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Predictors of Violence Following Emergency Department Visit for Cocaine-Related Chest Pain

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Abstract

This study examined one-year violence outcomes among non-injured patients treated in the Emergency Department (ED) for cocaine-related chest pain. An urban Level I ED required patients with chest pain (age 60 and younger) provide a urine sample for cocaine testing. Cocaine-positive consenting patients (n=219) were interviewed in the ED; 80% completed follow-up interviews over 12-months (n=174; 59% male, 79% African-American, mean age = 38.8, standard deviation 9.06; range = 19 to 60). Baseline rates of past year violent victimization and perpetration history were: 38% and 30%, respectively. During the 12-month follow-up, rates of victimization and perpetration outcomes were 35% and 30%, respectively. Predictors of violence outcomes (either victimization or perpetration) in the year post-ED visit based on characteristics measured at baseline or during the follow-up period (i.e., gender, age, psychological distress, binge drinking days, cocaine use days, marijuana use days, substance abuse/dependence diagnosis, victimization/perpetration history).

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Steve Chermack, Consultant on the assessment of violence measures, was involved in the conceptualization and data analysis models for the paper and co-wrote the Discussion section, and reviewed/edited the manuscript.

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Victimization during the follow-up was related to younger age, more frequent binge drinking and marijuana use at baseline, and victimization history, and to substance abuse/dependence, more frequent binge drinking, and psychiatric distress at follow-up. Specifically, participants who reported victimization at baseline were approximately 3 times more likely to report victimization at 12-month follow-up. Perpetration during the follow-up was related to younger age and more frequent binge drinking at baseline, and to substance abuse/dependence, more frequent binge drinking, and psychiatric distress at follow-up. Overall, no significant gender differences were observed in violence; however, women were more likely than men to report injury during the most severe partner violence incident. Violence is a common problem among patients presenting to an inner city ED for cocaine-related chest pain, with younger age and frequency of binge drinking being a consistent marker of continued violence involvement. Intervention approaches to link these not-in-treatment cocaine users to services and reduce cocaine use must take into account concomitant alcohol misuse and violence.

Keywords

Violence; Cocaine; Chest Pain; Emergency Department

Introduction

Morbidity and mortality in cocaine positive Emergency Department (ED) patients is most commonly due to violence-related injury, as opposed to other medical conditions resulting from their cocaine use. For example, in a large sample of cocaine positive ED patients, 23.9% of chief complaints were related to violent trauma (Mullen et al., 2001) and an autopsy study found the most common cause of death among cocaine positive patients was violent injury (37.5%) (Tardiff, 1988). Despite recommendations to ask all patients about drug and alcohol use, few EDs assess patients for illicit drug use if it does not relate to their direct acute care (D'Onofrio & Degutis, 2002; Lowenstein et al., 1990). An exception to this practice occurs with patients who present to the ED seeking care for chest pain. Because the medical management of cocaine related chest pain differs from that for non-cocaine related chest pain, standard of care in some urban EDs entails urine drug testing for cocaine use and observation in the ED or extended observation units for 8-12 hours (Weber et al., 2000). Chest pain is a common presenting medical complaint among cocaine users in inner-city EDs (Minor et al., 1991; Rich & Singer, 1991), with up to 25% of chest pain patients having positive urine drug screens for cocaine (Booth et al., 2005; Hollander et al., 1995; Qureshi et al., 2001). These patients, with documented cocaine use and extended ED stay for chest pain, provide an opportunity to examine violence issues, both history prior to ED visit, and longitudinal outcomes post-discharge. Findings from natural history studies of these cocaine-positive ED patients provide data that could be used in future brief interventions to link these patients to needed services.

Surprisingly, with a notable exception (Cunningham et al., 2007), few studies have examined violence issues, including victimization and perpetration in partner and non-partner relationships, among cocaine-positive patients in the ED. Cross-sectional research shows that rates of violence vary based on population: one-sixth from community surveys (Field & Caetano, 2005; Straus & Gelles, 1990); one-third among community samples of cocaine users (Falck et al., 2001; Siegal et al., 2000); between one-third and one-half among injured or cocaine-positive chest pain patients in the ED (Cunningham et al., 2003; Cunningham et al., 2007; Walton et al., 2007); and two-thirds among substance use treatment samples (Chermack et al., 2001; Fals-Stewart et al., 2002; Walton et al., 2002). To our knowledge no longitudinal studies have been published examining violence post-discharge among any medical or injured ED patients.

