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# Posttraumatic Stress Disorder Symptoms: A Mechanism in the Relationship between Early Sexual Victimization and Incapacitated/ Drug-or-Alcohol-Facilitated and Forcible Rape

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# Posttraumatic Stress Disorder Symptoms: A Mechanism in the Relationship between Early Sexual Victimization and Incapacitated/ Drug-or-Alcohol-Facilitated and Forcible Rape

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## Abstract

Sexual assault occurring when the victim is unable to consent or resist due to the use or administration of alcohol or drugs (i.e., incapacitated/drug-or-alcohol-facilitated rape; IR/DAFR) is a particularly prevalent form of victimization experienced by college women. By definition, substance use precedes IR/DAFR; however, few studies have examined other potential risk factors for IR/DAFR that may be unique from those associated with forcible rape (FR; i.e., sexual assault occurring due to threats or physical restraint). The present investigation tested a model of risk for IR/DAFR and FR suggesting that child or adolescent sexual abuse (CASA) leads to posttraumatic stress disorder (PTSD) symptoms, which in turn increase the likelihood of IR/DAFR, but not FR. Results revealed full mediation for PTSD hyperarousal symptoms in the pathway between CASA and IR/DAFR, and partial mediation for hyperarousal symptoms in the pathway between CASA and FR. Theoretical and clinical implications are discussed.

**Keywords:** IR/DAFR, forcible rape, child or adolescent sexual abuse, PTSD symptoms

More than 50% of all sexual assaults involve alcohol consumption by the perpetrator, victim, or both (Abbey, Zawacki, Buck, Clinton, & McAuslan, 2004). Other substances, including marijuana, also have been linked to rape (Messman-Moore, Coates, Gaffey, & Johnson, 2008). High rates of victim substance use (Miranda, Meyerson, Long, Marx, & Simpson, 2002) have spurred increased research interest in both incapacitated rape (IR), which occurs when a victim's ability to provide consent or resist unwanted sexual advances is compromised by the voluntary use of alcohol or drugs (Kaysen, Neighbors, Martell, Fossos, & Larimer, 2006; Testa, Livingston, VanZile-Tamsen, & Frone, 2003), as well as drug-or-alcohol-facilitated rape (DAFR), which occurs when a perpetrator gives alcohol or drugs a potential victim (with or without her knowledge) with the intention of incapacitating her. Rape involving substance use may be a particular concern among college populations, with an estimated 200,000 instances of IR/DAFR occurring each year among U.S. undergraduates (Kilpatrick, Resnick, Ruggiero, Conoscenti, & McCauley, 2007). Adding to this concern are findings that victim intoxication is associated with a greater severity of assault and increased risk for physical injury (Testa, VanZile-Tamsen, & Livingston, 2004), factors that are linked to detrimental outcomes including more severe posttraumatic stress disorder (PTSD) and depression symptoms (Hanson et al., 2001). There also is evidence that victims of IR/DAFR experience unique sequelae including self-blame, stigma, and increased alcohol use to cope (Brown, Testa, & Messman-Moore, 2009; Kaysen et al., 2006; Littleton, Grills-Taquechel, & Axsom, 2009).

Although IR/DAFR is increasingly recognized as a widespread problem, few studies have examined factors that may contribute specifically to this form of victimization. Within the broader literature on sexual assault, a history of child or adolescent sexual abuse (CASA) consistently has been found to predict adult revictimization. CASA victims are between two and three times more likely to experience sexual victimization as an adult (Arata, 2002), and 50% of college women report some form of CASA (Gidycz, Coble, Latham, & Layman, 1993; Gidycz et al., 2007). Despite strong associations with adult victimization, little attention has focused on CASA as a risk factor for IR/DAFR specifically. Support for this possibility stems from evidence that college women with a history of CASA report drinking to intoxication more frequently than those without CASA histories (Rodriguez-Srednicki, 2001). Alcohol and substance use, in turn, have been shown to increase risk for IR/DAFR (Mohler-Kuo, Dowdall, Koss, & Wechsler, 2004). Together, these findings suggest that CASA victims may be more likely to use alcohol or drugs to intoxication, thereby increasing risk for adult victimization in the form of IR/DAFR.

