HHS Public Access

Author manuscript

*J Subst Abuse Treat*. Author manuscript; available in PMC 2015 October 01.

Published in final edited form as:

*J Subst Abuse Treat*. 2014 October ; 47(4): 282–292. doi:10.1016/j.jsat.2014.05.005.

# Distal and Proximal Factors Associated with Aggression Towards Partners and Non-Partners among Patients in Substance Abuse Treatment

**Quyen M. Epstein-Ngo, Ph.D.**[a,b], **Maureen A. Walton, MPH, Ph.D.**[b,c], **Michelle Sanborn, M.S.**[c], **Shane Kraus, Ph.D.**[d], **Fred Blow, Ph.D.**[c,g], **Rebecca Cunningham, M.D.**[b,e,f], and **Stephen T. Chermack, Ph.D.**[c,g]

[a]University of Michigan Institute for Research on Women and Gender, University of Michigan, Ann Arbor, MI 48109, USA

[b]University of Michigan Injury Center, University of Michigan, Ann Arbor, MI 48105, USA

[c]University of Michigan Addiction Research Center, Department of Psychiatry, University of Michigan, Ann Arbor, MI 48105, USA

[d]Mental Illness Research, Education & Clinical Center, VA Connecticut Healthcare System, West Haven, CT 06515, USA

[e]Department of Health Behavior and Health Education, School of Public Health, University of Michigan, Ann Arbor, Michigan 48109, USA

[f]Department of Emergency Medicine, University of Michigan, Ann Arbor, Michigan 48105, USA

[g]Department of Veterans Affairs, Health Services Research and Development, Ann Arbor, Michigan 48109, USA

## Abstract

Studies of violence in substance use disorder (SUD) treatment settings typically focus on partner aggression (PA) although non-partner aggression (NPA) is also a common problem. This study examines potentially distinct paths of distal and proximal risk factors related to aggression towards non-partners (NPA) and partners (PA) among a SUD treatment sample. The sample included 176 adults reporting past-year violence. Bivariate analyses indicated several distal and proximal factors were associated with NPA and PA. According to multivariate, multiple mediation analyses



Corresponding Author: University of Michigan Institute for Research on Women and Gender, 1136 Lane Hall, 204 S. State Street, Ann Arbor, MI 48109–1290, USA. Tel.: 1- 734–615–8820; Fax: 1- 734–764–9533; qen@umich.edu (Q. M. Epstein-Ngo).

All authors contributed to the conceptualization and writing of the manuscript, and reviewed and approved the final manuscript. Drs. Chermack, Walton, and Blow were responsible for designing the overall study and for supervising data collection. Drs. Epstein-Ngo, Chermack, and Walton were responsible for the conceptualization, analysis and initial preparation of this article. Ms. Sanborn and Drs. Cunningham, Kraus, and Blow contributed critical feedback regarding the analyses and editing of the final manuscript.

Portions of these findings were presented at the 2012 annual meeting of the Research Society on Alcoholism.

youth aggression history was a factor for both NPA and PA. Alcohol and cocaine use and psychological distress were associated with NPA; marijuana use was associated with PA. There also was evidence of indirect effects of distal factors on NPA and PA. The results suggest that there may be substantially different dynamics associated with NPA and PA, and have implications for developing screening, assessment and treatment protocols targeting violence among individuals in SUD treatment.

### Keywords

substance use; risk factors; adults; partner violence; non-partner violence

## 1. Introduction

Several studies and systematic reviews suggest a clear link between substance use and perpetration of aggression (Chermack et al., 2008; Foran & O'Leary, 2008; Lipsey, Wilson, Cohen, & Derzon, 1997; Moore et al., 2008), with significantly higher rates of violence among substance use disorder (SUD) treatment samples than those reported in community-based samples (Brown, Werk, Caplan, Shields, & Seraganian, 1998; Caetano, McGrath, Ramisetty-Mikler, & Field, 2005; Chermack, Fuller, & Blow, 2000; Chermack et al., 2008). The link between substance use and aggression among SUD treatment samples has been made for both partner aggression (PA) (Chermack et al., 2010; Chermack et al., 2008; Chermack, Walton, Fuller, & Blow, 2001; O'Farrell, Murphy, Stephan, Fals-Stewart, & Murphy, 2004)[1] and non-partner aggression (NPA; e.g., aggression towards friends, strangers, acquaintances, etc.) (Chermack, Fuller, et al., 2000; Murray et al., 2008). The link between substance use and aggression can be understood using a biopsychosocial framework incorporating distal and proximal risk factors that includes four domains of influence: developmental influences, drug- and alcohol-related influences, individual differences, and contextual influences (Chermack, Booth, & Curran, 2006; Chermack & Giancola, 1997; Rothman, McNaughton Reyes, Johnson, & LaValley, 2012; Zucker, 1997).

The aim of this study was to take a first step in examining how distinct distal (e.g., parental alcohol problems, childhood conduct disorders, youth aggression) and proximal (e.g., current drug and alcohol use, psychological distress) factors are associated with the frequency of towards non-partners (NPA) and partners (PA) using cross-sectional data among a SUD treatment sample reporting past year violence. We also examined whether the pattern of relationships differ by aggression type (i.e. NPA versus PA).

### 1.1 Review of Relationships among Distal and Proximal Risk Indicators and Adult Aggression

Biopsychosocial theories of development suggest that understanding the associations between substance use and aggression necessitates understanding the roles of both distal and proximal factors from a variety of domains (Chermack and Giancola, 1997). Contextual factors such as individual and family history are important to understanding current

[1]Although articles co-authored by William Fals-Stewart have been cited in this article, the citations are from studies which do not use the data he collected, which was called into question.

associations between substance use and aggression. Additionally, there is evidence in the literature that there may be indirect effects of distal factors on adult aggression through more proximal factors. For instance, Fuller and colleagues (2003) found that distal factors such as grandparent marital aggression predicted parental antisocial behaviors which then predicted parental alcoholism and marital aggression, both of which mediated the association between parental antisocial behavior and childhood aggression in their children. In another study, Chermack and colleagues (2000) found that family history of violence and alcoholism was associated with childhood conduct problems, which was in turn associated with adult substance use and violence involvement. Moreover, for women, substance use was also associated with violence involvement. However, they did not specifically explore indirect effects of distal factors on aggression through more proximal factors. These studies lend support to the idea that the influence of distal factors on adult aggression may in part be due to indirect effects through more proximal factors. Community-based longitudinal studies have shown that distal risk factors, such as history of parental alcohol problems, childhood behavior problems, experiences of childhood abuse, and youth aggression, are linked to more *proximal risks* for aggression, such as substance use and psychological functioning (Zucker et al., 2006). Further, parental alcohol problems have been associated with earlier onset of alcohol use in their children (Cranford, Zucker, Jester, Puttler, & Fitzgerald, 2010), problems in adulthood with substance use (Chassin, Fora, & King, 2004; Zucker et al., 2006) and has been linked to poor adult psycho-social functioning, including symptoms of depression (Nicholas & Rasmussen, 2006), anxiety (Chassin, Pitts, DeLucia, & Todd, 1999), and marital problems (Kearns-Bodkin & Leonard, 2008). Childhood problem behaviors and youth aggression have also been linked to proximal risks (Hussong et al., 2007) including earlier onset of substance use and increased psychological distress (Beaudoin, Murray, Bond, & Barnes, 1997; Belliveau & Stoppard, 1995; Harter, 2000; Jester et al., 2008; Lease, 2002; Sorensen et al., 2011).