Theoretically, the relationship between substance use (including both cocaine and alcohol use) and violence is a function of acute intoxication effects (e.g., disinhibition), social/contextual factors (e.g., inner-city high crime environments), and individual difference factors (e.g., gender, psychiatric comorbidity) (Chermack & Giancola, 1997; Goldstein, 1985). For example, substances may be used to cope with depression, anxiety, and/or post-traumatic stress disorder resulting from experiencing violence, which is inherent to inner-cities (Rich & Grey, 2005). Alternatively, violence perpetration may be viewed as an effective strategy to prevent further victimization via the notion of the “code of the street” and avoidance of being labeled a “sucker” (Rich & Stone, 1996; Rich & Sullivan, 2001). A variety of studies have documented the relationship between substance use and violence including studies from laboratory (Chermack & Giancola, 1997; Hoaken & Stewart, 2003; Licata et al., 1993), substance use treatment (Brown et al., 1999; Chermack et al., 2001; O’Farrell et al., 1999; Straus and Gelles, 1990), domestic violence (Abbott et al., 1995; Melnick et al., 2002), and community survey (Cunradi et al., 1999) settings. More specifically, prior cross-sectional ED research has found that patients presenting with violent injuries report greater substance use and substance related consequences than patients presenting with unintentional injuries (Cherptel, 1997; Macdonald et al., 1999). Among injured patients, alcohol users were two times more likely, and illicit drug users were six times more likely to report past year violence than non-users/drinkers (Cunningham et al., 2003). Finally, a prior paper from this data set found that patients who reported more frequent binge drinking, marijuana use, and who met diagnostic criteria for substance use/dependence were more likely to report past year violence (Cunningham et al., 2007).

Longitudinal studies examining violence among substance users are non-existent among ED samples and are limited among substance use treatment samples (O’Farrell & Murphy, 1995; O’Farrell et al., 2004; Walton et al., 2002). Longitudinal studies of partner violence among alcohol treatment samples show that violence decreases post-treatment were mediated by reductions in problem drinking (O’Farrell & Murphy, 1995; O’Farrell et al., 2004). These studies have limited generalizability to ED studies of cocaine users because inclusion is restricted to men with a partner willing to participate in Behavioral Couples Therapy, and no information is collected regarding violence with non-partners. Another substance use treatment study examining partner and non-partner violence over a two-year period following substance use treatment found that victimization and perpetration were related to alcohol and marijuana use; cocaine use was related to victimization, but not perpetration (Walton et al., 2002).

Longitudinal ED studies are needed to examine rates and markers of violence (including both victimization and perpetration) over time, which may be particularly relevant for cocaine positive patients. Hypotheses were that baseline violence history (victimization and perpetration) would be related to violence during the 12-month follow-up period. Further, hypothesized baseline predictors of violence victimization and perpetration during the 12-month follow-up were younger age; more frequent binge drinking, cocaine use, and marijuana use; psychological distress; and substance abuse/dependence diagnosis. Based on our prior findings regarding the relationship between gender and violence in general ED samples (Cunningham et al., 2003; Cunningham et al., 2007; Walton et al., 2007), gender was not expected to be significantly related to violence. However, when examining the most severe incident of violence, it was expected that women would be more likely than men to report injury. Findings will help fill an important gap in the literature regarding violence outcomes among ED patients presenting with a common complication of cocaine use, chest pain, in order to inform interventions to address this population.

2.0 Method

2.1 Study Design and Setting

This natural history study used a consecutive cohort design of non-injured patients presenting to an inner-city ED Chest Pain Observation Unit (CPOU) (Hurley Medical Center in Flint, Michigan) with chest pain and recent cocaine use. The study was approved by the investigators' institutional review boards at the affiliated university and local hospital. This study was conducted at a Level I Trauma Center ED with a census of approximately 75,000 patients per year (see (Booth et al., 2005) for detailed information regarding methods). The standard of care in the study ED CPOU required that patients under age 60 undergo urine toxicologic screening for cocaine metabolites (Synchron ® LX Systems, Fullerton, CA; 95% sensitivity, 100% specificity) (Tietz, 1996), as the treatment for cocaine related chest pain differs from other cardiac disease. A detailed description of the CPOU protocol has been published previously, with the standard of care requiring at least a 9 hour observation period (Gibler et al., 1995).

2.2 Procedures

In order to maximize recruitment, research staff were present in the ED CPOU between the hours of 8 a.m. and 10 p.m., seven days per week between June 2002 through February 2004. Patients that underwent a cardiac work up overnight (10pm- 8am) were approached by the research assistant (RA) at 8 am prior to discharge from the CPOU. A two-phase enrollment procedure was used. During Phase 1 (initial screening), consecutive patients age 18-60 in the CPOU were approached by research staff to participate in the screening. Research staff obtained written informed consent to view patient medical records and documented the inclusion/exclusion criteria to determine eligibility for Phase 2. As an incentive, participants choose a \$1 gift from a basket (e.g., lotion, flashlight). Participants were eligible for Phase 2 if they met the following inclusion criteria and did not meet the exclusions noted below: age 18-60; positive toxicological urine screen for cocaine or, if urine screen results were incomplete, physician documentation in medical chart indicating treatment for cocaine-related chest pain and patient self-reported cocaine use. Patients at high risk for acute myocardial infarction were ineligible (see Booth et al. 2005 for medical criteria). Patients were also ineligible for the study if they were pregnant, unable to provide informed consent (e.g., unconscious, incarcerated, or non-English speaking), acutely suicidal (resulting in constant presence of designated hospital staff), or violent while in the ED (requiring restraint or hospital security monitoring). For Phase 2 participants, after providing written informed consent, a two-hour baseline interview was conducted during their ED stay by research staff (see Measures); remuneration was a \$25 gift certificate to a local retailer (e.g., grocery/clothing store). All participants were given information regarding local substance abuse treatment and HIV testing. Attempts were made to re-interview participants over a 12-month period (i.e., at 3, 6, and 12-months); only 12-month follow-up data are presented in this paper. A variety of procedures were used to track participants including: contacting participants via letters and phone calls sent prior to interviews; conducting interviews at a location of the participant's choice including homes, etc.; and, an additional \$5 incentive was provided for participants contacting the project (see Cunningham et al., 2008 for detailed methodology). Remuneration for the 12-month interview was \$50 with an additional \$10 for providing a urine drug screen to increase the accuracy of self-reports (see Thapa et al., In Press).