Despite these links, it should be noted that not all women with sexual abuse histories experience IR/DAFR (Arata, 2002). Certain psychological variables that are common among victims of CASA [e.g., posttraumatic stress disorder (PTSD)] may intervene before an adult victimization to increase the risk of IR/DAFR in particular. Common PTSD symptoms among CASA victims include distressing abuse-related memories or nightmares reminiscent of their victimization, as well as increased hypervigilance, irritability, concentration problems, and sleep difficulties (for review see Rodriguez, Vande Kemp, & Foy, 1998). Among college women, PTSD has been shown to predict general rape, substance

use, and risky sexual behavior over an 8-month period (Messman-Moore, Ward, & Brown, 2009). Although Messman-Moore and colleagues did not measure IR/DAFR and forcible rape (FR) separately, alcohol use mediated the relationship between PTSD symptoms and later sexual victimization, suggesting that using alcohol to cope with post-traumatic distress increases risk for revictimization. These findings highlight the possibility that PTSD is a particularly important risk factor for IR/DAFR.

Of the PTSD symptom clusters, hyperarousal appears to play an especially important role in explaining revictimization. In a study of 1449 undergraduate women, Risser, Hetzel-Riggin, Thomsen, and McCanne (2006) found that only the hyperarousal cluster of PTSD mediated associations between CSA and adult rape, leading the authors to speculate that difficulties with sleep, concentration, and heightened hypervigilance impair victims' abilities to discriminate between true threats and false alarms, resulting in greater risk for revictimization. Although IR/DAFR and FR were grouped together in that study, there is reason to believe that hyperarousal may play a unique role in mediating revictimization in the form of IR/DAFR specifically. For instance, a recent prospective study with college women revealed that although numbing symptoms directly mediated the link between CASA and revictimization, reexperiencing and hyperarousal symptoms were associated with problem drinking, which in turn predicted revictimization (Ullman, Najdowski, & Filipas, 2009). This finding fits with others showing that, of the PTSD symptom clusters, hyperarousal is most consistently linked to alcohol use (Dixon, Leen-Feldner, Ham, Feldner, & Lewis, 2009; Saladin, Brady, Dansky, & Kilpatrick, 1995; Reed, Anthony, & Breslau, 2007). Increased drinking in response to hyperarousal may in turn place women at greater risk of IR/DAFR through exposure to unfamiliar males (e.g., at bars, parties, etc.), binge drinking and blackouts (Kaysen et al. 2006; Kilpatrick et al., 2007; Testa et al., 2003), and impairment in recognizing and responding to risk (e.g., Loiselle & Fuqua, 2007). Together, these findings suggest that the mediational role of hyperarousal reported by Risser et al. may have been primarily driven by the occurrence of IR/DAFR in their sample rather than revictimization more generally.

### *The Present Study*

In sum, IR/DAFR is a significant problem among college women, yet little is known about risk factors associated specifically with this form of sexual victimization. Extant literature suggests that CASA and the development of PTSD symptoms, particularly hyperarousal, may contribute to risk for rape more generally; however, theory and recent empirical evidence suggest that PTSD symptoms may be especially relevant to the occurrence of IR/DAFR (vs. FR not involving substance use). To test this possibility we first examined whether CASA was associated with increased risk for later victimization, both IR/DAFR and FR. We expected that early sexual abuse would predict both forms of adult revictimization. Second, we tested a pathway from CASA to IR/DAFR through PTSD symptoms. Based on previously described theory and empirical findings (Risser et al., 2006), we hypothesized that hyperarousal aspects of PTSD would be the strongest path linking CASA to revictimization, but that this association would hold for IR/DAFR only—not FR.

## Method

### *Participants*

Participants were 714 undergraduate women recruited from a large public university in the Midwest. The mean age reported was 19.7 years ( $SD = 1.9$ ; range = 17–30). The ethnic composition of the sample was: European American (75.5%), African American (5.2%), Hispanic/Latina (7.4%), Asian (7.8%), Native American (1.0%), Hawaiian/Pacific Islander (.6%), and other (4.5%). Most participants (92.6%) had never been married. Regarding average household income while growing up, 11% reported US\$20,000 or less, 27% reported between US\$20,000 and US\$50,000, 28% reported US\$50,000 to US\$80,000, and 24% reported above US\$80,000.

