-induced blackouts are possible with a brief, web-based intervention, and reducing incapacitation may be one viable strategy within larger sexual assault prevention programming efforts.

Keywords

sexual assault; alcohol; blackout; incapacitation; college students

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Sexual assault, defined as nonconsensual sexual contact, and heavy episodic drinking, defined as drinking 2 or more drinks in 2 hours or less for women (NIAAA, 2004), occur in high rates on college campuses. Approximately 40% of college students engage in heavy episodic drinking (Mitka, 2009) and women under the age of 21 are at high risk of experiencing sexual assault (Bureau of Justice Statistics, 2006; Humphrey & White, 2000). Heavy episodic drinking is associated with sexual assault victimization and approximately half of all sexual assaults involve alcohol use by the victim, partner, or both (Abbey et al., 2004). In-the-moment consequences of heavy episodic drinking that may be especially linked to sexual assault victimization risk include alcohol-induced blackouts and incapacitation. Blackouts refer "to loss of memory for significant events that occurred during a drinking episode" (Pressman & Caudill, 2013, p. 932); whereas incapacitation refers to being unconscious (passing out) due to alcohol. There are many studies finding that heavy episodic drinking is a key predictor of sexual assault and particularly incapacitated rape (e.g., Carey et al 2015; Testa et al 2010, see Testa & Livingston 2009 for a review), but little examination of drinking to incapacitation or blackouts as separate mechanisms (e.g., only Valenstein-Mah et al 2015) as separate mechanisms. Alcohol-induced blackouts are common among college students, with 25% of college students reporting at least one in the past month (LaBrie, Hummer, Kenney, Lac, & Pedersen, 2011). Blackouts are associated with sexual assault victimization and re-victimization among college women (Valenstein-Mah et al., 2015). It is possible that perpetrators monitor potential victim's rate of drinking, and drinking at a rate that may lead to blackouts could be a behavior that perpetrators seek out. Additionally, being unconscious due to alcohol is a clear risk factor for being targeted by sexual assault perpetrators. The current study examined three separate facets of drinking (heavy episodic drinking, incapacitation, and blackouts) to determine the mechanism of change in sexual assault victimization reduction in a combined alcohol and sexual assault risk reduction program for underage college women.

Sexual Assault Victimization, Incapacitation, and Alcohol-Induced Blackouts

Heavy alcohol use, including heavy episodic drinking and drinking until incapacitation, is associated with sexual assault victimization (e.g., Carey et al 2015; Testa et al 2010, see Testa & Livingston 2009 for a review). Alcohol use results in several cognitive impairments, with blackouts and incapacitation occurring at high levels of use. Alcohol use at high levels can disrupt hippocampal functioning, thus resulting in an inability to transfer short-term autobiographical memories to long-term memory (Goodwin, 1995; White, 2003); and thereby "blacking out" the individual's subsequent recall of events and activities occurring during that time. Depending on the severity of this alcohol-induced memory impairment, a blackout will be classified as either fragmentary or complete (en bloc) (Hartzler & Fromme, 2003). Individuals can be conscious, active, and volitional during these blackouts and because of the cognitive impairment at the time, may be at high risk for sexual victimization. One study found that approximately 25% of college women later discovered they had

engaged in sexual activity during a blackout (White, Jamieson-Drake, & Swartzwelder, 2002). Alcohol-induced blackouts prospectively predicted incapacitated sexual re-victimization 30 days later among college women who had a sexual assault history (Valenstein-Mah et al., 2015). Because perpetrators target college women who are drinking heavily, it is important to determine if alcohol use and sexual assault risk reduction programming is effective at reducing not only heavy episodic drinking, but incapacitation and alcohol-induced blackouts as well in an effort to reduce sexual assault risk.