2.3 Participants

As detailed in a prior paper examining violence histories among the baseline sample of 219 (Cunningham et al., 2007), 2,342 potentially eligible individuals were initially screened with 94% participation (4% refused; 2% missed). The primary reasons for patient refusal to participate in Phase 1 were concerns about confidentiality, pain, fatigue or emotional stress.

Our Institutional Review Board did not permit review of medical records for patients who did not consent to participate in Phase 1 of the study. Among those who met study inclusion criteria, 302 were positive for cocaine use (based on either UDS or physician documentation in the medical chart that they were being treated for cocaine-related chest pain); of these, 219 participants (73% participation, 19% refused, 8% missed) agreed to take part in the study and 174 (80%) completed their 12-month interview. An attrition analysis compared participants who dropped out during follow-up with those who did not on demographic characteristics and substance use patterns. Results showed that males and those currently employed were significantly more likely to dropout at follow-up. Participants who completed follow-up and those who did not were similar with regard to their substance use.

Subsequent data are presented on the follow-up portion of the sample. The average age for the 174 participants was 38.8 years (standard deviation = 9.06; range = 19 to 60), with 59% of the sample being male (n=102), 79% African-American (n=137), 59% graduated from high school, and 73% reported income of less than \$20,000 per year.

2.4 Measures

The baseline and 12-month follow-up assessments contained a variety of measures including the Substance Abuse Outcomes Module (SAOM) (Smith et al., 1996; Smith Jr. et al., 1996), the Brief Symptom Inventory (BSI) to assess general psychological distress (Derogatis, 1993), the depression module from the Patient Health Questionnaire (PHQ) (Spitzer et al. 1999; Kroenke, Spitzer, & Williams, 2001), and, an expanded Conflict Tactics Scale (CTS) (Straus, 1990).

2.4.1 SAOM—The SAOM (American Psychiatric Association, 1993) (www.netoutcomes.net) was used to measure demographic information (i.e., age, gender, race, marital status, education, and employment status), substance use diagnoses (past 12-months at baseline; past 6 months at the follow-up interview), substance use frequency (past 28 days use) (Miller et al., 1995), and antisocial personality disorder (ASPD). Regarding alcohol consumption, the number of days involving binges (more than five drinks) was asked. For cocaine and marijuana, participants recorded the number of days they used each drug in the past four weeks. The SAOM has adequate reliability (internal reliability, coefficient α 0.58-0.90, test-retest reliability 0.56-0.99) and validity (concurrent validity generally 0.5-0.8, predictive validity 0.5-0.9) (McLellan et al., 1992; Smith et al., 2000). The SAOM has shown a 90-93% agreement with the CIDI-SAM on DSM-IV substance use diagnosis (present/absent) (Smith et al., 2000).

2.4.2. BSI—The BSI (Derogatis, 1993) measures of psychological distress and has good test-retest reliability for the sub-scales (reliabilities of 0.68-0.91), high internal consistency ratings (coefficient alphas of 0.71-0.85), and sensitivity to change (Derogatis, 1993). For this paper, the overall Global Severity Index (GSI) was used to indicate general distress.

2.4.3. PHQ-9—The nine-item depression module from the Patient Health Questionnaire (PHQ) was used to assess depression symptomatology (Spitzer et al. 1999; Kroenke et al., 2001). This measure has been shown to be a reliable and valid measure of depressive symptoms (e.g., Kroenke et al., 2001; Martin, Rief, Klaiberg, & Braehler, 2006). Participants respond to symptoms in the past two weeks, with a score of 10 or more indicating evidence at least “moderate” depression (e.g., 5 or more items occurring “more than half the days”) (Kroenke et al., 2001).