### *Measures*

#### *Child and adolescent sexual victimization*

To maximize sensitivity in detecting victimization history two measures were used to assess childhood or adolescence sexual victimization (prior to age 18). First, the sexual abuse subscale of the Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998), which is comprised of five Likert-type questions designed to assess sexual victimization experiences while growing up, was administered. Numerous investigations attest to the reliability and validity of scores on this measure (e.g., Bernstein, Fink, Handelsman, & Foote, 1994; Bernstein et al., 2003). The CTQ provides cut scores derived from Receiver Operator Characteristic (ROC) analyses, which allows classification of participants as either victims or nonvictims of sexual abuse (Bernstein & Fink, 1998). Alpha was .92 for the sexual abuse subscale in the present study.

The sexual abuse subscale of the Computer Assisted Maltreatment Inventory (DiLillo et al., 2010) also was administered. In contrast to the CTQ, which was derived through factor-analysis, the CAMI employs three behaviorally specific screener questions followed by 22 more detailed items that assess various dimensions of the victimization experience (e.g., age at the time of abuse, specific acts that occurred, frequency and duration of the abuse). The CAMI employs a definition of child sexual abuse that includes: sexual contact (excluding sex play/exploration) occurring before age 14 that involves force, occurs with an individual at least 5 years older, or occurred with a family member. Adolescent sexual abuse was defined as sexual contact (e.g., fondling or sexual touching, oral, anal, or vaginal sex) occurring between the ages of 14 and 17 that occurred without consent, involved force, or occurred with an individual at least 10 years older.

Women were classified as victims of child or adolescent sexual abuse if they endorsed victimization on either the CTQ or CAMI. This dichotomous variable was used in all analyses. Although the CTQ and CAMI have been shown to overlap substantially (92% agreement; DiLillo et al., 2006), each also may capture slightly different aspects of sexual abuse; thus, using both measures maximizes the detection of child and adolescent victimization (DiLillo et al., 2006).

*Substance-involved and forced rape*

The Modified Sexual Experiences Survey (MSES; Messman-Moore & Brown, 2004), an expanded version of the Sexual Experiences Survey (SES; Koss & Gidycz, 1985), was used to assess substance-involved and forcible rape since the age of 18. The MSES consists of 18 items assessing three types of unwanted sexual acts: sexual contact (kissing, fondling), oral–genital contact, and sexual intercourse (vaginal or anal). For each type of unwanted sexual act, participants were asked about different perpetrator tactics: arguments and pressure, misuse of authority, alcohol or drug intoxication, and physical force. Participants who reported oral sex, vaginal penetration, or anal sex when she was unable to consent or resist due to the use of alcohol or drugs were considered IR/DAFR victims. Participants who reported unwanted oral, vaginal, or anal sex when a man threatened or used some degree of physical force (e.g., twisting arm, holding down) were considered forcible rape victims. These dichotomous substance-involved and forcible rape variables were used in analyses. Because 20% of IR/DAFR victims ( $n = 26$ ) reported also experiencing forcible rape, IR/DAFR and FR were included in all models and allowed to correlate.

*PTSD symptoms*

The PTSD Checklist–Civilian (PCL-C; Weathers, Litz, Herman, Huska, & Keane, 1993) is a 17-item self-report instrument designed to assess the cluster B (reexperiencing), cluster C (avoidance), and cluster D (hyperarousal) symptoms of PTSD described in the *DSM-IV*. Respondents rate the severity of their symptoms in the past month on a Likert-type scale ranging from 1 = *not at all* to 5 = *extremely*. Responses are summed to yield a total severity score as well as severity scores for each of the symptom clusters; these continuous severity scores for the subscales were used in analyses. The PCL-C has internal consistency ranging from .89 to .97 and test-retest reliability of .96 (Weathers et al., 1993), and correlates highly with interview-based measures of PTSD ( $r = .93$ ; Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). In the present sample, alphas for reexperiencing, avoidance, and hyperarousal were .88, .83, and .81, respectively.