Research also suggests that distal risk factors are associated with adult partner and non-partner violence (Chermack, Fuller, et al., 2000; Chermack, Wryobeck, Walton, & Blow, 2006). For example, one study found that spousal aggression (for both men and women) was associated with a pattern of maternal alcohol problems but not with paternal alcohol problems (Kearns-Bodkin & Leonard, 2008). Among substance use disorder treatment samples (Chermack et al., 2008; Chermack, Stoltenberg, Fuller, & Blow, 2000; Chermack et al., 2001; Chermack, Wryobeck, et al., 2006) several distal factors (history of youth aggression, conduct problems, child abuse, parental/family aggression) have been associated with aggression severity.

In terms of more proximal risk indicators for aggression, several studies have found significant associations with substance use and/or psychological distress (Chermack & Blow, 2002; Chermack, Stoltenberg, et al., 2000; Moore et al., 2008; Walton, Chermack, & Blow, 2002). For example, alcohol and cocaine have been associated with aggression through experimental lab data (Chermack & Giancola, 1997), general substance use patterns (Parks, Hsieh, Bradizza, & Romosz, 2008), as well as daily-level and event-based data (Chermack & Blow, 2002; Chermack et al., 2010), and daily alcohol consumption was also found to be associated with partner violence among alcohol dependent men (Murphy,

Winters, O'Farrell, Fals-Stewart, & Murphy, 2005; Schumacher, Coffey, Leonard, O'Jile, & Landy, 2013; Schumm, O'Farrell, Murphy, & Fals-Stewart, 2009; Sullivan, Cavanaugh, Buckner, & Edmondson, 2009). The findings linking marijuana and aggression have been more mixed with general patterns of marijuana use associated with aggression (Moore et al., 2008; Rothman, Johnson, Azrael, Hall, & Weinberg, 2010), whereas experimental studies and daily-level, event-based studies have not found an association between acute marijuana use and increased aggression (Chermack et al., 2010; Epstein-Ngo, Walton, & Chermack, 2012; Myerscough & Taylor, 1985). There is also evidence from longitudinal studies that post treatment reductions in substance use is related to reductions in violence in SUD samples (O'Farrell, Fals-Stewart, Murphy, & Murphy, 2003; O'Farrell et al., 2004; Walton et al., 2002).

Finally, psychological distress has been found to be associated with NPA and PA among substance use samples cross-sectionally (Chermack et al., 2009; Cunningham et al., 2009; Mericle & Havassy, 2008; Murray et al., 2008; Walton MA, 2007; Walton et al., 2009) and with general aggression longitudinally (Walton et al., 2002). In general, most studies examining the relationship of more proximal factors (substance use, psychological distress) and aggression (NPA or PA) either did not include more distal factors in the analyses or did not attempt to examine the inter-relationships and relative impact of both distal and proximal factors (Chermack, Fuller, et al., 2000; Chermack et al., 2009; Chermack et al., 2001; DeMaris, Benson, Fox, Hill, & Van Wyk, 2003; Schumm, O'Farrell, Murphy, Murphy, & Muchowski, 2011; Testa et al., 2012; Walton et al., 2002).

Although prior studies have shown associations between either distal or proximal factors related to aggression, common limitations include: 1) a focus on only one gender (e.g., males perpetrating aggression) (Murphy et al., 2005; Schumacher et al., 2013; Schumm et al., 2009; Sullivan et al., 2009), 2) a focus on only PA or using combined aggression measures that do not distinguish relationship type (Chermack, Fuller, et al., 2000; Chermack, Wryobeck, et al., 2006), and 3) using other combined measures (e.g., collapsing across paternal and maternal alcohol problems, using measures of childhood behavioral problems that collapse across aggressive and non-aggressive problem behaviors, drug use measures that combine use of different types of substances, etc.) (Chermack et al., 2008; Chermack, Stoltenberg, et al., 2000; DeMaris et al., 2003; Haber et al., 2010; Hussong et al., 2007; Kachadourian, Homish, Quigley, & Leonard, 2012; Schumacher et al., 2013). Further, studies have tended to examine a limited set of potentially important distal and proximal factors (Chermack, Stoltenberg, et al., 2000; Chermack, Wryobeck, et al., 2006; Sullivan, Cavanaugh, Ufner, Swan, & Snow, 2013) and thus have not included multiple domains of risk in the same model. Due to such limitations, there is very limited data regarding whether there might be differences in how distal and proximal factors may be related to NPA and PA.

It is important to understand underlying factors associated with NPA and PA because potential differences could have implications for developing screening/assessment protocols and tailored intervention approaches for individuals involved with NPA and/or PA. For example, although there is evidence suggesting reduced aggression post-SUD treatment is associated with post-treatment substance use (O'Farrell et al., 2003; O'Farrell et al., 2004;

Walton et al., 2002), it is possible that factors in addition to substance use (aggressive disposition/history, psychological distress) contribute to NPA and/or PA. A more refined understanding of potential factors associated with NPA and PA could help inform the development of more tailored assessment and treatment protocols, and have theoretical and methodological implications for future longitudinal studies examining the dynamics associated with NPA and PA.

### 1.2 The Current Study

The current cross-sectional study addresses a number of limitations of prior work by examining the interrelationships among an array of proximal and distal risk factors and their associations with PA and NPA among a sample of men and women in SUD treatment. First, in support of prior literature (Chermack et al., 2009; Cunningham et al., 2009; Mericle & Havassy, 2008; Murray et al., 2008; Walton MA, 2007; Walton et al., 2009), we hypothesized that proximal risk factors such as heavy drinking, cocaine use, and symptoms of psychological distress would be positively associated with both NPA and PA. Second, we hypothesized that distal risk factors would have an indirect effect through proximal risk factors on NPA and PA. Analyses regarding the precise associations between distal and proximal factors are exploratory in nature given that these associations have not been previously explored. The analysis strategy allowed for an examination of potential similarities and differences in terms of the relationships among distal and proximal risk factors and different forms of aggression (NPA and PA).

## 2. Materials and Methods

### 2.1 Study Recruitment

This paper presents cross-sectional data from individuals who were recruited from SUD treatment programs (e.g., community residential centers, intensive outpatient, and regular outpatient settings) as part of a randomized control pilot study (RCT) for a brief violence prevention intervention for men and women in SUD treatment. Ninety-five percent of those who were approached for the study agreed to participate in the initial screening survey, yielding a screening sample size of 489 (see Chermack et al., 2008 for additional information regarding the screening sample). Inclusion criteria for the RCT consisted of reporting a history of past-year physical aggression, living within the study catchment area (i.e., 45 mile radius of the study sites, in urban areas in the Midwest of the United States), and being new to treatment (i.e., recruited within 30 days of starting treatment). Participants with psychotic symptoms and/or significant cognitive impairments were excluded from the study, as well as being an intravenous heroin user or on opioid agonist treatment. Study procedures were approved by the University of Michigan Institutional Review Board and all participants provided informed consent prior to inclusion in the study.