2.4.3. CTS—The expanded version of the CTS 143 (Straus, 1990) asked participants to rate the frequency of aggressive behaviors that occurred during the past 12 months across a variety

of relationship types. Thus, the questions asked about victimization and perpetration of violence in disputes and disagreements with partners/spouses and with non-partners (i.e., friends, strangers and acquaintances, bosses, coworkers and people in bars). The frequency response scale from the original CTS was retained. For each of these two relationship types, violence typologies were constructed to classify the severity of both violence victimization and perpetration. Based on violence severity scales identified in previous factor analysis studies with the CTS (Straus and Gelles, 1990), participants were grouped into the following categories, no violence, moderate violence (i.e., pushing, grabbing or shoving; slapping; hitting, punching, or kicking), or severe violence (i.e., beating up; hitting with a hard object; threatening with a knife or gun; and using a knife or gun). This modified measure has been used in prior papers (Chermack and Walton, 1999; Chermack et al., 2001; Walton et al., 2002). Further, participants were asked additional questions regarding the most severe violent event including whether they or the other person involved in the incident used alcohol or cocaine prior to or during the event, and whether the incident resulted in injury requiring medical attention.

2.5 Data Analysis

Data were analyzed using SAS 9.1 (Cary, NC). First, descriptive statistics were computed for baseline and follow-up violence perpetration and victimization. Agreement over time between baseline violence history (perpetration and victimization) and violence (perpetration and victimization) post-ED visit during the 12-month follow-up was calculated using McNemar's statistics. Because the dynamics underlying violence processes for victimization and perpetration may differ and because ~ 40% of participants reported victimization or perpetration only (and not both), we elected to analyze data separately for any violence, victimization, and perpetration variables. Second, initial bivariate analysis (e.g., Chi-square for categorical variables and Wilcoxon Rank test continuous variables due to non-normal distributions) compared the any violence, victimization, and perpetration groups separately with baseline and 12-month follow-up variables (demographic, substance use, and psychosocial variables), which were selected based on hypotheses. Third, parallel, separate multivariate logistic regression analyses were conducted predicting any violence, victimization, and perpetration status at 12-months using either baseline variables or variables measured at 12-month follow-up. Variables were selected for inclusion in models based on hypotheses (i.e., gender) and review of bivariate analyses (i.e., variables that were significant at the $p < .05$ level either at baseline or at 12-month interview) and included: age, gender, substance abuse/dependence diagnoses, binge drinking, cocaine use, marijuana use, and distress from the BSI. Note that for the model examining baseline variables as predictors of violence during the follow-up interval, baseline victimization and perpetration were added to control for prior violence. Finally, because depression and psychological distress were highly correlated, we elected to include only one mood variable (i.e., distress) in the model; however, findings were nearly identical when data was analyzed with depression replacing distress in the model (data not shown).

3.0 Results

3.1 Comparisons between Violence Victimization and Perpetration at Baseline and 12-months

Overall, rates of involvement with any past year violence (perpetration or victimization) was 46% at baseline (19% moderate, $n=33$; 26% severe, $n=44$) and 41% (17% moderate, $n=29$; 24% severe, $n=41$) at 12-month follow-up. Baseline rates of past year victimization and perpetration were 38% and 30%, respectively. Among those reporting baseline violence, 53% reported both victimization and perpetration, and 47% reported either victimization or perpetration. During the 12-month follow-up, rates of victimization were 35% and rates of

perpetration were 30%; among those reporting violence during the 12-month follow-up, 61% reported both victimization and perpetration, and 39% reported either victimization or perpetration. Table 1 shows the rates in percent of participants reporting violence victimization and perpetration at baseline and 12-months, and the relationship between these violence variables over time. Baseline victimization was not significantly related to follow-up victimization or perpetration (McNemar statistics = 0.14 and 2.12; $p > .05$, respectively). Similarly, baseline perpetration was not significantly related to follow-up victimization or perpetration (McNemar statistics = 1.11 and 0.00; $p > 0.05$, respectively).

Gender differences examined in rates of overall victimization and perpetration at baseline were not significant ($\chi^2(1) = 1.2221$, $p > 0.05$; $\chi^2(1) = 0.5342$, $p > 0.05$; respectively). Also, gender differences examined in rates of overall victimization and perpetration at follow-up were not significant ($\chi^2(1) = 1.0599$, $p > 0.05$; $\chi^2(1) = 0.0325$, $p > 0.05$; respectively).

3.2 Comparisons of 12-Month Violence Outcomes

Violence outcomes [any, victimization, and perpetration groups (yes/no) based on 12-month follow-up] were compared separately based on a variety of baseline and 12-month follow-up variables. Table 2 shows data for any violence only because the pattern of bi-variate findings (i.e., direction of association and significance) were identical when victimization and perpetration were analyzed separately (with a single exception described below). Younger participants were more likely to report any violence in the year following their ED visit. Cocaine use at baseline did not significantly predict any violence over the follow-up interval; however, cocaine use during the follow-up period was significantly related to any violence during the follow-up. The results were different for frequency of binge drinking and marijuana use. More days of binge drinking at baseline, and during the follow-up interval, was significantly related to any violence over the follow-up period. Participants who reported any violence during 12-month follow-up reported greater psychological distress, and, were more likely to have a diagnosis of depression and substance abuse/dependence during the follow-up. Violence was not significantly related to social support or baseline ASPD diagnoses. Finally, marijuana use at baseline and during the follow-up interval was significantly related to any violence during the follow-up period; note that this finding was true for victimization but was not significant for perpetration.