*Procedures*

Data were collected as part of a larger study of sexual victimization among female college students. Participants were recruited from undergraduate psychology classes using an online tool, *Experimetrix.com*, and received course credit for participating in a single laboratory session. To increase sample diversity, ethnic minority women were also recruited via flyers posted throughout campus, online advertisements, student newspaper advertisements, and through in-person solicitation in Ethnic Student Association meetings and courses. After obtaining written informed consent, groups of 3–6 participants completed several computer-based questionnaires, including those used here. All procedures were approved by the University Institutional Review Board.

## Results

### *Descriptive Statistics*

Nearly 32% ( $n = 226$ ) of the sample reported CASA prior to the age of 18. The average CTQ abuse score for victims was 7.5 ( $SD = 4.9$ ), which is considered moderate to severe according to the CTQ authors (Bernstein & Fink, 1998). Of those identified as child sexual abuse victims on the CAMI ( $n = 169$ ), 68% ( $n = 115$ ) reported one perpetrator involved in the abuse, 16.6% ( $n = 28$ ) reported two perpetrators, and 15.4% ( $n = 26$ ) reported three to five perpetrators. For CAMI victims, approximately 26.0% ( $n = 44$ ) reported that threats of force or actual force were used during the abuse, and 63.9% ( $n = 108$ ) reported penetration. A total of 18.1% ( $n = 131$ ) of the sample reported IR/DAFR on the SES, while 7.5% ( $n = 55$ ) reported forcible rape. For IR/DAFR victims, the most commonly reported experience was vaginal penetration ( $n = 60$ ; 46.5%) followed by anal penetration ( $n = 55$ , 42.6%) and oral sex ( $n = 54$ ; 41.9%). For forcible rape victims, the most commonly reported experience was anal penetration ( $n = 30$ ; 54.5%) followed by vaginal penetration ( $n = 28$ , 51%) and oral sex ( $n = 14$ ; 25.5%). These percentages do not sum to 100% because a participant could report multiple unwanted acts. Of those reporting IR/DAFR, 20% ( $n = 26$ ) also reported experiencing at least one forcible sexual assault experience after the age of 18. For CASA victims, the mean reexperiencing score was 11.1 ( $SD = 4.9$ ), avoidance was 14.4 ( $SD = 5.7$ ), and hyperarousal was 12.4 ( $SD = 5.1$ ). These scores were significantly higher than those who did not report CASA victimization [reexperiencing = 9.2 ( $SD = 4.0$ );  $F(1, 713) = 20.6, p < .001$ , avoidance = 11.6 ( $SD = 4.9$ );  $F(1, 713) = 46.8, p < .001$ , and hyperarousal = 9.9 ( $SD = 4.2$ );  $F(1, 713) = 40.6, p < .001$ ].

To examine whether demographic characteristics such as older age or ethnic minority status were associated with increased likelihood of reporting sexual victimization, correlations and chi square analyses were conducted. Age was not associated with CASA ( $r = .01, p = .81$ ), IR/DAFR ( $r = .04, p = .26$ ), or FR ( $r = .05, p = .21$ ). Ethnicity was not significantly associated with CASA,  $\chi^2(1) = .46, p = .50$ , or forcible rape,  $\chi^2(1) = .11, p = .74$ . However, compared to ethnic minority women (7%), White women (22%) were more likely to report IR/DAFR,  $\chi^2(1) = 20.1, p < .01$ .

### *Preliminary Analyses*

All 714 participants provided all data points examined in the present study. Data were analyzed to detect nonnormal distributions, skewness, and kurtosis of each continuous PTSD symptom variable. Values were within acceptable ranges for skewness (.87 to 1.08) and kurtosis (.02 to .66), suggesting that the assumptions of normality apply to the PTSD symptom scores. Dichotomous variables are always considered to be in violation of the normality assumption (Muthen, 1993); therefore, bias-corrected bootstrapping (described below in the path analysis section) was employed.