Overall, 75% of the screening sample reported past-year violence ($n$ = 352). However, only 205 participants met the remaining inclusion criteria for the baseline assessment. Eighty-one individuals were excluded due to distance, 30 participants had been in the treatment center too long, 11 were heroin dependent or were receiving methadone, 17 had a schizophrenia diagnosis, and 19 participants refused further participation/dropped out of treatment. Of

those screened and eligible for the baseline assessment, 194 participants completed the baseline assessment, 18 of whom were excluded from the analyses due to missing data, yielding the final sample for this study of 176 participants. (See Figure 1 for the present study flow chart).

## 2.2 Measures

**2.2.1 Non-Partner and Partner Aggression—**Aggression towards non-partners (NPA) and partners (PA) in the year prior to entering substance abuse treatment was assessed with a modified version of the revised Conflict Tactics Scales-2 (CTS2); (Straus, Hamby, Boney-McCoy, & Sugarman, 1996). The CTS2 is a widely used measure of expressed and received psychological aggression, physical aggression, sexual coercion, and injury. For the purposes of this study, the CTS2 was modified so that each participant indicated expressed and received aggression and injury related to partner and non-partner conflicts (see Chermack et al., 2008; Murray et al., 2008 for additional details). Although the non-partner questions have not been formally validated, they are nearly identical to the well-validated partner CTS2 measure. Scores for past-year NPA and PA were obtained by summing the midpoints for the response categories given by the participants, per procedures established by the measure's developers (Strauss et al., 1996). Cronbach's alpha for the CTS2 = 0.92 and was 0.93 for the modified CTS2 for NPA.

**2.2.2 Childhood Conduct Problems—**To measure childhood conduct problems, participants were asked to indicate the frequency of nine childhood conduct problems (e.g., expulsions/suspensions from school, running away from home, conflict with parents, damaging property/fire-setting, "breaking in," being sent to juvenile court, shoplifting, and lying to/conning others). The response scale was a binary yes/no, whether the behaviors had occurred before the age of 15 years. Responses were summed, (yes = 1; no = 0) giving a score of frequency of childhood conduct problem behaviors (Chermack, Stoltenberg, et al., 2000; Chermack, Wryobeck, et al., 2006). Cronbach's alpha for this sample was 0.72.

**2.2.3 Youth Aggression—**Frequency of youth aggression was measured using a modified version of the Conflict Tactics Scales (Straus, 1979). Participants were asked how often they used a series of moderate (pushed, grabbed or shoved slapped, hit, punched or kicked) and severe (beat up, hit with a hard object, threatened with a knife or gun, and used a knife or gun) aggressive behaviors during childhood and adolescent conflicts with non-family members (Chermack, Stoltenberg, et al., 2000). Scores were computed in the same manner as the CTS scales above. Cronbach's alpha for this sample was 0.94.

**2.2.4 Parental History of Alcohol Use Problems—**Maternal and paternal history of alcohol use problems were assessed using the Father and Mother Short Michigan Alcoholism Screening Test (F-SMAST and M-SMAST); (Sher & Descutner, 1986). The F-SMAST and the M-SMAST were adapted from the original SMAST (Selzer, Vinokur, & van Rooijen, 1975), which is a 13-item self-report questionnaire designed to detect the presence of an alcohol disorder. The SMAST items were reworded to refer to the father's and mother's drinking behavior. Participants were asked to indicate whether their parent's drinking included a series of behaviors indicative of problem drinking (e.g., "Was your

father (mother) able to stop drinking when he (she) wanted to?" and "Has your father (mother) ever gotten into trouble at work because of his (her) drinking?"). The response scale was dichotomous (yes = 1/no = 0), with summed responses ranging from 0 to 13 for each parent. Both the F-SMAST and M-SMAST have demonstrated adequate reliability and validity (Crews & Sher, 1992; Endicott, Spitzer, & Fleiss, 1975). Cronbach's alpha for the F-SMAST and M-SMAST were 0.93 and 0.88, respectively.

**2.2.5 Alcohol and Drug Use—**Alcohol and drug use in the 28 days prior to entering treatment was assessed using the University of Arkansas Substance Abuse Outcomes Module (SAOM); (Smith et al., 1996). The number of days involving binge drinking (more than five drinks consumed) was assessed for alcohol use. Drug use was assessed by having participants indicate the number of days of use in the 28 days prior to entering treatment. Responses were summed to create a variable reflecting the number of days participants used alcohol or drugs prior to entering treatment. The SAOM has solid psychometric properties including internal consistency (Chermack, Roll, et al., 2000), test-retest reliability (Smith et al., 2006), and concurrent validity with widely used substance use measures such as the addiction severity index (McLellan et al., 1992). This paper focuses only on alcohol, marijuana and cocaine as frequency of other illicit drug use was too low to include in our analyses.

**2.2.6 Psychological Distress—**Psychological distress was measured using the global severity index (GSI) subscale of the Brief Symptom Inventory (BSI); (Derogatis & Melisaratos, 1983). Participants were asked about their symptoms of current distress in relation to psychological symptoms. For each item, participants were asked to indicate to what extent they were "bothered or disturbed" by each symptom in the past seven days (e.g., feeling no interest in things, feeling blue, feeling tense or keyed up). Responses are given on a 5-point Likert-type scale ranging from 0 ("not at all") to 4 ("extremely"). Prior studies have confirmed the reliability and validity of the BSI, its subscales, and its relative diagnostic accuracy compared to similar instruments using large samples of mentally ill adult respondents and substance users (Benishek, Hayes, Bieschke, & Stoffelmayr, 1998; Hayes, 1997; Royse & Drude, 1984).

**2.2.7 Additional measures—**The initial screening survey included brief measures of demographics (e.g., age, race, gender, employment status) (see Chermack et al., 2008 for details on screening items used in this study).

### 2.3 Data analysis

The analysis approach included both simple descriptive statistics as well as analyses of indirect effects. Multivariate, multiple indirect effects analyses were conducted with age, race and gender as covariates using Hayes and Preacher's (Hayes, Preacher, & Myers, 2011) approach (SPSS MEDIATE macro) in order to examine the influence of distal risk factors on NPA and PA through proximal risk factors (see Figure 2). In order to explore the hypothesized indirect effects of distal risk factors on NPA and PA through proximal risk factors, Preacher and Hayes' (Preacher & Hayes, 2004, 2008) bootstrapping approach to tests of indirect effects was used. By using nonparametric resampling of one's data and

estimating indirect effects with each sampling, the bootstrapping approach does not require an assumption of normality, and it is particularly well-suited to smaller sample sizes (Shrout & Bolger, 2002). This process of resampling produced a distribution from which bootstrap confidence intervals (CI) were calculated. CIs that do not include 0 are considered to be significant indirect effects (Hayes et al., 2011). The results reflect the influence of one independent variable on the dependent variable while simultaneously controlling for the effects of the other proposed independent variables. The analyses were conducted twice, using 10,000 bootstrapping resamples in order to estimate the model with the two different dependent variables (i.e., NPA and PA). Only unstandardized coefficients were reported for this analytic procedure (Hayes et al., 2011). Finally, we conducted post-hoc analyses exploring gender interactions given the potential for differences in NPA and PA by gender (Chermack et al., 2010; Epstein-Ngo et al., 2013), and found no significant interactions.

