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## The Association of Trauma and PTSD with the Substance Use Profiles of Alcohol and Cocaine Dependent Out-of-Treatment Women

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### Abstract

The association of trauma and PTSD with alcohol and cocaine use is explored to determine if there is additive risk associated with dual dependence. Data were collected from out-of-treatment women enrolled in an HIV-prevention study. Women who experienced a DSM-IV qualifying event (N=791) were stratified into four substance use groups based on lifetime alcohol and cocaine use. Women with lifetime co-morbid alcohol and cocaine dependence experienced significantly more traumatic events, had a higher prevalence of violent events and lifetime diagnosis of PTSD and PTSD-related impairment. There is added risk for associated trauma and subsequent PTSD among women who have dual substance dependence.

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The co-morbidity of substance use and post-traumatic stress disorder (PTSD) is well documented in the existing literature. A debate continues over which is most likely to occur first, the trauma or the substance use. Cottler et al. found that the onset of traumatic event exposure and drug use were nearly identical in women but among men drug use preceded event exposure.<sup>1</sup> Breslau et al. found prospective and retrospective evidence of increased risk for the onset of drug abuse or dependence in persons with PTSD and that there is some indication of a shared vulnerability to PTSD and substance use by those who experience a traumatic event.<sup>2</sup> While the debate may continue, the fact remains that the presence of either trauma or substance use makes individuals more likely to report the occurrence of the other as well as subsequent PTSD. Such was the case when addictive risk was examined among a sample of trauma inpatients.<sup>3</sup> This may be especially salient for women as studies indicate that being female can increase the chance of being dually diagnosed with cocaine dependence and PTSD<sup>4</sup> and women with PTSD have been found to be over four times more likely than non-PTSD women to have drug abuse or dependence.<sup>5</sup> Similarly, women in a general population study were found to have an increased risk for alcohol use disorder if they were exposed to trauma even if PTSD was not present.<sup>6</sup>

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Several studies have examined the co-morbid association of substance use and PTSD among substance-using women. Falck et al. assessed DSM-IV PTSD among crack cocaine users not in treatment finding that 18.9% of the women had co-morbid PTSD.<sup>7</sup> Najavits et al. assessed a sample of cocaine dependent outpatients and found that 21.6% of those women had current PTSD.<sup>8</sup> Similarly, Back et al. found a 42.9% rate of PTSD among their cocaine dependent sample.<sup>9</sup> Johnson et al. found that the early onset of alcohol use and alcohol dependence was associated with trauma exposure and the subsequent development of PTSD among a sample of active substance users but this was not so for cocaine dependence.<sup>10</sup>

Studies examining both alcohol dependence and cocaine dependence simultaneously as they relate to traumatic exposure, event type and/or PTSD are limited by small and/or treatment samples or the restricted assessment of traumatic events.<sup>3,11-14</sup> Back et al. conducted an assessment examining substance-specific profiles of PTSD among a small sample of female treatment seekers (n=74) and found that women with alcohol dependence and PTSD had more accident-related events but did not differ in terms of physical or sexual traumas from women with cocaine dependence and PTSD.<sup>12</sup> In a larger treatment study which was majority male, Drissen et al. found that trauma exposure (unspecified events) were not significantly different across substance dependent or co-morbid dependence groups, yet, PTSD was more prevalent with co-morbid dependency.<sup>13</sup> Pierce et al. found in a sample of substance dependent patients that alcohol dependence was related to PTSD; however, specific events were not considered across substance groups and co-morbid substance dependence was not assessed.<sup>14</sup>

The present analyses seek to build on the existing literature by distinguishing between alcohol and cocaine dependence and the dual association of both dependencies on traumatic event type and PTSD development among a relatively large sample of active substance using women who have experienced at least one qualifying traumatic event. It is hypothesized that co-morbid substance dependence will have greater association with traumatic event exposure and PTSD and that there will be distinct differences in types of events across substance use profiles.

## Method

### Design

Data for these analyses were collected during two concurrent community-based HIV prevention studies focused on reducing high-risk sexual and drug use behaviors among drug using females (Women Teaching Women-WTW-NIDA funded) and heavy alcohol using females (Sister to Sister –STS -NIAAA funded). Changes in risk were assessed with standardized assessments at baseline, at a 4 month follow-up and at a 12 month follow-up. Only baseline data were utilized in the present analyses.