Correlations between study variables are presented in table 1. All study variables evidenced significant low-level associations, and the proposed mediators were highly intercorrelated, particularly the PTSD symptom clusters. To explore the first hypothesis that sexual abuse prior to age 18 would be associated with IR/DAFR after age 18, a chi-square

was conducted. Findings revealed that 24% of CASA victims also reported IR/DAFR compared to 16% of nonvictims,  $\chi^2(1) = 7.18, p < .01$ . Similarly, 10% of CASA victims also reported forcible rape compared to 2% of nonvictims,  $\chi^2(1) = 22.7, p < .01$ .

**Table 1.** Correlations between Study Variables

Variable	CASA	IR/DAFR	FR	Reexp.	Avoidance	Hyper.
CASA	1.0					
IR/DAFR	.09*	1.0				
FR	0.21**	0.26**	1.0			
Reexperiencing	0.10*	0.23**	0.16**	1.0		
Avoidance	0.18**	0.23**	0.20**	0.67**	1.0	
Hyperarousal	0.16**	0.26**	0.22**	0.87**	0.81**	1.0

**Note:** CASA = Child or Adolescent Sexual Abuse; IR/DAFR = Incapacitated Rape/Drug-or-Alcohol-Facilitated Rape; FR = Forcible Rape.

\* $p < .05$ . \*\* $p < .01$ .

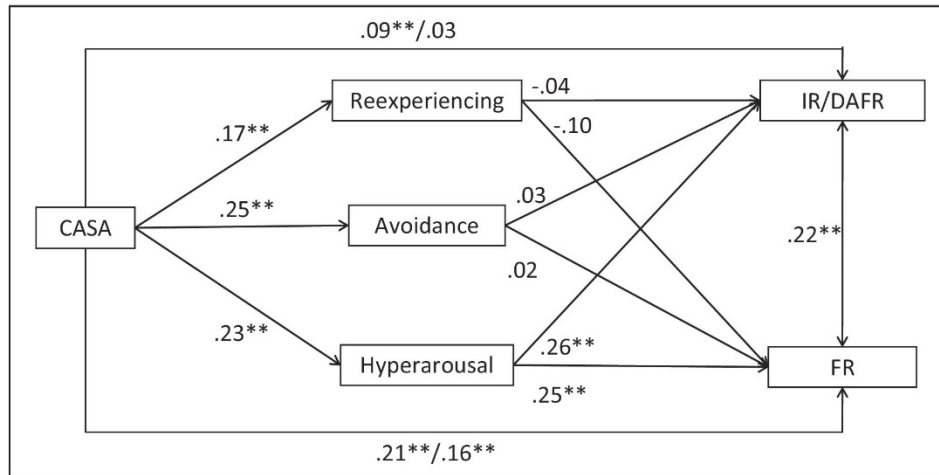
### Path Modeling

To test the second hypothesis regarding the mediational role of individual PTSD symptom clusters in the pathway between CASA and IR/DAFR, a model that simultaneously included the reexperiencing, avoidance, and hyperarousal symptoms of PTSD was examined. Full mediation requires a significant association between the IV and DV that is reduced to nonsignificance in the presence of a hypothesized mediator (Baron & Kenny, 1986). If the association between the IV and DV is substantially reduced, but remains significant in the presence of a hypothesized mediator, partial mediation is established (Baron & Kenny). To accommodate multiple mediators and dependent variables, a path modeling approach was employed using Mplus, version 5.0 (Muthen & Muthen, 2008). The hypothesized model included one exogenous variable, CASA history, and five endogenous variables: PTSD reexperiencing, avoidance, and hyperarousal symptoms as well as the binary IR/DAFR and FR variables. Because they constitute elements of a unified syndrome and previous research has revealed strong relationships between the three PTSD symptom clusters (e.g., Cross & McCanne, 2001), the residuals of the variables representing the PTSD symptom clusters were allowed to covary (Preacher & Hayes, 2008). The dependent variables, IR/DAFR and FR, were identified and treated as dichotomous in these analyses. The model was a good fit for these data,  $\chi^2(1, 175) = 0.81, p = .37, CFI = 1.0, RMSEA = .001; SRMR = .006$ .