Web-Based Personalized Feedback Intervention for Alcohol Use and Sexual Assault Risk

To our knowledge, there is only one web-based intervention that targets both alcohol use and sexual assault risk among college students (Gilmore, Lewis & George, 2015). The alcohol use reduction component of this intervention was a personalized feedback intervention (Neighbors et al., 2010) that targets student perceptions of normative drinking and perceived attitudes towards drinking, which are the strongest predictors of alcohol use (Neighbors et al., 2007; Perkins, 2002). The sexual assault risk reduction component was theoretically-based and aimed to empower women with sexual assault risk perception and resistance strategies while still placing the blame for the assault on the perpetrator. Findings from this combined alcohol use and sexual assault risk reduction program has demonstrated efficacy at reducing the number of incapacitated rapes, sexual assault victimization, and frequency of heavy episodic drinking for women with more severe sexual assault histories (Gilmore, Lewis, & George, 2015). However, it is unclear what the effects of the intervention were on incapacitation and alcohol-induced blackouts. Further, it is unknown if reducing these three facets of drinking (heavy episodic drinking, incapacitation, and alcohol-induced blackouts) result in less sexual assault victimization at follow-up. Examining intervention effects on all three facets of alcohol use is important because perpetrators may be better at targeting those with these specific in-the-moment alcohol-induced consequences over and above heavy episodic drinking episodes alone.

Current Study

The current study examines secondary outcomes of a web-based alcohol only intervention, sexual assault only intervention, and a combined alcohol use and sexual assault risk reduction intervention (Gilmore, Lewis, & George, 2015). The combined intervention was effective at reducing sexual assault victimization 3-months post-intervention among those with more severe sexual assault histories at baseline. The current study is a secondary analysis examining the mechanism underlying that effect. It was hypothesized that the combined alcohol use and sexual assault risk reduction intervention would be associated with reduced heavy episodic drinking, incapacitation, and alcohol-induced blackouts compared to the control condition. It was also hypothesized that the combined intervention compared to the control condition would indirectly be associated with reductions in sexual assault victimization through reductions in heavy episodic drinking, incapacitation, and alcohol-induced blackouts in the 3-month follow-up period. This was hypothesized because in the combined condition, personalized feedback was provided regarding one's own identified alcohol-related consequences which included both blackouts and incapacitation. This information was paired with the overall program that addressed both sexual assault risk and alcohol use. Thus, providing both feedback on these specific alcohol-related

consequences paired with risk factors associated with sexual assault victimization is hypothesized to be associated with reductions in alcohol-induced blackouts and incapacitation. Because sexual assault victimization at baseline was associated with outcomes previously (Gilmore et al., 2015), it was included as a covariate in the current analyses.

Method

Participants

College women were recruited from university psychology courses to participate in a study on "drinking and sexual behaviors." Individuals responded to online postings for these courses, and if they were interested, they participated in a screening survey. A total of 674 participants completed the screening assessment. Of those screened, 264 women were eligible and enrolled in the study (39.17% of those screened). Participants were eligible if they a) were female, b) engaged in heavy episodic drinking at least once in the last month, and c) were between the ages of 18 and 20. A total of 207 participants completed the follow-up survey (78.41%), however, all individuals who completed the baseline survey were included in the analyses.

Measures

Demographics.—Participant age and race/ethnicity at baseline were included as covariates in this study.

Membership in a Sorority.—Participants were asked whether they were currently affiliated with a sorority. Answer choices were either 0 ("No") or 1 ("Yes"). This item was used as a covariate.

Adolescent/Adult Sexual Assault Victimization.—Adolescent/adult sexual assault history was assessed using the Sexual Experiences Survey (Koss et al., 2007). Participants were asked about coerced sexual experiences after their 14th birthday using behaviorally specific questions including experiences perpetrated by verbal coercion, incapacitation, threats of physical force, and physical force. Adolescent/adult sexual assault experiences included sexual contact, sexual coercion, attempted penetration, and completed penetration. Participants indicated the number of times that a tactic or multiple tactics were used up to 3 times. Adolescent/adult sexual assault victimization was calculated using a 63-point scale (Davis et al., 2014) for each time point with high scores indicating more severe sexual assault experiences and scores of 0 indicating no adolescent/adult sexual assault. This scoring procedure takes into account both frequency (0 to 3) and severity of experiences. A victimization score was calculated by multiplying each experience type by the frequency and then summing all of the experiences for a total of up to 63 points. Baseline and follow-up sexual assault victimization were used as covariates and outcomes of interest, respectively.