3.3 Predicting Any Violence, Victimization, and Perpetration

Parallel, separate logistic regression analyses were conducted predicting any violence, victimization, and perpetration status at 12-months using either baseline variables (Table 3) or variables measured at 12-month follow-up (Table 4) and controlling for some baseline variables. The model predicting victimization from baseline variables (Table 3) was significant; whereas, models for any violence and perpetration were not significant. Participants who were younger and who reported more frequent binge drinking in the month prior to their ED visit were significantly more likely to report violent victimization during the year following this visit. Participants who were reported violence victimization at baseline were approximately 3 times more likely to report violence victimization at 12-month follow-up.

Logistic regression models predicting any violence, victimization, and perpetration based on 12-month follow-up variables (Table 4) were significant. Examination of odds ratios showed that findings varied based on violence processes considered. Participants who were younger, reported victimization at baseline, and those meeting substance abuse/dependence criteria during the follow-up period were more likely to report victimization at 12-month follow-up. In contrast, 12-month perpetration was significantly related to meeting criteria for abuse/dependence diagnosis and more frequent binge drinking during the follow-up interval.

3.4. Description of Most Severe Violent Event

Participants were asked whether they used alcohol or cocaine immediately prior to, or during the most severe incident of violence victimization and perpetration. At baseline and during the follow-up interval, most participants reported they drank alcohol and used cocaine prior to a violence victimization and perpetration event (Table 5). As can be seen in this table, about half of the time, either the participant or other person was injured during the most severe event which required medical attention. Gender differences in injury were examined for the most severe event of victimization and perpetration as measured at baseline and during follow-up. Significant gender differences were found for baseline victimization only. At baseline, 33% of women, as compared to 10% of men, reported a partner injured them resulting in medical attention ($\chi^2 (1) = 4.53$; Fisher's exact test, $p < .05$); further, 38% of men as compared to 0% of women reported a person other than partner injured them so that they needed medical attention ($\chi^2 (1) = 5.14$; Fisher's exact test, $p < .05$).

4.0 Discussion

To our knowledge, this study is the first to examine longitudinal violence outcomes among cocaine using patients presenting to the ED with chest pain, the most frequently reported medical consequence of cocaine use (Minor et al., 1991). With chest pain patients, there is an excellent opportunity, or “teachable moment,” for screening, assessment, and intervention efforts (i.e., motivational interviewing, linkage interventions such as case management) given their high prevalence in urban ED's, the fact that their cocaine use may be documented as part of standard care, and because they may be placed in ED-based observation units for extended periods (Bernstein et al., 1997; D'Onofrio & Degutis, 2002, 2005; D'Onofrio et al., 2005; el-Guebaly et al., 1998; Maio et al., 1997; Rockett et al., 2003; Weber et al., 2003).

Findings show that about 40% of patients presenting to the ED with cocaine-related chest pain will be involved with violence in the year after discharge, which exceeds rates of violence found among substance abuse treatment samples two years post-discharge (Walton et al., 2002). These rates of violence are alarming given findings from the ED literature that morbidity and mortality, in cocaine positive patients, is most commonly due to intentional injury, and not their cardiac issues (Mullen et al., 2001; Tardiff, 1988). In fact, half of the participants in this study reported their most severe violence event resulted in an injury requiring medical attention; notably, one participant in our study died during the follow-up interval from a gun shot wound. Thus, brief interventions addressing cocaine using chest pain patients should include violence assessment, intervention, and referrals in their protocols. A recent study demonstrated the effectiveness of using case management approaches among ED patients admitted to the hospital for violence in reducing violent crime convictions (Cooper et al., 2006) and ED staff may be particularly well-suited to address violence issues (McCloskey et al., 2005).

Rates of violence (victimization and perpetration) before and after an ED visit for cocaine-related chest pain were nearly identical, approximately one-third. Surprisingly, findings did not show a significant relationship between violent perpetration over time; thus although the overall rates remained steady, the participants perpetrating violence differed. In contrast, a baseline history of victimization may be a marker for further victimization in the year following the ED visit. Further, unlike the alcohol brief intervention literature where rates of alcohol use decrease following medical care visits, even for control groups (D'Onofrio & Degutis, 2002), and a prior paper from this study showing rates of substance use decreased post-ED visit (Thapa et al., In Press), overall rates of violence did not change following their ED visit. Further, when violence occurred, it was more common for it to be severe than moderate, increasing the potential for serious injury. Information regarding markers for continued violence post-ED visit could assist in identification of those at greatest risk, and aid in future intervention

development. Markers of violence victimization and perpetration were similar in this study with some notable exceptions (see below), perhaps reflecting a cycle of violence. Few demographic factors were predictive of violence involvement over time, with the exception of age. Consistent with the literature, younger age was related to greater violence perpetration.