Figure 1 presents the standardized coefficients for all specified paths in the model. The direct paths from CASA to IR/DAFR and FR were significant (.09 and .21, respectively) prior to the inclusion of PTSD symptoms clusters. As expected, a history of CASA was positively associated with all three PTSD symptom clusters; however, when all symptom clusters were examined simultaneously, only the hyperarousal was significantly positively associated with CASA and both IR/DAFR and FR. The mediated effect of hyperarousal symptoms in the association between CASA and IR/DAFR was significant (Estimate = .05,  $SE = .02, p < .01$ ) and accounted for 7% of the variance in IR/DAFR. The mediated effect of



hyperarousal symptoms in the association between CASA and FR also was significant (Estimate = .03,  $SE = .01$ ,  $p < .05$ ) and accounted for 8% of the variance in FR. However, hyperarousal symptoms fully mediated the association between CASA and IR/DAFR only, as the previously significant path (.09,  $p < .05$ ) became nonsignificant (.03,  $p = .39$ ) in the presence of the mediator. For the association between CASA and FR, this previously significant direct path (.21,  $p < .001$ ) remained statistically significant (.16,  $p < .001$ ) in the presence of the mediator.



**Figure 1.** Model of relationships between CASA, reexperiencing, avoidance, hyperarousal, IR/DAFR, and FR

**Note:** For the paths between CASA and IR/DAFR and FR, the number before the backslash represents the path coefficient for the direct relationships whereas the number after the backslash represents the coefficient for the mediated relationship.

**Additional Exploratory Analyses**

In examining our primary mediational findings, several additional questions arose regarding the generalizability of the model to college women with more diverse ethnic backgrounds, the temporal ordering of the variables in this cross-sectional study, and the specific aspects of hyperarousal that might account for the linkages between CASA and adult rape. To shed light on these questions, we conducted exploratory analyses as described below.

*Generalizability to ethnically diverse college women*

Because white women ( $n = 539$ ) were more likely than ethnic minority participants ( $n = 175$ ) to endorse IR/DAFR, we also tested the model depicted in figure 1 separately for these two groups. For white women, the model fit the data well,  $\chi^2(1, 539) = 3.5$ ,  $p = .06$ , CFI = .99, RMSEA = .07; SRMR = .02, and hyperarousal symptoms served as a significant pathway from CASA to IR/DAFR and FR. However, for ethnic minority women, although the model fit the data well,  $\chi^2(1, 175) = 0.10$ ,  $p = .57$ , CFI = 1.0, RMSEA = .001; SRMR = .004, neither

CASA nor any of the PTSD symptom clusters were significantly associated with either IR/DAFR or FR, suggesting that the mediational relationship observed earlier applied only to white women.

#### *Temporal ordering of study variables*

Although initial findings were consistent with our hypothesis that PTSD symptoms accounted for the link between CASA and revictimization, PTSD symptoms were assessed within the timeframe of the past month, which raises the possibility that the temporal ordering of variables is reversed such that IR/DAFR and FR actually preceded the observed PTSD outcomes. We therefore tested an alternative model in which FR and IR/DAFR were predicted to mediate the link between CASA and the PTSD symptom clusters. Compared to our primary model, fit indices for this alternate model were not as strong,  $\chi^2 = 45.6$ ,  $p < .001$ , CFI = 0.98, RMSEA = .25; SRMR = .05, lending additional support for our hypothesized model.

#### *Specific hyperarousal symptoms linking CASA to adult rape*

Finally, because the hyperarousal cluster of PTSD contains several different symptoms (i.e., sleep problems, concentration difficulties, anger/irritability, hypervigilance, and exaggerated startle) that often do not load highly on a single factor (McWilliams, Cox, & Asmundson, 2005), we broke this cluster into its constituent parts to better pinpoint specific symptoms that may contribute to IR/DAFR. Although bivariate correlations revealed that all five hyperarousal symptoms were significantly associated with both forms of victimization ( $r$ s ranged from .12 to .23), multivariate logistic regression models predicting each form of victimization from the five hyperarousal symptoms (each measured by a single item of the PCL) revealed that sleep problems predicted only IR/DAFR ( $B = .29$ ,  $SE = .12$ ,  $p < .01$ ), and anger/irritability predicted both IR/DAFR ( $B = .35$ ,  $SE = .12$ ,  $p < .01$ ) and FR ( $B = .55$ ,  $SE = .12$ ,  $p < .001$ ). Concentration difficulties, hypervigilance, and startle were not related to either form of victimization in multivariate models.