Heavy Episodic Drinking.—Baseline frequency of heavy episodic drinking was used as a covariate and asked individuals: "How often did you have 4 or more drinks containing any kind of alcohol within a 2-hour period." Participants answered this question based on the

past month. Answer choices ranged from 0 times in the past month to five to six times a week or more (range: 0–7). Follow-up heavy episodic drinking was also assessed.

Incapacitation and Alcohol-Induced Blackouts.—Incapacitation and alcohol-induced blackouts and incapacitation were comprised of separate two items from the Brief Rutgers Alcohol Problem Index (Earleywine, LaBrie, & Petersen, 2008). For incapacitation, participants were asked how many times the following happened while drinking in the past 3 months: "Passed out or fainted suddenly?" For alcohol-induced blackouts, participants were asked how many times the following happened while drinking in the past 3 months: "Suddenly found yourself in a place that you could not remember getting to?" Answer choices for both items included 0 (Never), 1 (1 to 2 times), 2 (3 to 5 times), 3 (6 to 10 times), and 4 (more than 10 times).

Procedure and Intervention Conditions

A total of 264 were eligible to participate in the study and prior to completing the full baseline assessment/screening survey, participants completed key information regarding their alcohol use and sexual assault history, and were randomized to receive either a full assessment ($n = 211$) or the minimal assessment control condition ($n = 53$) stratified by sexual assault history. This first randomization occurred to ensure that completing an extensive assessment did not bring out behavioral change in itself. However, there were no differences in outcomes between the minimal assessment and full assessment, therefore, they were combined for a single control condition for the purposes of this study. After completing the baseline assessment, a second randomization occurred. Those who completed the full assessment were randomly assigned based on sexual assault history to a full assessment only control condition ($n = 107$), an alcohol-only intervention condition ($n = 53$), a sexual assault risk reduction-only intervention condition ($n = 52$), or a combined alcohol and sexual assault risk reduction condition ($n = 52$). All randomization was completed by a computer algorithm to ensure equal number of participants in each group stratified by sexual assault history. The alcohol-only intervention was an existing and tested personalized feedback intervention (Neighbors et al., 2010), which included content from a web-based version of BASICS (Dimeff, Baer, Kivlahan, Marlatt, 1999). This program provides a personalized summary of drinking and related consequences, moderation education, alcohol expectancies, and other didactic information using the spirit of motivational interviewing. The sexual assault risk reduction-only program included personalized feedback components regarding campus- and state-specific definitions and prevalence of sexual assault, risk factors for sexual assault, and education regarding risk perception, resistance strategies, barriers to resistance, and resources that could be accessed if one was assaulted. The combined alcohol and sexual assault risk reduction program included integrated content from both interventions (see Gilmore, 2015 for more details regarding interventions). Participants received extra course credit for participating in the baseline assessment and those that completed a follow-up 3 months later received a $25 e-gift card.

Dummy coded variables were created to compare these four groups of participants. For all three dummy codes, the assessment group was the reference group. The first dummy code

compared the assessment group to the alcohol intervention group, and the second dummy code compared the assessment group to the sexual assault risk reduction condition. Finally, the third dummy code compared the assessment group to the combined alcohol and sexual assault risk reduction groups.