Baselines were conducted between 2000 and 2004 after Washington University School of Medicine IRB approval was obtained. Protocol for both studies involved non-probability sampling methods as women were simultaneously recruited through a street outreach method to identify women who were most at-risk for the targeted behaviors. Community health outreach workers familiar with the targeted neighborhoods and the drug culture

approached women and provided a brief description of the study. The women were given a voucher with information for the study and the women's contact information was obtained. When contact was made by project staff, women were screened for study eligibility.

## Sample

Criteria for eligibility for the WTW study included female gender; at least 18 years of age, testing HIV sero-negative at baseline, and testing positive through urine analysis for cocaine, heroin or amphetamines in the past 30 days. STS women also had to be at least 18 years of age and had to meet the threshold for problem drinking as determined by the Alcohol Use Disorders Identification Test (AUDIT) while testing negative for cocaine, heroin and amphetamine use. Contact through street outreach was made with 5,551 women. Forty-nine percent ( $n=2,717$ ) of these women were initially eligible based on study criteria. Of the women deemed eligible, the projects were unable to later locate 27%; 26% did not show for interviews; 13% had no interest in participating in the study and another 2% did not complete the interview process. The remaining 32% ( $n=858$ ) completed baseline assessments.

Only women who reported experiencing at least one DSM-IV qualifying event ( $n=791$ ), as assessed with the Computerized Diagnostic Interview Schedule Version IV (*C-DIS*)<sup>15</sup> were included in the present analyses. The majority of women were African American (81%) and ranged in age from 18 to 67 years with a mean age of 35.83 ( $SD=8.88$ ). Forty-three percent of the women had not obtained a high school diploma or GED. A small proportion of the women (21%) were employed either full or part-time and almost half (48%) received income from welfare, public assistance or AFDC over the previous 12 months. Nearly a third (29%) of the women considered themselves to be homeless; 40% reported residing in their own home or apartment. A significant percentage of the women (64%) had never been married; the sample had a mean of 2.77 ( $SD=2.29$ ) children. A small percentage of women (7%) self-reported poor health.

## Measures

The study assessed, via the *C-DIS*, DSM-IV PTSD, depressive disorder and antisocial personality disorder. The Washington University Risk Behavior Assessment for Women (*WU-RBA-W*) queried information regarding demographics. In addition, the Substance Abuse Module<sup>16-17</sup> elicited DSM-IV substance dependence criteria to make diagnosis.

*PTSD* was determined by asking the respondents about terribly frightening or horrible events they may have had at any time in their life. The events were: military combat related events, being shot or stabbed, being mugged, being raped by a relative or raped by a non-relative, being in a disaster, exposure to radiation, untimely death of a close friend or relative, being held captive, diagnosis of a life-threatening illness, being in a serious accident, witnessing a serious injury or killing, and discovering a dead body. Those who answered yes to a qualifying traumatic event were then asked specific follow-up questions which assessed DSM-IV PTSD criteria for the most terrifying event. Both lifetime and current (active within the last year) PTSD was assessed along with lifetime and current PTSD, impairment and treatment.

## Analysis

For comparison across substance classification, the women were grouped by lifetime history of the severity of the consequences of their substance use. Four mutually exclusive groups were used: 1) women who never met criteria for alcohol or cocaine dependence (non-dependent-ND); 2) women who met criteria for alcohol dependence but not cocaine dependence (AD only); 3) women who met criteria for cocaine dependence but not alcohol dependence (CD only); and 4) women who met criteria for both alcohol and cocaine dependence (co-morbid AD/CD).

Data were assessed using the SAS 9.2 statistical program. Multinomial logit models were performed using the CATMOD procedure to assess risk factors across the 4 groups using the non-dependence group as the referent group. Odds ratios were determined by exponentiating the variable coefficients and reporting associated p-values.<sup>18</sup> Bivariate level comparisons were conducted with chi-square tests for categorical data and with ANOVA tests for interval level data.