## 3. Results

### 3.1 Sample Characteristics

The ages for this sample ranged from 18–63 years of age with a mean age of 35.8 (10.8). The sample consisted of 76.1% males, 50.0% of the sample was Caucasian, 50% African American/"Other" race (see Table 1). Approximately 15% of the sample was currently employed and 71.0% was currently on probation or parole. Five percent of the sample reported their highest level of education as 8$^{th}$ grade or less, 39.2% reported completing some high school, 25.6% reported graduating from high school, 24.4% had completed some college, and 5.7% had graduated from college. Sixty-four percent of the sample report binge drinking in the 28 days before seeking treatment, 54.5% reported using marijuana, and 64.8% reported cocaine use.

### 3.2 Descriptive Correlational Analyses

Table 2 depicts the correlations between participant characteristics, distal and proximal risk factors, and NPA and PA. Heavy drinking and marijuana use were related to NPA, whereas cocaine use and marijuana use were related to PA. Psychological distress was associated with both NPA and PA. In terms of distal factors, youth aggression was associated with both NPA and PA; however, childhood conduct problems were related only to NPA. Paternal and maternal alcohol problems were associated with PA; however, neither were associated with NPA. In terms of demographic factors, bivariate analyses indicate that younger age was associated with higher levels of reported childhood conduct problems, youth aggression, and more marijuana use. Age was unrelated to the outcome variables of NPA and PA. There were also no racial differences in distal or proximal factors or the outcome variables. With regard to gender, females reported more cocaine use and psychological distress whereas males reported more childhood conduct problems and youth aggression. There were no significant gender differences in terms of the outcome variables. Multivariate analyses (described below) also revealed no differences in NPA and PA in terms of demographic variables.

### 3.3 Regression Analyses of Multiple Indirect Effects

**3.3.1 Non-Partner Aggression—**In the analysis of multiple indirect effects with NPA as the criterion variable, participant's age, gender, and race were used as covariates. The race variable was coded into a binary variable (Caucasian and African American/Other). Childhood conduct problems, youth aggression, maternal and paternal alcohol problems were entered as the predictor variables and heavy drinking, cocaine use, marijuana use, and psychological distress were entered as mediators (See Figure 2). Results of these analyses are presented in Table 3 and summarized in Figure 3.

In terms of distal risk factors, results of the analyses indicated that childhood conduct problems (whether directly or indirectly) were not significantly associated with NPA. Youth aggression was directly associated with higher levels of past-year NPA ($B = 0.43$, $p \leq .001$). The estimated effect of youth aggression on NPA through psychological distress was −0.0006 with a 95% CI of 0.0001 to 0.0056, indicating that psychological distress played a mediating role in this association. The same was not true for youth aggression and the remaining mediators.

Maternal alcohol problems were not significantly associated with NPA, through direct nor indirect paths. It was, however, directly associated with increased psychological distress ($B = 0.05$, $p \leq .05$). The estimated effect of paternal alcohol problems on NPA through cocaine use was 0.26 with a 95% CI of 0.0157 to 1.2301, indicating that cocaine use played a mediating role in this association. There were no other significant mediators between paternal alcohol problems and past-year NPA.

In terms of proximal risk factors, heavy alcohol use was directly associated with higher levels of past-year NPA ($B = 0.80$, $p \leq .05$). Cocaine use, marijuana use, and psychological distress were not directly associated with NPA. [Insert Figure 3 About Here]

**3.3.2 Partner Aggression—**In the analysis of multiple indirect effects with PAas the criterion variable, participant's age, gender, and race were used as covariates. Childhood conduct problems, youth aggression, maternal alcohol problems, and paternal alcohol problems were again entered as the predictor variables and heavy drinking, cocaine use, marijuana use, and psychological distress were entered as mediators (See Figure 2). Results of these analyses are presented in Table 4 and summarized in Figure 4.

In terms of distal risk factors, results of the analyses indicated childhood conduct problems (whether directly or indirectly) were not significantly associated with PA. Youth aggression was directly associated with more current psychological distress ($B = 0.003$, $p \leq .001$) as well as higher levels of past-year PA ($B = 0.18$, $p \leq .001$). When taking into account the variance explained by all of the predictors and mediators, youth aggression was still significantly associated with past-year PA ($B = 0.15$, $p \leq .001$). There were no indirect effects of youth aggression on past-year PA.

Maternal alcohol problems were directly and significantly associated with more current psychological distress ($B = 0.05$, $p \leq .05$). Both maternal and paternal alcohol problems were associated with higher levels of past-year PA ($B = 2.86$, $p \leq .05$ and $B = 2.04$, $p \leq .05$,

respectively). However, after taking into account the variance explained by all of the predictors and mediators, these associations were no longer significant (*B*= 1.86, *ns* and *B* = 1.80, *ns*, respectively). There were no indirect effects of maternal or paternal alcohol problems on past-year PA.

In terms of proximal risk factors, marijuana use was directly associated with higher levels of past-year PA ($B = 0.73$, $p \leq .05$). Heavy drinking, cocaine use, and psychological distress were not directly associated with PA.

## 4. Discussion

Despite the increased likelihood for violence involvement among SUD treatment samples, little is known about the distal and proximal factors associated with the potentially distinct sequelae of non-partner and partner aggression (Chermack et al., 2010; Chermack et al., 2008; Chermack, Wryobeck, et al., 2006). This study addresses a number of limitations of prior work by focusing on PA *and* NPA among men and women in SUD treatment, and examining an array of proximal and distal risk factors simultaneously. The findings illustrate similarities and notable differences in the inter-relationships among risk indicators for NPA and PA, and has important clinical, theoretical and methodological implications for men and women in SUD treatment settings who report aggression (Chermack et al., 2008; Murray et al., 2008).

### 4.1 Distal Risk Factors

For both NPA and PA, a history of *youth aggression* was significantly associated with both NPA and PA above and beyond the influence of all other risk factors examined in these models. This suggests the relative importance of youth aggression as a general factor related to both NPA and PA. Further, those with a history of youth aggression also reported higher levels of psychological distress. These findings underscore the importance of assessing youth aggression in both clinical settings and research. In the current study, we were not able to assess a number of potential constructs (e.g., aggressive cognition schemas, trait aggressiveness, low empathy, genetic or biological factors, social learning effects, coping skills, etc.) (Chermack & Giancola, 1997; Gilbert & Daffern, 2010) that may account for (mediate) the impact of youth aggression on adult aggression. Future longitudinal research assessing such constructs in SUD samples could provide valuable information regarding such mediators, which could help guide violence prevention and intervention development. Nevertheless, the findings appear to suggest that for individuals in SUD treatment with long standing problems with aggression (both in childhood and adulthood), there may be some benefit of targeting anger management or violence prevention skills specifically during SUD treatment (in addition to interventions targeting substance use).

Finally, the findings that maternal alcohol problems were related to psychological distress and paternal alcohol problems were related to cocaine use suggest that there may be differences in the impact of paternal and maternal factors on later problems. Prior studies have shown mixed results in terms of differences in the impact of maternal and paternal alcohol problems (Chermack, Wryobeck, et al., 2006; Cranford et al., 2010; Kearns-Bodkin, Testa, & Livingston, 2007; Sorensen et al., 2011). For example, Kearns-Bodkin and

colleagues (Kearns-Bodkin & Leonard, 2008) showed that appraisals of marital relationships for husbands and wives were associated with alcoholism in the opposite gender parents. Moreover, husbands' physical aggression and wives' experiences of husbands' aggression was highest among those with alcoholic mothers and nonalcoholic fathers. Chermack and colleagues (Chermack, Wryobeck, et al., 2006) found that for individuals with a history of paternal alcohol problems, maternal violence was associated with aggression severity. These findings indicate that there are likely effects of both paternal and maternal alcohol problems as well as interactions with other factors that impact the development of future problems (psychological, substance use and violence).