Data Analytic Plan

In order to test the hypothesized effects, a path model was estimated using MPlus Version 7 using the Model Indirect command (Muthen & Muthen, 1998–2011). Mplus uses Full Information Maximum Likelihood (FIML), which produces less bias compared to other techniques (e.g. list wise deletion, pairwise deletion, and mean imputation; Enders, 2001). Emerging adult age, race (dichotomous), membership in a sorority (dichotomous), baseline heavy episodic drinking, and earlier levels of the outcomes (i.e., baseline blackouts, baseline sexual assault) were used as covariates in predicting follow-up blackout, incapacitation, and the covariate heavy episodic drinking. Main effects of dummy codes 1, 2, and 3 were entered as predictors of the mediators, blackout and incapacitation at follow-up. The dummy codes were also entered as predictors of the covariate, follow-up heavy episodic drinking. Additionally, interactions between the dummy codes and each of the other covariates were initially entered into the model. All non-significant (p<.05) interactions were trimmed. Finally, heavy episodic drinking, incapacitation, and alcohol-induced blackouts were used to predict sexual assault victimization at follow-up. The indirect effects of the interventions on sexual assault victimization through heavy episodic drinking, incapacitation, and blackouts were also examined.

Rationale for Mediation Analyses.—Given the interest in examining the effects of the interventions on sexual assault victimization via heavy episodic drinking, incapacitation, and alcohol-induced blackouts, mediation analyses are appropriate. Modern approaches to mediation suggest that significant mediation effects may occur in the presence or absence of significant direct effects (MacKinnon, Fairchild, & Fritz, 2007; Rucker, Preacher, Tormala, & Petty, 2011). Thus, we will test the hypothesized indirect effect regardless of whether the main effects of the intervention on sexual assault are significant.

Results

Descriptive Statistics and Correlations

The majority of participants were freshmen (61.10%), living on campus or in a sorority house (71.90%), were not in serious relationship (71.50%), and 37.8% reported being members of a sorority. The majority of participants identified as White (57.60%) and the remainder identified as Asian American/Pacific Islander (20.50%), multiracial (14.10%), Black/African American (3.90%), other ethnicity/race (2.90), Native American (1.00%), and Hispanic/Latina (9.50%). On average, women were 18.77 years old (SD=.76). On average, individuals reported engaging in heavy episodic drinking 2–3 times in the past month (M=2.49, SD=1.39). On average, individuals reported engaging in heavy episodic drinking 1–2 times in the past month at follow-up (M=1.83, SD=1.41). Baseline sexual assault victimization was 5.44 on average (*SD*=10.71) and follow-up sexual assault victimization was 4.49 on average (*SD*=9.63). On average, individuals reported engaging in heavy

episodic drinking 1–2 times in the past month at follow-up (M=1.83, SD=1.41). Alcohol induced blackouts were .55 on average ($SD = .73$) at baseline and .46 on average ($SD = .71$) at follow-up. Incapacitation was .15 on average ($SD = .41$) at baseline and .24 on average ($SD = .60$) at follow-up.

Table 1 provides the zero-order Pearson (between two continuous variables), Tetrachoric (two dichotomous variables), and Biserial (dichotomous and continuous variables) correlations for constructs included in the final study model. In terms of relations among predictors and outcomes in the zero-order correlations, only the combined intervention was associated with alcohol-induced blackouts at follow-up. Specifically, those in the combined intervention reported fewer incidents of alcohol-induced blackouts than those in the assessment group, and none of the interventions were associated with incapacitation in the zero-order correlations. No interventions were related to heavy episodic drinking frequency or sexual assault victimization at follow-up. Incapacitation at follow-up was associated with sexual assault victimization at follow-up, with more frequent incapacitation being associated with more sexual assault victimization.

Final Study Model

Goodness of fit was determined by comparing results from the model with standards for acceptability (i.e. Hu & Bentler, 1999). The final model (described below) showed adequate fit to the data: RMSEA=.102, CFI=.903, SRMR=.037. Table 2 provides the standardized model results, and the Figure depicts the hypothesized paths.