## Results

The 791 women were fairly evenly distributed in terms of their dependence history with 29% (n=231) never meeting criteria for alcohol or cocaine dependence; 26% (n=204) in the AD only group; 17% (n=135) with CD only; and the remaining 28% (n=221) with a history of co-morbid AD/CD. Women in the CD only group (M=38.01; SD=6.30) and those in the dual AD/CD group (M=38.18; SD=7.06) were significantly older than women in the AD only group (M=33.16; SD= 9.63) and women in the ND group (M=34.35; SD= 9.88) {F=15.88; p<.0001}.

As shown in Table 1, the women did not differ by race, education, welfare receipt, or health status. However, marital status did vary; women with CD only (OR=.52; p=.003) and women with co-morbid AD/CD (OR=.63; p=.02) were less likely to never marry or in other words more likely to have married than women in the ND group. Women who had dual alcohol and cocaine dependence were more likely to be unemployed (OR=.57; p=.02) and to not live in their own residence (OR=.61; p=.01) when compared to women to the ND women. When homelessness was assessed, each of the dependence groups (AD, CD & AD/CD) had an increased likelihood of reporting homelessness compared to the ND women. The likelihood of homelessness increased by severity; with the AD/CD group most likely to consider themselves homeless (41%; OR=3.38; p<.0001).

## Traumatic Event Exposure

All of the women included in these analyses had experienced at least one of the potentially traumatic events assessed. The women experienced an average of 4.85 events (SD= 2.61). The mean number of events experienced was significantly higher as the classification of substance use intensified (F=18.39; p<.0001). Women who did not meet any dependence criterion (ND) reported the least number of traumatic events (M= 4.09 events; SD=2.42). Women with alcohol dependence only experienced 4.66 events (SD=2.50). The CD only group experienced 4.84 events (SD=2.53) and the co-morbid AD/CD group experienced

5.83 events ( $SD=2.65$ ). The age of onset for the occurrence of the potentially traumatic event that caused the most problems for the women also differed significantly ( $F=4.62$ ;  $p=.003$ ). The CD only women reported being older when they experienced this problematic event ( $M=26.51$ ;  $SD=10.19$ ) than women with either AD only ( $M=22.41$ ;  $SD=10.49$ ) or women with ND ( $M=21.40$ ;  $SD=10.36$ ).

As indicated in Table 2, the prevalence of events differed significantly across the substance use groups with the co-morbid AD/CD group being the most dissimilar to the ND users. Rape was the one event that distinguished each of the dependent groups from the non-dependent group. Compared to ND women: AD only women were more likely to report rape by a relative ( $OR=1.77$ ;  $p=.02$ ); CD only women were more likely to report non-relative rape ( $OR=1.86$ ;  $p=.001$ ); AD/CD women were over two times more likely to report being raped by a relative ( $OR=2.44$ ;  $p=.0001$ ) and more than three times more likely to report rape by a non-relative ( $OR=3.40$ ;  $p<.0001$ ). Being held captive was an event that differed for women in the CD only ( $OR=2.29$ ;  $p=.002$ ) and AD/CD groups ( $OR=3.68$ ;  $p<.0001$ ) when each was compared to ND women. The unexpected death of a friend or relative also differed for CD only women ( $OR=1.88$ ;  $p=.03$ ) and AD/CD women ( $OR=2.01$ ;  $p=.005$ ) when compared to ND women. In addition, dual AD/CD women were more likely to report a life threatening illness ( $OR=1.85$ ;  $p=.04$ ); a serious accident ( $OR=1.69$ ;  $p=.01$ ) and a friend or relative event ( $OR=1.70$ ;  $p=.01$ ); being mugged ( $OR=2.61$ ;  $p<.0001$ ); and some other terrible event ( $OR=2.80$ ;  $p<.0001$ ) than were ND women.

## PTSD

Lifetime PTSD developed in 33% of the women exposed to a traumatic event. As indicated in Table 3, the dependence groups were more likely to meet criteria for PTSD than the ND group. Women in the AD only group and women in the CD only group were more likely to have PTSD and related symptomatology than the ND group, however the AD only group was the only group that was less likely to report the desire for or receipt of PTSD-related treatment ( $OR=.21$ ;  $p=.01$ ). Dually diagnosed AD/CD women, compared to ND women were over three times more likely to meet criteria for PTSD ( $OR=3.06$ ;  $p<.0001$ ), re-experience the event ( $OR=3.32$ ;  $p<.0001$ ), avoid stimuli ( $OR=3.33$ ;  $p<.0001$ ), and report increased arousal ( $OR=3.60$ ;  $p<.0001$ ). They were also more likely to report PTSD-related impairment ( $OR=3.39$ ;  $p<.0001$ ) compared to ND women.