Further, both maternal and paternal alcohol problems had indirect effects on NPA in particular. Both genetic/biologically based influences as well as social environmental factors have been noted as potential mediators of the impact of parental alcohol problems on future problem behaviors (Chermack, Wryobeck, et al., 2006; Cranford et al., 2010; Hussong, Huang, Curran, Chassin, & Zucker, 2010; Kearns-Bodkin & Leonard, 2008; Sorensen et al., 2011). The findings of the present study illustrate the importance of assessing such constructs in both clinical settings and research, and suggest that future longitudinal research on involvement with types of adult violence (NPA and PA) should include biological measures, paternal and maternal alcohol problems and family environment measures (e.g., social modeling influences), and an array or adult problem behaviors (e.g., alcohol, cocaine and marijuana use, psychological distress/disorders). Further, the present findings also support the role of prevention and/or early intervention approaches for families with parental drinking problems and/or aggressive children (Hussong et al., 2010; Maag & Katsiyannis, 2010; Mytton, DiGuiseppi, Gough, Taylor, & Logan, 2006).

### 4.2 Proximal Risk Factors

The relationship between the more proximal risk factors and NPA and PA differed substantially, with no factors common to both models. The model for NPA was consistent with the findings of prior studies and conceptual models of aggression in terms of significant relationships with heavy drinking and cocaine use patterns (Chermack & Blow, 2002; Murray et al., 2008). Although it was not possible to determine whether the alcohol or cocaine was used before or after the violence, prior laboratory and event based research suggests that use increases the likelihood of aggression (Chermack & Blow, 2002; Chermack & Giancola, 1997; Epstein-Ngo et al., 2013; Licata, Taylor, Berman, & Cranston, 1993). However, somewhat surprisingly, only marijuana use patterns were associated with PA. Again, our data does not allow for the establishment of within day temporality. Prior event based studies have shown that marijuana use does not increase aggression (Chermack et al., 2010; Epstein-Ngo et al., 2012; Rothman et al., 2010) and implies that this finding may reflect a clustering of risk behaviors as demonstrated in prior work and/or the use of a measure of general marijuana use patterns (Moore et al., 2008; Rothman et al., 2010). Alternatively, other work suggests marijuana withdrawal might be related to aggression (Kouri, Pope, & Lukas, 1999; Moore & Stuart, 2005). Finally, it was beyond the scope of our study to examine the effects of combinations of substance use disorders on aggression given the study measures and sample size. There is evidence that co-occurring alcohol and cocaine use disorders may increase the likelihood of PA (Kraanen, Vedel, Scholing, &

Emmelkamp, 2013; Smith, Homish, Leonard, & Cornelius, 2012). Additionally, studies of event based aggression have found that the combination of alcohol and cocaine use was related to general aggression (Chermack & Blow, 2002) and alcohol and marijuana use combined has been linked to NPA (Epstein-Ngo et al., 2014). Future studies examining co-ingestion of substances and co-occurring SUD diagnoses would help to further elucidate these associations and potential clinical implications.

One interesting finding in this study was the negative association between psychological distress and NPA, specifically in the context of the indirect effect of youth aggression on current NPA. There was a strong positive bivariate association between psychological distress and NPA which is consistent with the literature (e.g., Chermack et al., 2001; Walton et al., 2002), although the multivariate analyses revealed no significant direct effect of psychological distress on NPA. However, youth aggression was positively associated with psychological distress, but psychological distress, in turn, had a negative (albeit weak) association with NPA. This appears to reflect a more nuanced or complicated association between youth aggression and NPA, and suggests that there may be a subgroup of individuals whose NPA does not persist into adulthood, and who have relatively high levels of recent psychological distress. These findings reflect a need for future studies that can help to better elucidate the dynamics between youth aggression, psychological distress, and adult NPA.

The overall pattern suggests that there are likely substantially different proximal factors related to NPA and PA. This is somewhat consistent with Chermack et al. (Chermack, Fuller, et al., 2000) in which both alcohol and drug consequences were related to NPA but only drug consequences was related to PA in a SUD treatment sample. The present pattern of findings have methodological and theoretical implications, (e.g. importance of assessing proximal and distal risk factors, examining differences in NPA vs. PA) and suggest the importance of examining the relationships of specific drugs to both NPA and PA in order to have a more refined understanding of how drug use or consequences may be associated with different types of violence. Future studies are needed using daily assessment methodologies to better examine the relationship between acute substance use and NPA and PA.

Although heavy drinking was bivariately associated with NPA, the lack of an association between heavy drinking patterns and PA was somewhat unexpected given evidence from several studies with a variety of methodologies (epidemiological, controlled experimental, event-based) and samples (nationally representative samples, SUD samples, etc.) that alcohol use or consequences are associated with general aggression and partner aggression (Chermack & Blow, 2002; Testa et al., 2012). There are several possible reasons for this discrepancy, including that: 1) the present multivariate analyses adjusted for the impact of other potentially important factors (e.g., youth aggression, psychological distress, etc.), 2) there may have been a more restricted range of alcohol use patterns in this SUD sample reporting past year violence compared to representative community or national samples making it more difficult to observe a significant relationship, 3) the present study focused on use patterns rather than examining the impact of acute event specific alcohol use [although a prior study with the present sample did not find acute alcohol use related to PA; (Chermack

et al., 2010)], and 4) that in SUD samples, other factors (e.g., youth aggression, relationship issues, etc.) play a more potent role in terms of their association with PA.

Finally, although some prior studies have shown psychological distress to be related to both PA and NPA (Chermack & Blow, 2002; Chermack, Fuller, et al., 2000; Moore et al., 2008; Walton et al., 2002), the present findings suggest that the relationship between psychological distress and both PA and NPA appears complicated, particularly when examined in the context of other violence risk factors. It appears that youth aggression and maternal alcohol problems contribute to adult problems with psychological distress, but that psychological distress may not be positively related to NPA or PA. It should be noted that there is very limited longitudinal data examining inter-relationships over time among psychological distress, substance use and types of aggression involvement (Chermack et al., 2009), although one study did find that psychological distress measured early in treatment predicted violence at a two year follow-up (Walton et al., 2002). The present findings highlight a need for future research targeting adult aggression to simultaneously assess such constructs using longitudinal designs. At this point, it is unknown whether successful treatment of psychological distress/problems would impact risk of aggression or whether interventions to decrease involvement with aggression would have an impact on psychological distress (or both). Nevertheless, in terms of clinical implications, the bivariate findings suggest that individuals in treatment for SUDs reporting past year violence and high levels of psychological distress may be involved with more frequent NPA and PA.