Effects on Incapacitation and Alcohol-Induced Blackouts—In terms of intervention effects, we found support for two of the interventions in predicting incapacitation and alcohol-induced blackouts. Specifically, the sexual assault only intervention was associated with lower risk, in comparison to the assessment only group. The combined alcohol and sexual assault risk reduction intervention was associated with less alcohol-involved blackouts but there was no significant effect on incapacitation. There was no effect of the alcohol only group in predicting blackouts and incapacitation. Additionally, those who reported more incidents of alcohol-induced blackouts and incapacitation at baseline also reported more incidents of alcohol-induced blackouts and incapacitation at follow-up. No other covariates were associated with alcohol-induced blackouts and incapacitation. Additionally, there were no significant (p<.05) interactions between predictors and covariates or between covariates, therefore, no interactions remained in the final study model.

Effects on Follow-Up Heavy Episodic Drinking—In predicting follow-up heavy episodic drinking, only one covariate or predictor conferred risk. Specifically, more baseline heavy episodic drinking was associated with more heavy episodic drinking at follow-up. No other predictors or covariates conferred risk for heavy episodic drinking ($p < .05$).

Effects on Follow-up Sexual Assault Victimization—There were no effects of any of the interventions on sexual assault victimization at follow-up, however, there was a significant effect of incapacitation on sexual assault victimization. Specifically, those who

reported more incidents of incapacitation reported significantly more sexual assault victimization at follow-up. The effect of blackouts on sexual assault victimization was non-significant. More heavy episodic drinking was marginally associated with more severe sexual assault ($p=.051$).

Mediational Findings—We next examined whether heavy episodic drinking, incapacitation, and alcohol-induced blackouts mediated the effect of the interventions on sexual assault victimization. In terms of indirect effects, we only found support for incapacitation as a mediator of the effect of the sexual assault only intervention on sexual assault victimization [95% CI: −.151- −.015]. Incapacitation did not mediate the effect of the alcohol only or combined interventions on sexual assault victimization. Heavy episodic drinking and blackouts did not mediate the effects of the alcohol only, sexual assault only, or combined interventions on sexual assault victimization.

Discussion

To our knowledge, this is the first study to examine the efficacy of a combined alcohol use and sexual assault intervention at reducing heavy episodic drinking, incapacitation, and alcohol-induced blackouts. We found partial support for our hypotheses. Results indicated that the web-based combined alcohol use and sexual assault risk reduction program reduced alcohol-involved blackouts as hypothesized. Surprisingly, we found that the sexual assault risk reduction intervention content was associated with reductions in incapacitation and alcohol-induced blackouts. It was also found that that reductions in incapacitation, but not blackouts, mediated the association between the interventions and sexual assault victimization at follow-up.

Previous research has found that the majority of sexual assaults in college are, in fact, incapacitated sexual assaults (Carey et al., 2015; Mohler-Kuo et al., 2004). This suggests that among underage college women who engage in heavy episodic drinking, it may be more important to highlight sexual assault risks rather than other alcohol-related consequences alone. It may not be enough to reduce heavy episodic drinking if many assaults occur when the victim is incapacitated. Future interventions could specifically target sexual assault risk and drinking to incapacitation.

The sexual assault risk reduction only content and the combined alcohol use and sexual assault risk reduction content were effective at reducing alcohol-induced blackouts while the alcohol only content was not. Further, the sexual assault intervention content was effective at reducing incapacitation. Therefore, the sexual assault risk reduction content appears to be the content that was associated with changes in incapacitation and alcohol-related blackouts. One possibility may be that although the intervention presentation was not immune to the impact of asking extensive questions about one's alcohol use. All individuals prior to receiving the intervention responded to a questionnaire regarding their alcohol use behavior, attitudes, and perceived norms. This questionnaire paired with feedback regarding sexual assault risk may have allowed for participants to naturally draw connections between using alcohol at a rate that would induce blackouts and incapacitation and sexual assault even if it was not explicitly connected like it was in the combined intervention. It may also be possible

that providing college women with information about sexual assault risk on their campus, providing them with personalized feedback on sexual assault risk perception and sexual assault resistance strategies, and addressing barriers to resistance may increase their likelihood of engaging in protective behaviors that would reduce their likelihood of engaging in drinking that leads to alcohol-induced blackouts and incapacitation. It is surprising that the alcohol only intervention was not effective at reducing alcohol-involved blackouts and incapacitation due to the extensive personalized education focused on alcohol, however, it appears that providing content that targets sexual assault risk is more effective than focusing on alcohol alone among this population.