## Discussion

Knowledge regarding the differential association between substance use and PTSD is limited due to the lack of examination of varied substance use classifications simultaneously.<sup>19</sup> The present analyses sought to further explore the relationship that substance use disorder has with trauma exposure and PTSD among women with problematic substance use. By stratifying the women based on diagnostic criteria for substance dependence, substance using women who did not meet dependence criteria were evaluated separately from those who had alcohol dependence, cocaine dependence, or dual alcohol and cocaine dependence. Previous research contrasting the associations of alcohol and cocaine dependence with PTSD and trauma indicate that AD has a stronger association with PTSD

symptomatology and that cocaine dependence has greater association with social and occupational impairment defined as shorter duration of employment, fewer days worked in the past month, and lower monthly income.<sup>12</sup>

Research indicates that problematic alcohol use is known to worsen symptoms of PTSD and lead to psychological trauma.<sup>20</sup> Though unable to ascertain causality in the present analyses, women's dependence, whether alcohol or cocaine, was significant to the exposure to certain types of traumatic events when they were compared to those women who had problematic use but did not meet dependence criteria. Analyses not presented indicate that the difference in association between alcohol dependence and cocaine dependence with trauma exposure was in the occurrence of one traumatic event (being held captive) and the groups did not differentially report lifetime PTSD symptoms or PTSD diagnosis. This finding indicates that dependence on alcohol is just as significant to PTSD development as cocaine dependence.

Co-morbid alcohol and cocaine dependence had greater association with certain types of events and PTSD symptom criteria. The events were those that involved personally experienced violence such as being mugged, raped or held captive. The fact that the association for these events was not as strong for cocaine and not present at all for non-dependence and alcohol dependence only indicates that the co-morbid nature of the substances may lead to a higher degree of susceptibility than would be expected among women with one substance dependence. This is partially supported by other research that indicated poly-substance dependence and PTSD led to more reports of self-harm and suicidal behavior.<sup>21</sup> It is possible that dual dependence is a response to certain types of traumatic exposure or serves as a precipitator to enhanced vulnerability to certain types of exposure. Additional research is needed to fully understand this association. Impairment was clearly more associated with dependence on substances than was substance use in the absence of dependence. A similar finding in previous research was that cocaine dependence was uniquely associated with negative life perception of daily hassles.<sup>22</sup>

Several limitations should be noted prior to a discussion of implications. Due to the retrospective nature of these data, the analyses are limited to estimates of prevalence of exposure to traumatic events, PTSD and substance use disorders and the associations between them. In addition, the C-DIS did not include chronic traumas or stressors that could occur in the respondents' lives such as childhood chronic victimization. The data presented are self-reported, thus resulting in some potential bias including recall bias, as subjects are required to remember events that may have occurred many years earlier. The only situation when this could present bias is if co-morbid women were more likely to remember and report PTSD symptoms than non-co-morbid women. Further, these data are limited in their ability to test non-study specific hypotheses as these data were collected to examine high-risk sexual and drug use behaviors in response to an intervention and not trauma exposure per se. Given that the sample was majority African American and from lower socio-economic status, the generalizability of these results to other women with or without substance dependence is limited. The results may also be influenced by selection bias as only 32% of women initially deemed eligible for inclusion in the study eventually completed baseline assessments. It is possible that substance use patterns and exposure to traumatic

events differed between women not completing assessments and women included in these analyses.