### 4.3 Study Limitations

Several limitations should be noted. As noted above, the nature of this data did not allow for temporal associations to be established between the proximal factors (i.e. substance use) and aggression. This study was only able to examine use in the month prior to SUD treatment and its association with past-year aggression. Future studies using daily assessment methodologies could examine the temporal relationship between substance use and aggression more closely. Moreover, this study did not assess participants' past-year history of intimate relationships. Individuals were not required to be in an intimate relationship in the past year, although they were asked about their current marital status. Future research with larger samples and more detailed/nuanced assessment of intimate relationships (e.g., whether participants were in a relationship, assessing different types of "relationships," length of time in the relationship, how many relationships/partners in the past year, etc.) would provide important and more detailed information regarding aggression among intimate partners. Additionally, due to the cross-sectional nature of this study, causality cannot be determined. However, this study is a first step in attempting to identify potential key pathways of distal and proximal risk factors that are uniquely associated with PA versus NPA. Future work should examine the relationship between distal and proximal factors, as well as more immediate social and contextual factors, and partner and non-partner violence using a longitudinal study design. Second, although preliminary analyses did not reveal any significant gender effects or interactions, it is possible that studies with larger samples might be needed to detect interactions involving gender or to conduct separate models for men and women. Third, the study did not include measurement of certain constructs that could reveal potential gender differences (e.g., motivations for conflict, consequences of aggression,

etc.). Thus, future studies should further explore potential gender differences in terms of factors related to involvement in partner and non-partner aggression. Fourth, this study did not corroborate participant self-report on the measures used in this study. However, we ensured confidentiality of self-report information and obtained a certificate of confidentiality in order to support self-report validity. Moreover, evidence suggests that individuals in SUD treatment may provide more accurate reporting of aggression than community-based, representative, or forensic samples (Panuzio et al., 2006). There is also evidence to support the accuracy of self-reported substance use in research studies and among those new to SUD treatment (Chermack, Roll, et al., 2000; Chermack, Singer, & Beresford, 1998; Darke, 1998; Desmarais, Van Dorn, Sellers, Young, & Swartz, 2012; Large et al., 2012). Fifth, this study did not include comprehensive measures of psychological disorders (e.g. major depressive disorder, post-traumatic stress disorder), which would be important to assess in future studies. Finally, the nature of the data did not allow us to assess whether the aggressive acts among these participants were deliberate acts of perpetration/instigation of violence or acts of defensive aggression in response to others' aggression. Further exploration of the motivations for aggression would be important for future studies to explore.

### 4.4 Conclusions

Factors related to NPA and PA involvement differed substantially with only youth aggression as a common predictor in both models. Specifically, there were more proximal factors related to NPA (alcohol and cocaine use, psychological distress). The findings suggest that for substance use disorder samples in which there is co-occurring violence towards others, there are different factors associated with PA and NPA, and that this may have implications for assessment and treatment protocols targeting aggression. Finally, the findings further underscore the need for early identification and intervention for youth aggression, and have implications for assessment and treatment of individuals in SUD treatment involved aggression towards partners and non-partners. Specifically, our findings indicate that screening/treatment of SUD samples should address issues of both partner and non-partner aggression, and assess an array of proximal (e.g., heavy drinking, cocaine use, psychological distress) and distal risk factors (e.g., parental alcohol problems, youth aggression, childhood conduct problems). Finally, the findings suggest that future longitudinal research is needed at the event level to clarify the proximal dynamics associated with both PA and NPA, including acute psychological distress and substance use, as well as assess more distal factors in order to better understand the life-long developmental risk factors associated with NPA and PA.

## Acknowledgments

Funding for this study was provided by NIDA R01 DA017295 and NIDA T32 DA007267. NIDA had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication. Research reported in this publication was also supported by the National Center for Advancing Translational Sciences of the National Institutes of Health under Award Number 2UL1TR000433 and the University of Michigan Injury Center, an Injury Control Research Center funded by the Centers for Disease Control and Prevention (CDC R49CE002099). The views expressed in this article are those of the authors and do not necessarily represent the views of NIDA, the National Institutes of Health, the Centers for Disease Control and Prevention, the University of Michigan, or the Department of Veterans Affairs.

## References


Beaudoin CM, Murray RP, Bond J, Barnes GE. Personality characteristics of depressed or alcoholic adult children of alcoholics. Personality and Individual Differences. 1997; 23(4):559–567.10.1016/S0191-8869(97)00080-9

Belliveau JM, Stoppard JM. Parental alcohol abuse and gender as predictors of psychopathology in adult children of alcoholics. Addict Behav. 1995; 20(5):619–625. 0306-4603(95)00022-5 [pii]. [PubMed: 8712059]

Benishek LA, Hayes CM, Bieschke KJ, Stoffelmayr BE. Exploratory and confirmatory factor analyses of the Brief Symptom Inventory among substance abusers. J Subst Abuse. 1998; 10(2):103–114. S0899-3289(99)80127-8 [pii]. [PubMed: 9854697]

Brown TG, Werk A, Caplan T, Shields N, Seraganian P. The incidence and characteristics of violent men in substance abuse treatment. Addict Behav. 1998; 23(5):573–586. S0306-4603(98)00004-5 [pii]. [PubMed: 9768295]

Caetano R, McGrath C, Ramisetty-Mikler S, Field CA. Drinking, alcohol problems and the five-year recurrence and incidence of male to female and female to male partner violence. Alcohol Clin Exp Res. 2005; 29(1):98–106. 00000374-200501000-00014 [pii]. [PubMed: 15654298]

Chassin L, Fora DB, King KM. Trajectories of alcohol and drug use and dependence from adolescence to adulthood: the effects of familial alcoholism and personality. J Abnorm Psychol. 2004; 113(4):483–498. 2004-20178-001 [pii]. 10.1037/0021-843X.113.4.483 [PubMed: 15535782]

Chassin L, Pitts SC, DeLucia C, Todd M. A longitudinal study of children of alcoholics: predicting young adult substance use disorders, anxiety, and depression. J Abnorm Psychol. 1999; 108(1):106–119. [PubMed: 10066997]

Chermack ST, Blow FC. Violence among individuals in substance abuse treatment: the role of alcohol and cocaine consumption. Drug Alcohol Depend. 2002; 66(1):29–37. S0376871601001806 [pii]. [PubMed: 11850133]

Chermack ST, Booth BM, Curran GM. Gender differences in correlates of recent physical assault among untreated rural and urban at-risk drinkers: role of depression. Violence Vict. 2006; 21(1):67–80. [PubMed: 16494133]

Chermack ST, Fuller BE, Blow FC. Predictors of expressed partner and non-partner violence among patients in substance abuse treatment. Drug Alcohol Depend. 2000; 58(1–2):43–54. S0376-8716(99)00067-8 [pii]. [PubMed: 10669054]

Chermack ST, Giancola PR. The relation between alcohol and aggression: an integrated biopsychosocial conceptualization. Clin Psychol Rev. 1997; 17(6):621–649. S0272-7358(97)00038-X [pii]. [PubMed: 9336688]

Chermack ST, Grogan-Kaylor A, Perron BE, Murray RL, De Chavez P, Walton MA. Violence among men and women in substance use disorder treatment: a multilevel event-based analysis. Drug Alcohol Depend. 2010; 112(3):194–200. S0376-8716(10)00211-5 [pii]. 10.1016/j.drugalcdep.2010.06.005 [PubMed: 20667666]

Chermack ST, Murray RL, Walton MA, Booth BA, Wryobeck J, Blow FC. Partner aggression among men and women in substance use disorder treatment: correlates of psychological and physical aggression and injury. Drug Alcohol Depend. 2008; 98(1–2):35–44. S0376-8716(08)00164-6 [pii]. 10.1016/j.drugalcdep.2008.04.010 [PubMed: 18554825]