Consuming alcohol at a rate that puts one at risk for incapacitation and alcohol-induced blackouts is common on college campuses (LaBrie et al., 2011) and can have severe consequences, including sexual assault victimization (Valenstein-Mah et al., 2015). Therefore, it is imperative to not only provide college students with effective skills to reduce their alcohol use and engage in safe drinking, but to also provide them with psychoeducation that sexual assault perpetrators may be more likely to target individuals who are drinking at a level that leads to incapacitation. This can be done within a motivational interviewing framework, where psychoeducation regarding risk is paired with personalized feedback regarding one's own experiences with alcohol-induced blackouts and incapacitation. It is promising that reductions in incapacitation from this brief, web-based intervention also led to decreases in sexual assault victimization. Given that both alcohol use and sexual assault victimization are common among college women, it is necessary to continue to research interventions that may target both concurrently to reduce negative consequences for this population. It is also important to note that these findings existed above and beyond the association between heavy episodic drinking frequency and sexual assault victimization alone.

It was surprising that heavy episodic drinking was only marginally associated with sexual assault victimization in the current study. Including all three of variables of heavy episodic drinking, incapacitation, and alcohol-induced blackouts allows for the unique contribution of each to be examined as related to sexual assault victimization. It appears that in this sample, incapacitation is a stronger predictor of sexual assault victimization when compared to heavy episodic drinking and alcohol-induced blackouts.

Strengths and Limitations

Although this was the first study to examine reducing heavy episodic drinking, incapacitation, and alcohol-induced blackouts with the goal of reducing sexual assault victimization risk, there are several limitations that should be considered. The first was that incapacitation and alcohol-induced blackouts were not the entire focus of the intervention. Future research should determine if specifically targeting incapacitation in a brief manner reduces both incapacitation and sexual assault victimization risk. It is likely that perpetrators can witness a potential victim's rate of drinking and it may play a role in choice of victim. Second, the current study only examined underage college women who engage in heavy episodic drinking and other populations are at risk of heavy episodic drinking and can experience sexual assault victimization including sexual and gender minorities, adolescents,

men, non-college populations, and military or veteran populations. Future studies should examine other at-risk groups. The current study examined heavy episodic drinking, incapacitation, alcohol-induced blackouts, and sexual assault victimization at the same time point, therefore, true mediation cannot be determined. Future investigations should examine the outcomes at three time points to ensure that true mediation can be assessed. Finally, we used a single item to measure heavy episodic drinking, blackouts, and incapacitation, which somewhat reduces out confidence in results.

The brief, web-based interventions included in the current study targeted sexual assault risk and/or alcohol use among underage, heavy episodic drinking college women. This is a population that is at high risk for heavy episodic drinking, incapacitation, alcohol-related blackouts, and being targeted for sexual assault victimization. It is promising that both the combined alcohol use and sexual assault risk reduction program and the sexual assault risk reduction only program were effective at reducing blackouts and the sexual assault risk reduction program was effective at reducing incapacitation compared to the control conditions. These findings suggest that providing evidence-based sexual assault risk reduction programming in itself may help reduce alcohol-related consequences. Future work should assess the effect of presenting these specific alcohol-related consequences in personalized normative feedback combined with sexual assault risk reduction programming compared to providing a full alcohol use reduction intervention.

Conclusion

This study adds an important next step to the understanding of heavy episodic drinking, incapacitation, alcohol-involved blackouts, and sexual assault victimization. Alcohol-induced blackouts and incapacitation can be reduced through brief web-based interventions focused on sexual assault risk reduction or both alcohol use and sexual assault risk reduction. This finding is promising because not only were incapacitation and alcohol-involved blackouts reduced, the reduction in incapacitation led to reduction in sexual assault victimization at follow-up.