## **Discussion**

The present study examined the role of PTSD symptoms, particularly hyperarousal, in mediating links between CASA and IR/DAFR and FR among college women. Rates of CASA (33%) were comparable to those found in other college samples (e.g., Gidycz et al., 1993). Although our finding that 18% of college women reported IR/DAFR is consistent with estimates obtained in other studies using similar assessment measures (e.g., 19.4%; Walsh et al., under review), these estimates are substantially higher than Kaysen and colleagues' (2006) finding that 9% of women reported rape involving *voluntarily* use of alcohol or drugs by the victim. Whereas Kaysen et al. used a single question asking about "forced sex" that participants were too drunk to prevent, the present study included three questions inquiring about instances of vaginal penetration, oral or anal sex when participants were unable to consent due to the use of alcohol or drugs. Sensitivity in detecting IR/DAFR in the present study may have been enhanced by the use of multiple behaviorally specific questions assessing unwanted sexual experiences while incapacitated by alcohol or drugs. Further,

in contrast to Kaysen et al., the present study did not separately examine substance-facilitated (i.e., a perpetrator intentionally gives alcohol or drugs to a victim) and incapacitated rape (i.e., a victim willingly consumed alcohol or drugs); thus, it is possible that the inclusion of both forms of victimization accounts for the higher rates of IR/DAFR found here. The discrepant rates of IR/DAFR obtained across studies highlights a need for researchers to uniformly operationalize and assess IR/DAFR.

As hypothesized, a history of CASA was positively associated with both IR/DAFR and FR. Although the forcible rape finding corroborates prior work (Arata, 2002; Risser et al., 2006), the CASA-IR/DAFR association is novel and suggests the existence of a unique variant of revictimization that rarely has been the focus of previous studies. The variance accounted for by CASA and PTSD symptoms in IR/DAFR was small, reflecting the likelihood that this form of adult sexual victimization results from a complex set of influences that may also include perpetrator characteristics and contextual factors (e.g., social isolation). Future work could examine the interplay of CASA with these factors to further illuminate the etiological influences responsible for substance-involved revictimization. Nonetheless, the present findings highlight early abuse experiences as an important distal risk factor that should be included as a part of more complex, multivariate models of IR/DAFR.

As expected, a detailed analysis of the specific contributions of each of the PTSD reexperiencing, avoidance, and hyperarousal symptom clusters revealed that hyperarousal was the sole mechanism through which CASA was related to both IR/DAFR and FR. These findings extend research identifying hyperarousal as a pathway to more general sexual revictimization (Risser et al., 2006), and illuminate the role of hyperarousal in predicting revictimization specifically involving victim substance use. In contrast to other symptoms of PTSD, hyperarousal difficulties may be more likely to trigger coping-motivated drinking to achieve some degree of symptom relief. Unfortunately, such attempts may result in substance use to the point of altered cognitive (e.g., information processing) and physical capabilities (e.g., incapacitation) leading to increased risk for revictimization (Testa & Parks, 1996). Moreover, although Risser and colleagues proposed that hyperarousal symptoms in general may reduce the ability to distinguish between true threats and false alarms, our analyses identified anger/irritability and sleep difficulties as particular aspects of hyperarousal that may contribute to this process. In the context of PTSD, anger/irritability and sleep difficulties are characterized by heightened physiological arousal that may be especially ameliorated by the sedative properties of alcohol (Waldrop, Back, Sensenig, & Brady, 2008).

Importantly, analyses accounting for ethnic differences showed that the mediational effects of hyperarousal were supported only among white women. One explanation for the nonsignificant finding among ethnic minority women is that this group may be less likely to disclose assault experiences, perhaps due to fear of negative reactions, including disbelief, from others (e.g., Ullman, Starzynski, Long, Mason, & Long, 2008). Alternatively, most ethnic minority women in the present study were recruited from meetings of campus organizations (e.g., the Mexican-American Student Association). African American and Latina female college students have been shown to better control their alcohol consumption relative to European American female college students (Babb, Stewart, & Bachman, 2012); thus it is conceivable that participants from those organizations may have been less active

in drinking and social activities associated with sexual assault risk. Further, due to small cell sizes, we were unable to examine differences in sexual assault risk between women from different ethnic backgrounds. However, there is evidence that drinking patterns differ across ethnic groups (e.g., Chen & Jacobson, 2012), therefore future research should attempt to examine differences between ethnic groups in terms of substance-involved sexual assault risk. Additional research is needed to understand the pathways to sexual victimization and revictimization among ethnic minority college women.