Few gender differences in violence victimization or perpetration were found in this study. Prior research with ED samples (Cunningham et al., 2003; Cunningham et al., 2007); and substance use treatment samples (Chermack et al., 2001; Walton et al., 2002), shows few consistent gender differences. However, examination of partner violence specifically, or issues related to fear or injury, show important gender differences (Archer, 2000; Felson & Cares, 2005; Stets & Straus, 1989; Tjaden & Thoennes, 2000; Walton et al., 2007). Our findings replicate an important gender difference, namely that women were much more likely than men to report being injured during the most severe partner violence and requiring medical attention (Archer, 2000; Felson & Cares, 2005; Stets & Straus, 1989; Tjaden & Thoennes, 2000; Walton et al., 2007). It may be that these gender differences reflect the gender of the other person involved in the violent event (e.g., likely men), although this supposition requires further study. These gender findings highlight the importance of more comprehensively measuring aggressive interactions in order to understand gender differences.

Findings from this study underscore the interrelationship among violence and substance use among a unique sample of urban cocaine users presenting to the ED for medical care. The most potent and consistent determinant of past and future violence involvement (including partner and non-partner relationships), both victimization and perpetration, was binge drinking, which is consistent with prior research from community-based samples (Testa et al., 2003). Of course, given that all participants in this study were cocaine users, this may have restricted the range to allow us to identify the cocaine-violence relationships; although bivariately, some support for the relationship between cocaine use and violence was found during the follow-up interval. This finding parallels a prior cross-sectional paper from this study, which also suggested binge drinking was a more salient correlate of violence than cocaine use (Cunningham et al., 2007). In contrast, a prior ED study of all injured patients (and not exclusively cocaine users) showed that illicit drug use was more strongly associated with violence than alcohol use (Cunningham et al., 2003). Laboratory research concludes that acute alcohol consumption is more strongly associated with aggression than other drug use (i.e., marijuana, cocaine) (Chermack & Giancola, 1997; Licata et al., 1993), although marijuana withdrawal may increase aggression (Hoaken & Stewart, 2003). However, substance use treatment studies, using calendar approaches examining acute intoxication, emphasize both cocaine and alcohol use in relation to violence (Chermack & Blow, 2002; Fals-Stewart, 2003). A commonality in all of these studies is that it is critical to assess alcohol use in samples of cocaine users. Thus, commonly used assessment tools such as the 10-item AUDIT (Saunders et al., 1993), or 3-item AUDITc (Bush et al., 1998), which contain a question on binge drinking, may be useful in identification of cocaine patients at risk for violence involvement post-ED visit.

One caveat to the above-mentioned impact of binge drinking, as opposed to cocaine use, on violence relates to findings for the most severe violence event. When asked about a single day of the most severe violent event, it appears that alcohol and cocaine use are involved in the majority (~80-90%) of the cases. This finding is remarkable given that participants reporting any violence involvement indicated they used alcohol on average 7-8 days in the past month and cocaine on average about 4 days in the past month. Thus, there was a markedly higher percentage of acute substance use preceding severe violence than what would be expected from participants' general use patterns. A potential explanation for this finding is that when alcohol and cocaine are ingested concurrently, the metabolite cocaethylene is formed. Cocaethylene increases tendencies for violent thoughts and threats, which may lead to an increase in violent behavior (Pennings, 2002). Thus, these findings are consistent with the literature reflecting

differences based on whether substance use and violence are assessed using aggregate measures or daily calendar approaches, and suggest the importance of acute consumption of alcohol and cocaine in violence incidents (Walton et al., 2002; Chermack et al., 2002).

Further, the severity substance use problems appear to be related to the likelihood the violence. In this regard, psychological distress and depression diagnosis were associated bi-variately with violence in this study, but were not significant in multivariate models containing binge drinking and substance abuse/dependence diagnostic variables. Our prior work found that psychological distress predicted substance use and violence outcomes following substance use treatment (Blow et al., 2000; Flynn et al., 2004; Walton et al., 2002) and depression was particularly salient for women's partner violence (Walton et al., 2007). In this regard, studies examining violence among participants from inner-city settings suggest that other mental health factors (i.e., anxiety, post-traumatic stress disorder related to victimization) may be important for both substance use (as a form of self-medication) and violence (in which the "code of the street" dictates retaliation following assault in order to protect one's self from future assault) (Rich & Grey, 2005; Rich & Stone, 1996; Rich & Sullivan, 2001). Of course, casual influences related to acute substance use, mental health issues, and violence cannot be disentangled in the current study.