Chermack ST, Murray RL, Winters JJ, Walton MA, Booth BM, Blow FC. Treatment needs of men and women with violence problems in substance use disorder treatment. Subst Use Misuse. 2009; 44(9–10):1236–1262.10.1080/10826080902960007 [PubMed: 19938916]

Chermack ST, Roll J, Reilly M, Davis L, Kilaru U, Grabowski J. Comparison of patient self-reports and urinalysis results obtained under naturalistic methadone treatment conditions. Drug Alcohol Depend. 2000; 59(1):43–49. S0376-8716(99)00106-4 [pii]. [PubMed: 10706974]

Chermack ST, Singer K, Beresford TP. Screening for alcoholism among medical inpatients: how important is corroboration of patient self-report? Alcohol Clin Exp Res. 1998; 22(7):1393–1398. [PubMed: 9802518]

Chermack ST, Stoltenberg SF, Fuller BE, Blow FC. Gender differences in the development of substance-related problems: the impact of family history of alcoholism, family history of violence and childhood conduct problems. J Stud Alcohol. 2000; 61(6):845–852. [PubMed: 11188490]

Chermack ST, Walton MA, Fuller BE, Blow FC. Correlates of expressed and received violence across relationship types among men and women substance abusers. Psychol Addict Behav. 2001; 15(2): 140–151. [PubMed: 11419230]

Chermack ST, Wryobeck JM, Walton MA, Blow FC. Distal and proximal factors related to aggression severity among patients in substance abuse treatment: family history, alcohol use and expectancies. Addict Behav. 2006; 31(5):845–858. S0306-4603(05)00164-4 [pii]. 10.1016/j.addbeh.2005.06.004 [PubMed: 16002224]

Cranford JA, Zucker RA, Jester JM, Puttler LI, Fitzgerald HE. Parental alcohol involvement and adolescent alcohol expectancies predict alcohol involvement in male adolescents. Psychol Addict Behav. 2010; 24(3):386–396. 2010-19026-003 [pii]. 10.1037/a0019801 [PubMed: 20853923]

Crews TM, Sher KJ. Using adapted short MASTs for assessing parental alcoholism: reliability and validity. Alcohol Clin Exp Res. 1992; 16(3):576–584. [PubMed: 1626659]

Cunningham RM, Murray R, Walton MA, Chermack ST, Wojnar M, Wozniak P, Blow FC. Prevalence of past year assault among inner-city emergency department patients. Ann Emerg Med. 2009; 53(6):814–823 e815. S0196-0644(09)00042-0 [pii]. 10.1016/j.annemergmed.2009.01.016 [PubMed: 19282061]

Darke S. Self-report among injecting drug users: a review. Drug Alcohol Depend. 1998; 51(3):253–263. discussion 267–258. S0376871698000283 [pii]. [PubMed: 9787998]

DeMaris A, Benson ML, Fox GL, Hill T, Van Wyk J. Distal and proximal factors in domestic violence: A test of an integrated model. Journal of Marriage and Family. 2003; 65(3):652–667.10.1111/j.1741-3737.2003.00652.x

Derogatis LR, Melisaratos N. The Brief Symptom Inventory: an introductory report. Psychol Med. 1983; 13(3):595–605. [PubMed: 6622612]

Desmarais SL, Van Dorn RA, Sellers BG, Young MS, Swartz MS. Accuracy of Self-Report, Biological Tests, Collateral Reports and Clinician Ratings in Identifying Substance Use Disorders Among Adults With Schizophrenia. Psychology of Addictive Behaviors, Online. 2012

Endicott J, Spitzer RL, Fleiss JL. Mental status examination record (MSER): reliability and validity. Compr Psychiatry. 1975; 16(3):285–301. 0010-440X(75)90055-3 [pii]. [PubMed: 1095289]

Epstein-Ngo QM, Cunningham RM, Whiteside LK, Chermack ST, Booth BM, Zimmerman MA, Walton MA. A daily calendar analysis of substance use and dating violence among high risk urban youth. Drug Alcohol Depend. 2013; 130(1–3):194–200. S0376-8716(12)00447-4 [pii]. 10.1016/j.drugalcdep.2012.11.006 [PubMed: 23219602]

Epstein-Ngo QM, Walton MA, Chermack ST. Distal and Proximal Risk Factors for Non-Partner Violence in a Substance Use Disorder Treatment Sample. Alcoholism-Clinical and Experimental Research. 2012; 36:231a–231a.

Epstein-Ngo QM, Walton MA, Chermack ST, Blow FC, Zimmerman MA, Cunningham RM. Event-level analysis of antecedents for youth violence: comparison of dating violence with non-dating violence. Addict Behav. 2014; 39(1):350–353.10.1016/j.addbeh.2013.10.015 [PubMed: 24182751]

Foran HM, O'Leary KD. Alcohol and intimate partner violence: a meta-analytic review. Clin Psychol Rev. 2008; 28(7):1222–1234. S0272-7358(08)00088-3 [pii]. 10.1016/j.cpr.2008.05.001 [PubMed: 18550239]

Gilbert F, Daffern M. Integrating contemporary aggression theory with violent offender treatment: How thoroughly do interventions target violent behavior? Aggression and Violent Behavior. 2010; 15(3):167–180.10.1016/j.avb.2009.11.003

Haber JR, Bucholz KK, Jacob T, Grant JD, Scherrer JF, Sartor CE, Heath A. Effect of Paternal Alcohol and Drug Dependence on Offspring Conduct Disorder: Gene–Environment Interplay. J Stud Alcohol Drugs. 2010; 17:652–663. [PubMed: 20731970]

Harter SL. Psychosocial Adjustment of Adult Children of Alcoholics: A Review of the Recent Empirical Literature. Clinical Psychology Review. 2000; 20(3):311–337. [PubMed: 10779897]

Hayes AF, Preacher KJ, Myers TA. Mediation and the Estimation of Indirect Effects in Political Communication Research. Sourcebook for Political Communication Research: Methods, Measures, and Analytical Techniques. 2011:434–465.

Hayes JA. What does the Brief Symptom Inventory measure in college and university counseling center clients? Journal Of Counseling Psychology. 1997; 44(4):360–367.

Hussong AM, Huang W, Curran PJ, Chassin L, Zucker RA. Parent alcoholism impacts the severity and timing of children's externalizing symptoms. J Abnorm Child Psychol. 2010; 38(3):367–380.10.1007/s10802-009-9374-5 [PubMed: 20084453]

Hussong AM, Wirth RJ, Edwards MC, Curran PJ, Chassin LA, Zucker RA. Externalizing symptoms among children of alcoholic parents: Entry points for an antisocial pathway to alcoholism. J Abnorm Psychol. 2007; 116(3):529–542. 2007-11737-010 [pii]. 10.1037/0021-843X.116.3.529 [PubMed: 17696709]

Jester JM, Nigg JT, Buu A, Puttler LI, Glass JM, Heitzeg MM, Zucker RA. Trajectories of childhood aggression and inattention/hyperactivity: differential effects on substance abuse in adolescence. J Am Acad Child Adolesc Psychiatry. 2008; 47(10):1158–1165. S0890-8567(08)60101-X [pii]. 10.1097/CHI.0b013e3181825a4e [PubMed: 18724257]

Kachadourian LK, Homish GG, Quigley BM, Leonard KE. Alcohol expectancies, alcohol use, and hostility as longitudinal predictors of alcohol-related aggression. Psychol Addict Behav. 2012; 26(3):414–422. [pii]. 10.1037/a00258422011-23442-001 [PubMed: 22004128]

Kearns-Bodkin JN, Leonard KE. Relationship functioning among adult children of alcoholics. J Stud Alcohol Drugs. 2008; 69(6):941–950. [PubMed: 18925353]

Kearns-Bodkin JN, Testa M, Livingston JL. Mother-daughter congruency in reports of daughters' high school drinking behavior. Alcoholism-Clinical and Experimental Research. 2007; 31(6):111a–111a.