Acknowledgements:

Biography

Amanda K. Gilmore, PhD, is an Assistant Professor at the National Crime Victims Research and Treatment Center in the Department of Psychiatry & Behavioral Sciences at the Medical University of South Carolina. Her program of research focuses on the effect of alcohol use on sexual assault, sexual decision making, and sexual functioning.

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Mollie Selmanoff, BS, is a case manager and clinic coordinator at the National Crime Victims Research and Treatment Center in the Department of Psychiatry & Behavioral Sciences at the Medical University of South Carolina. She coordinates a clinic for recent sexual assault victims and a clinic providing Dialectical Behavior Therapy to victims of crime.

William H. George is a professor of psychology, and adjunct professor of American ethnic studies at the University of Washington. His research focuses mainly on understanding the role of alcohol, cultural factors, and victimization history on sexuality: sexual perception and disinhibition, sexual coercion and assault, and HIV-related sexual risk-taking. Much of his research and that of his students has been funded by the National Institute of Alcohol Abuse and Alcoholism.

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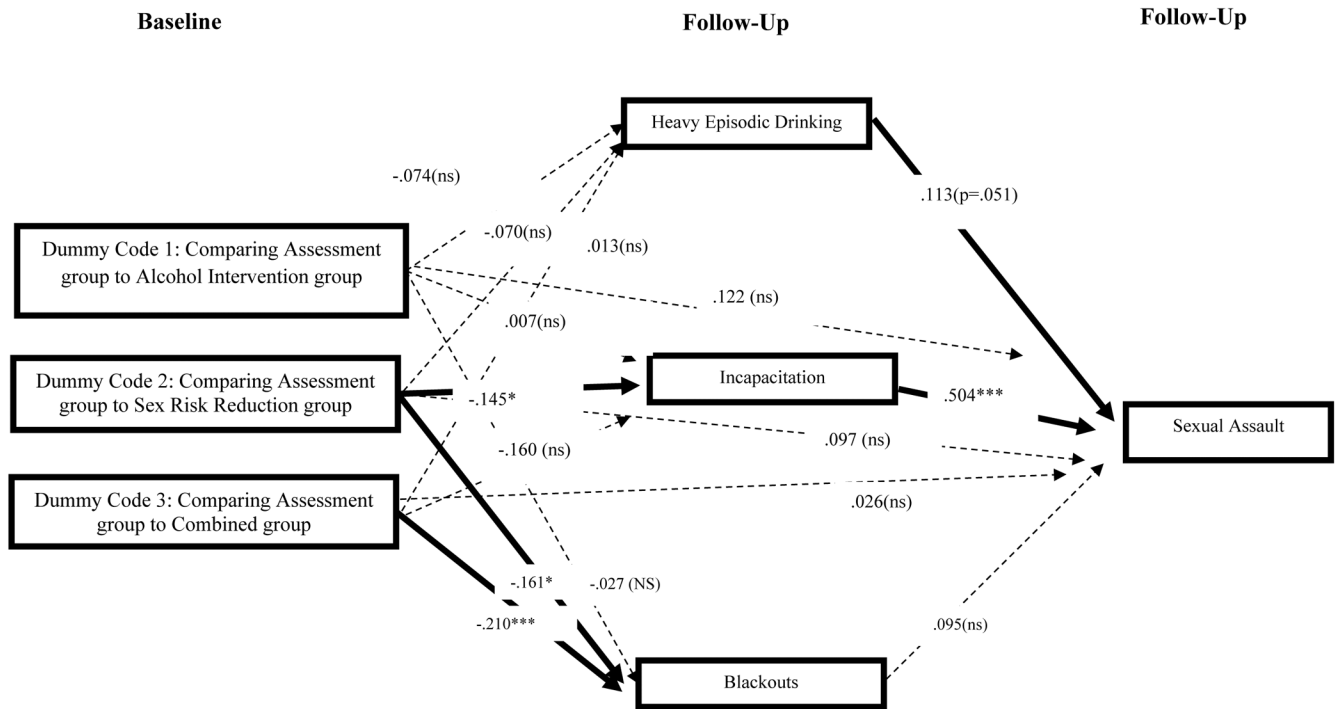**Baseline**　　　　　　　　　　　　　　　**Follow-Up**　　　　　　　　　　　　　**Follow-Up**

Figure.