4.1 Limitations

Several limitations of this research require acknowledgement. First, corroboration of violence data by significant others or via objective crime data was not collected. It is possible that an underreporting bias may exist for violence perpetration given social desirability factors. Second, data is based on self-report; however, procedures were implemented to increase reliability and validity of self-reports including provision of a research context in which confidentiality was assured; urine samples were obtained for drug testing which may enhance self-report; third, standardized measures were used. Third, findings should not be generalized to all cocaine positive patients in the ED; it is unclear how inclusion of cocaine positive trauma patients may have impacted the results of this study. Fourth, as with any research study, the incentives provided for interview completion could have influenced interview responses. Fifth, the context of violence (e.g., motivation, fear, etc) was not measured extensively in this study, which could result in undetected gender differences. Our prior research shows gender differences in fear and injury associated with violence (Walton et al., 2007), and we did find gender differences for injury for the most severe violent event. Future studies should further examine these issues using newer measures, which assess constructs relevant for gender differences (e.g., Conflict Tactics Scale 2- injury, sexual violence, etc., Straus et al., 1996), and using calendar approaches to tease apart acute intoxication factors with social contextual factors (Chermack & Blow, 2002; Fals-Stewart, 2003). A final limitation of this study is that few social/contextual factors were examined (e.g., exposure to community violence, illicit behavior such as buying/selling drugs) and co-occurring mental health conditions were not assessed (e.g., generalized anxiety disorder, post-traumatic stress disorder). Future studies using lengthy, interview-based approaches for substance use and violence, and more detailed diagnostic assessments of co-morbid mental health conditions, will further elucidate these issues.

4.2 Conclusions

Patients presenting to the inner-city ED for cocaine-related chest pain experience high rates of violence in the year following ED visit and are likely to return to the inner-city ED for care for violence-related injuries. Recent recommendations include integration of Screening, Brief Intervention, and Referral to Treatment (SBIRT) protocols for substance use (Committee on Trauma 2007; SAMSHA, 2008) as standard of care in ED settings. Future studies should

examine the efficacy of various SBIRT strategies to address not only cocaine use, but binge drinking and violence, among these not-in-treatment cocaine users.

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Table 1

Rates (in percentage) of past year Violence Victimization and Perpetration at Baseline ED Visit and during the 12-Month Follow-up period (n=174).

Violence Variables	<u>Follow-up Victimization</u> % (n)		<u>Follow-up Perpetration</u> % (n)	
	(Total = 35%)		(Total = 30%)	
	No (n=109)	Yes (n=61)	No (n=118)	Yes (n=52)
<u>Baseline Victimization</u>				
(Total = 38%)				
Yes (n=64)	52% (33)	48% (31)	63% (40)	37% (24)
No (n=106)	72% (76)	28% (30)	74% (70)	26% (28)
<u>Baseline Perpetration</u>				
(Total = 30%)				
Yes (n=52)	62% (32)	38% (20)	71% (37)	29% (15)
No (n=118)	65% (77)	35% (41)	69% (81)	31% (37)

Table 2

Bi-variate Comparisons between Any Violence and Baseline/Follow-up Characteristics (N=174).

Characteristics	Any Violence	
	(during 12-month follow-up)	
	% (n) / M (SD) No (n=102)	% (n) / M (SD) Yes (n=70)
Baseline Interview		
<u>Demographics</u>		
Male	57% (58)	61% (43)
Age	40.2 (9.43) **	36.5 (8.20)
African-American	75% (76)	86% (60)
Never Married/Single	77% (79)	73% (51)
Employed (yes)	37% (37)	39% (27)
Annual income		
< \$10,000	37% (33)	31% (15)
\$10,000 - 19,999	33% (29)	47% (23)
>= \$20,000	30% (27)	22% (11)
<u>Substance Use</u>		
Substance Abuse/Dependence Past 12m	56% (57)	70% (49)
Binge drinking Days (past 28 days)	4 (7.7) **	8 (10.6)
Cocaine Use Days (past 28 days)	7 (8.6)	7 (7.6)
Marijuana Use Days (past 28 days)	5 (8.7) *	8 (10.3)
<u>Psychosocial</u>		
Distress (past week)	0.93 (0.82)	1.01 (0.76)
Social Support	74.5 (18.2)	74.1 (21.3)
PHQ-9 Major Depressive Disorder	40% (41)	50% (35)
Anti Social Personality Disorder	25% (25)	33% (23)
12-Month Follow-up Interview		
<u>Substance Use</u>		
Substance Abuse/Dependence Past 6m	33% (34) ***	67% (47)
Binge drinking Days (past 28 days)	3 (6.8) **	6 (9.8)
Cocaine Use Days (past 28 days)	3 (5.7) *	4 (6.1)
Marijuana Use Days (past 28 days)	4 (8.9) *	6 (9.8)
<u>Psychosocial</u>		
Distress (past week)	0.54 (0.71) *	0.78 (0.82)
Social Support	80.8 (21.2)	81.3 (20.2)
PHQ-9 Major Depressive Disorder	17% (16) *	26% (18)

*
p < .05;**
p < 0.01;***
p < 0.001

Note: M=mean; SD = Standard deviation

Table 3

Summary of Logistic Regression Analysis using Baseline Characteristics to Predict Violence Victimization or Perpetration during the 12-month follow-up interval (N=174).