Findings from the current investigation should be considered in the context of study limitations. As noted, the cross-sectional design and the measurement timeframe for PTSD symptoms limit conclusions about the temporal sequencing of the relationships between CASA, PTSD symptoms, and revictimization. Findings from our alternate analyses examining IR/DAFR as a mediator lend some support for our model as originally proposed (with PTSD mediating IR/DAFR). These findings also fit with prior results that 63% of CSA victims identified the onset of PTSD symptoms as occurring prior to adult revictimization (Arata, 1999). Nevertheless, longitudinal studies are needed to provide further evidence that PTSD symptoms reported by CASA victims in fact precede adult revictimization. Finally, although college students are at high risk for IR/DAFR, this group represents a subset of victimized women who are likely to be higher in functioning and experience less severe PTSD symptoms than general community or clinical samples. The present findings suggest the importance of examining this pathway among noncollege women, as well as those who meet diagnostic criteria for PTSD. It also will be important for future studies to assess PTSD symptoms specifically related to CASA experiences to improve our understanding of these relationships.

Although IR/DAFR by definition involves heavy episodic drinking or illicit drug use, these behaviors, including degree of intoxication, were not directly measured in the present study. To more fully elucidate the processes that contribute to IR/DAFR, it will be important to investigate relationships between CASA, PTSD symptoms, heavy episodic drinking or illicit drug use, degree of intoxication (e.g., legally intoxicated but functional, blacked out, passed out), and IR/DAFR. Moreover, although alcohol is the substance most often implicated in rape (Abbey et al., 2004), other drug use has also been linked to sexual assault (Krebs, Lindquist, Warner, Fisher, & Martin, 2009; Messman-Moore et al., 2008); thus, future research might discriminate between alcohol and other drug-involved assaults. Future studies also could assess the role of alcohol use as a gateway to other concomitant forms of drugging, including voluntary (e.g., marijuana) and involuntary (e.g., rohypnol) substance consumption. For instance, in the context of a party, college students who are drinking may be more likely to also use other substances such as marijuana or cocaine, which may augment risk for victimization. Unbeknownst to women, perpetrators also may administer "date rape" drugs like rohypnol through alcoholic beverages, hoping that expectations of intoxication will mask the incapacitating effects of the drug until women are unable to escape the situation. There is also a need to further examine the interactive nature of victim and perpetrator substance use in compounding risk for sexual assault (e.g., Abbey et al., 2004).

Finally, future studies should examine motivations for drinking and drug use among women with CASA and PTSD symptoms. Although drinking or using drugs to cope with

the hyperarousal aspects of PTSD is one explanation for the links between CASA and IR/DAFR, another possibility is that substance use alleviates distress associated with sexual dysfunction or interpersonal difficulties commonly reported by CASA victims (Loeb et al., 2002), particularly in cases where women with sexual assault histories may use alcohol or drugs to overcome sexual inhibition (Sanjuan, Langenbucher, & Labouvie, 2009). To ameliorate problems with self-medicating to the point of incapacitation, it is crucial to understand motivations for substance use among CASA victims.

The present findings are among the first to implicate the hyperarousal component of PTSD as a pathway from CASA specifically to adult IR/DAFR. This finding may be helpful in developing more effective interventions to reduce the risk of IR/DAFR. Treating hyperarousal symptoms stemming from CASA, particularly sleep difficulties and increased anger or irritability, and associated coping responses (e.g., substance abuse) may reduce the risk of revictimization in the form of IR/DAFR among CASA victims. Interventions that teach women to employ less risky cognitive and behavioral coping responses (e.g., relaxation) when experiencing heightened irritability and sleep difficulties may be especially beneficial.

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