Study Model

Notes. Standardized coefficients for main study findings are shown above, *p<.05, **p<.01, ***p<.001.Effects of covariates age, race, sorority, baseline heavy episodic drinking, blackouts, incapacitation, and sexual assault are not shown.

Table 1.

Correlations between Study Variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Assessment vs. Alcohol Intervention	--												
2. Assessment vs. Sexual Assault Intervention	−.248**	--											
3. Assessment vs. Combined Intervention	−.248**	−.245**	--										
4. Age	−.072	.072	−.019	--									
5. Race	−.056	.051	−.003	.015	--								
6. Sorority	−.004	−.018	.003	−.125	−.148*	--							
7. Baseline Heavy Episodic Drinking	.001	−.010	−.071	−.080	.052	.371***	--						
8. Baseline Blacking Out	−.027	.110	.006	.034	.014	.162	.286**	--					
9. Baseline Incapacitation	−.093	.120	.003	.036	.005	.013	.129	.330***	--				
10. Baseline Sexual Assault Severity	.089	.112	−.069	.033	.004	.027	.113	.138*	.179*	--			
11. Follow-Up Blacking Out	.054	−.045	−.171*	−.035	.000	.162*	.286***	.454***	.295**	.003	--		
12. Follow-Up Incapacitation	.057	−.050	−.133	.047	.123	.060	.154	.253**	.269**	.141	.592***	--	
13. Follow-Up Heavy Episodic Drinking	−.106	.135	.086	−.029	.005	.167	.099	.281**	.136	.180**	.440***	.257**	--
14. Follow-Up Sexual Assault Severity	.121	.030	−.121	.097	.015	.017	.076	.100	.204**	.562***	.443***	.582***	.156*

Notes: N=264;

*
$p<.05$,

**
$p<.01$,

***
$p<.001$

Table 2.

Results of Path Model (N=264) Predicting Blacking Out and Sexual Assault Severity.

Predictor	Blacking Out (follow-up)		Incapacitation (follow-up)		Heavy Episodic Drinking (follow-up)		Sexual Assault (follow-up)	
	B	SE	B	SE	B	SE	B	SE
Assessment vs. Alcohol Intervention	−.027	.072	.007	.085	−.074	.057	.122	.064
Assessment vs. Sexual Assault Intervention	−.161*	.086	−.145*	.056	−.070	.066	.097	.064
Assessment vs. Combined Intervention	−.210***	.050	−.160	.058	.013	.067	.026	.044
Age	−.042	.059	.042	.078	−.018	.056	--	--
Race	−.006	.063	.125	.072	.011	.061	--	--
Sorority	.013	.067	.018	.064	.058	.070	--	--
Baseline Heavy Episodic Drinking	.099	.082	.034	.065	.451***	.073	--	--
Baseline Blacking Out	.370***	.077	.170*	.083	.087	.072	--	--
Baseline Incapacitation	.163*	.076	.210*	.100	.033	.065	--	--
Baseline Sexual Assault	.088	.072	.081	.077	.098	.055	--	--
Follow-Up Heavy Episodic Drinking	--	--	--	--	--	--	.113(p=.051)	.058
Follow-Up Blacking Out	--	--	--	--	--	--	.095	.108
Follow-up Incapacitation	--	--	--	--	--	--	.504***	.134

Note.

*
$p<.05$,

**
$p<.01$,

***
$p<.001$. B =Standardized regression coefficient. SE=Standard error.