Baseline Interview Characteristics	Victimization (during 12-month follow-up)		Perpetration (during 12-month follow-up)		Any Violence (during 12-month follow-up)	
	OR (CI)		OR (CI)		OR (CI)	
Gender (Male)	1.37 (0.63, 3.00)		0.74 (0.35, 1.60)		1.15 (0.56, 2.36)	
Age	0.92 (0.88, 0.97) ***		0.96 (0.92, 0.99) *		0.95 (0.91, 0.99) *	
Victimization (Yes)	2.74 (1.06, 7.11) *		2.00 (0.80, 5.06)		-----	
Perpetration (Yes)	0.41 (0.16, 1.10)		0.48 (0.18, 1.25)		-----	
Any violence (Yes)	-----		-----		1.10 (0.53, 2.32)	
Substance Abuse/Dependence (past 12 month) (Yes)	0.82 (0.33, 2.05)		1.05 (0.43, 2.60)		1.11 (0.50, 2.56)	
Binge drinking Days (past 28 days)	1.06 (1.02, 1.11) **		1.05 (1.01, 1.10) *		1.05 (1.01, 1.10) **	
Cocaine Use Days (past 28 days)	0.98 (0.93, 1.02)		1.00 (0.95, 1.04)		0.97 (0.93, 1.02)	
Marijuana Use Days (past 28 days)	1.01 (0.97, 1.05)		1.00 (0.95, 1.03)		1.00 (0.96, 1.04)	
Distress (past week)	1.10 (0.66, 1.80)		0.75 (0.45, 1.24)		1.10 (0.70, 1.70)	

* p < 0.05,

** p < 0.01,

*** p < 0.001

Note: OR= Odds ratio, CI= confidence interval. Victimization: Wald statistic = 24.98 (DF= 9), p < 0.001, -2 log L = 181.38; Perpetration: Wald statistic = 13.62 (DF= 9), p = 0.14, -2 log L = 185.91; Any Violence: Wald statistic = 15.14 (DF= 8), p = 0.0565, -2 log L = 204.131.

Table 4

Summary of Logistic Regression Analysis using baseline and follow-up characteristics to Predict Violence Victimization or Perpetration during the 12-month follow-up interval (N=174).

Characteristics	Victimization (during 12-month follow-up) OR (CI)	Perpetration (during 12-month follow-up) OR (CI)	Any Violence (during 12-month follow-up) OR (CI)
Baseline Interview			
Age (Baseline)	0.92 (0.88, 0.97) ***	0.96 (0.92, 1.00)	0.95 (0.91, 0.99) *
Gender (Male)	1.75 (0.81, 3.78)	1.01 (0.47, 2.15)	1.42 (0.70, 3.00)
Victimization (Baseline) (Yes)	2.70 (1.09, 6.62) *	1.85 (0.75, 4.55)	-----
Perpetration (Baseline) (Yes)	0.52 (0.20, 1.35)	0.47 (0.18, 1.24)	-----
Any Violence (Baseline) (Yes)	-----	-----	1.20 (0.60, 2.41)
Follow-up Interview			
Substance Abuse / Dependence (past 6 months) (Yes)	3.21 (1.37, 7.51) **	2.81 (1.20, 6.65) *	3.50 (1.60, 7.70) **
Binge Drinking Days (past 28 days)	1.03 (0.99, 1.08)	1.05 (1.01, 1.10) *	1.03 (0.98, 1.10)
Cocaine Use Days (past 28 days)	0.97 (0.91, 1.04)	0.98 (0.92, 1.04)	0.98 (0.92, 1.04)
Marijuana Use Days (past 28 days)	0.98 (0.94, 1.03)	1.00 (0.95, 1.04)	0.98 (0.94, 1.02)
Distress (past week)	1.46 (0.90, 2.40)	1.42 (0.88, 2.31)	1.40 (0.88, 2.24)

*
p < 0.05,

**
p < 0.01,

p < 0.001

Note: OR= Odds ratio, CI= confidence interval. Victimization: Wald statistic = 29.38 (DF= 9), p < 0.001, -2 log L = 181.83; Perpetration: Wald statistic = 25.21 (DF= 9), p < 0.001, -2 log L = 178.16 ; Any Violence : Wald statistics = 24.50 (DF=8), p = 0.0019, -2 Log L = 200.680

Table 5

Substance use and injury for the most severe violence episode at baseline and 12-month follow-up (N=174).

Characteristic	% (n) Yes	% (n) No
Baseline Variables		
<u>Victimization</u>		
Cocaine Use Before or During	78% (31)	22% (9)
Alcohol Use Before or During	89% (40)	11% (5)
Participant Injury requiring medical attention	62% (16)	38% (10)
<u>Perpetration</u>		
Cocaine Use Before or During	69% (24)	31% (11)
Alcohol Use Before or During	91% (39)	9% (4)
Other Person Injury requiring medical attention	41% (11)	59% (16)
Follow-up Variables		
<u>Victimization</u>		
Cocaine Use Before or During	79% (30)	21% (8)
Alcohol Use Before or During	87% (40)	13% (6)
Participant Injury requiring medical attention	48% (13)	52% (14)
<u>Perpetration</u>		
Cocaine Use Before or During	79% (27)	21% (7)
Alcohol Use Before or During	84% (36)	16% (7)
Other Person Injury requiring medical attention	43% (10)	57% (13)