Notwithstanding these limitations, the findings have important research and treatment implications. The current analyses suggest that women who have substance use dependence may have more impairment following a traumatic event and addressing the impairment issue could rely heavily on simultaneously addressing the dependence. In terms of event exposure, illicit drug use appears to both contribute to event exposure in terms of prevalence of events and subsequent diagnosis. The cycle of trauma exposure and substance use can be a volatile one<sup>23</sup> and the need for an integrated treatment model that simultaneously addresses both issues has support within the literature.<sup>24-25</sup> In fact, there is some evidence that women with the most severe presentation of PTSD and substance co-morbidity respond the best to treatment efforts.<sup>26</sup> Support for integrated models of treatment could be enhanced with additional research that examines the effectiveness of such models in addressing trauma exposure, PTSD, and the use of and dependence on varying types of substances among drug using populations.

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**Table 1**  
**Demographic Characteristics Based on Status of Substance Use Diagnosis among Women with a Qualifying Event (N=791)**

	Non-Dependence (ND) N=231	AD Only N=204	CD Only N=135	Co-morbid AD/CD N=221
	%	% OR* (p-value)	% OR* (p-value)	% OR* (p-value)
Black/African American	83	76	85	79
Never Married	69	73	53 .52 (.003)	58 .63 (.02)
No diploma/GED	47	41	42	42
Work full or part-time	26	19	21	17 .37 (.02)
Welfare recipient	51	42	52	45
Living in own residence	46	43	36	34 .61(.01)
Homeless	17	26 1.77 (.02)	33 2.46 (.0004)	41 3.38 (<.0001)
Poor health status	7	8	7	7

\* Comparisons use CATMOD procedures in SAS with the non dependent group (neither) as the referent category.

**Table 2**  
**Event Prevalence Based on Status of Substance Use Dependence and the Presence of a Qualifying Event (N=791)**

Event	Non- Dependence (ND) N=231	AD Only N=204	CD Only N=135	Co-morbid AD/CD N=221
Events (mean)*	4.09 SD=2.42	4.66 SD=2.50	4.84 SD=2.53	5.83 SD=2.65
	%	% OR <sup>†</sup> (p-value)	% OR <sup>†</sup> (p-value)	% OR <sup>†</sup> (p-value)
Stabbed or shot	24	23	27	31
Mugged	48	55	57	71 2.61 (<.0001)
Raped by relative	15	24 1.77 (.02)	21	30 2.44 (.0001)
Raped by non-relative	42	51	58 1.86 (.001)	71 3.40 (.0001)
Disaster	28	32	27	32
Death of friend/relative	75	80	85 1.88 (.03)	86 2.01 (.005)
Held captive	14	17	27 2.29 (.002)	38 3.68 (<.0001)
Life threatening illness	7	11	8	15 1.85 (.04)
Serious accident	28	31	25	40 1.69 (.01)
Witness accident/killing	45	49	51	52
Discovered dead body	23	21	25	24
Friend/relative event	42	50	52	55 1.70 (.01)
Other terrible event	15	22 1.64 (.05)	19	33 2.80 (<.0001)

\* F=18.39; p<.0001

<sup>†</sup> Comparisons generated with CATMOD procedures in SAS with non-dependence as the referent category.

**Table 3**  
**Comparisons of PTSD Symptomatology Across Alcohol and Cocaine Dependency**  
**Diagnosis among Women with a Qualifying Event (N= 791)**

	Non-Dependence (ND) N=231	AD Only N=204	CD Only N=135	Co-morbid AD/CD N=221
	%	% OR* (p-value)	% OR* (p-value)	% OR* (p-value)
PTSD (Lifetime)	19	28 1.74 (.02)	30 1.84 (.02)	41 3.06 (<.0001)
Criterion B met (Lifetime)	44	60 1.92 (.001)	60 1.90 (.004)	72 3.32 (<.0001)
Criterion C met (Lifetime)	33	50 1.96 (.001)	44 1.60 (.03)	62 3.33 (<.0001)
Criterion D met (Lifetime)	39	54 1.83 (.002)	57 2.08(.001)	70 3.60 (<.0001)
PTSD Impairment (Lifetime)	14	27 2.30 (.001)	27 2.35 (.002)	35 3.39 (<.0001)
PTSD (Current)	14	22 1.71 (.04)	27 2.26 (.003)	30 2.71 (<.0001)
PTSD-related Treatment (Current)	45	18 .21 (.01)	31	36

\* Comparisons generated with CATMOD procedures in SAS with non dependence as the referent category.