Kouri EM, Pope HG Jr, Lukas SE. Changes in aggressive behavior during withdrawal from long-term marijuana use. Psychopharmacology (Berl). 1999; 143(3):302–308. [PubMed: 10353434]

Kraanen FL, Vedel E, Scholing A, Emmelkamp PM. Screening on perpetration and victimization of intimate partner violence (IPV): two studies on the validity of an IPV screening instrument in patients in substance abuse treatment. PLoS One. 2013; 8(5):e63681.10.1371/journal.pone.0063681 [PubMed: 23696847]

Large M, Smith G, Sara G, Paton MB, Kedzior KK, Nielssen O. Meta-analysis of self-reported substance use compared with laboratory substance assay in general adult mental health settings. International Journal of Methods in Psychiatric Research. 2012; 21(2):134–148. [PubMed: 22367926]

Lease SH. A model of depression in adult children of alcoholics and nonalcoholics. Journal of Counseling and Development. 2002; 80(4):441–451.

Licata A, Taylor S, Berman M, Cranston J. Effects of cocaine on human aggression. Pharmacol Biochem Behav. 1993; 45(3):549–552. 0091-3057(93)90504-M [pii]. [PubMed: 8332615]

Lipsey MW, Wilson DB, Cohen MA, Derzon JH. Is there a causal relationship between alcohol use and violence? A synthesis of evidence. Recent Dev Alcohol. 1997; 13:245–282. [PubMed: 9122498]

Maag JW, Katsiyannis A. Early intervention programs for children with behavior problems and at risk for developing antisocial behaviors: Evidence- and research-based practices. Remedial and Special Education. 2010; 31(6):464–475.

McLellan AT, Kushner H, Metzger D, Peters R, Smith I, Grissom G, Argeriou M. The fifth edition of the Addiction Severity Index. J Subst Abuse Treat. 1992; 9(3):199–213. [PubMed: 1334156]

Mericle AA, Havassy BE. Characteristics of recent violence among entrants to acute mental health and substance abuse services. Soc Psychiatry Psychiatr Epidemiol. 2008; 43(5):392–402.10.1007/s00127-008-0322-4 [PubMed: 18297223]

Moore TM, Stuart GL. A review of the literature on marijuana and interpersonal violence. Aggression and Violent Behavior. 2005; 10:21.

Moore TM, Stuart GL, Meehan JC, Rhatigan DL, Hellmuth JC, Keen SM. Drug abuse and aggression between intimate partners: a meta-analytic review. Clin Psychol Rev. 2008; 28(2):247–274. S0272-7358(07)00103-1 [pii]. 10.1016/j.cpr.2007.05.003 [PubMed: 17604891]

Murphy CM, Winters J, O'Farrell TJ, Fals-Stewart W, Murphy M. Alcohol consumption and intimate partner violence by alcoholic men: comparing violent and nonviolent conflicts. Psychol Addict Behav. 2005; 19(1):35–42. 2005-02590-005 [pii]. 10.1037/0893-164X.19.1.35 [PubMed: 15783276]

Murray RL, Chermack ST, Walton MA, Winters J, Booth BM, Blow FC. Psychological aggression, physical aggression, and injury in nonpartner relationships among men and women in treatment for substance-use disorders. J Stud Alcohol Drugs. 2008; 69(6):896–905. [PubMed: 18925348]

Myerscough R, Taylor S. The effects of marijuana on human physical aggression. J Pers Soc Psychol. 1985; 49(6):1541–1546. [PubMed: 3003332]

Mytton J, DiGuiseppi C, Gough D, Taylor R, Logan S. School-based secondary prevention programmes for preventing violence. Cochrane Database Syst Rev. 2006; (3):CD004606.10.1002/14651858.CD004606.pub2 [PubMed: 16856051]

Nicholas KB, Rasmussen EH. Childhood abusive and supportive experiences, inter-parental violence, and parental alcohol use: Prediction of young adult depressive symptoms and aggression. Journal of Family Violence. 2006; 21(1):43–61.10.1007/s10896-005-9001-3

O'Farrell TJ, Fals-Stewart W, Murphy M, Murphy CM. Partner violence before and after individually based alcoholism treatment for male alcoholic patients. J Consult Clin Psychol. 2003; 71(1):92–102. [PubMed: 12602429]

O'Farrell TJ, Murphy CM, Stephan SH, Fals-Stewart W, Murphy M. Partner violence before and after couples-based alcoholism treatment for male alcoholic patients: the role of treatment involvement and abstinence. J Consult Clin Psychol. 2004; 72(2):202–217. 2004-12113-006 [pii]. 10.1037/0022-006X.72.2.202 [PubMed: 15065955]

Panuzio J, O'Farrell TJ, Marshall AD, Murphy CM, Murphy M, Taft CT. Intimate partner aggression reporting concordance and correlates of agreement among men with alcohol use disorders and their female partners. Assessment. 2006; 13(3):266–279. 13/3/266 [pii]. 10.1177/1073191106287792 [PubMed: 16880279]

Parks KA, Hsieh YP, Bradizza CM, Romosz AM. Factors influencing the temporal relationship between alcohol consumption and experiences with aggression among college women. Psychol Addict Behav. 2008; 22(2):210–218. 2008-06772-006 [pii]. 10.1037/0893-164X.22.2.210 [PubMed: 18540718]

Preacher KJ, Hayes AF. SPSS and SAS procedures for estimating indirect effects in simple mediation models. Behavior Research Methods Instruments & Computers. 2004; 36(4):717–731.10.3758/Bf03206553

Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior Research Methods. 2008; 40(3):879–891.10.3758/Brm.40.3.879 [PubMed: 18697684]

Rothman EF, Johnson RM, Azrael D, Hall DM, Weinberg J. Perpetration of physical assault against dating partners, peers, and siblings among a locally representative sample of high school students in Boston, Massachusetts. Arch Pediatr Adolesc Med. 2010; 164(12):1118–1124. 164/12/1118 [pii]. 10.1001/archpediatrics.2010.229 [PubMed: 21135340]

Rothman EF, McNaughton Reyes L, Johnson RM, LaValley M. Does the alcohol make them do it? Dating violence perpetration and drinking among youth. Epidemiol Rev. 2012; 34(1):103–119. mxr027 [pii]. 10.1093/epirev/mxr027 [PubMed: 22128086]

Royse D, Drude K. Screening drug abuse clients with the brief symptom inventory. Int J Addict. 1984; 19(8):849–857. [PubMed: 6335710]

Schumacher JA, Coffey SF, Leonard KE, O'Jile JR, Landy NC. Self-regulation, daily drinking, and partner violence in alcohol treatment-seeking men. Exp Clin Psychopharmacol. 2013; 21(1):17–28. [pii]. 10.1037/a00311412013-03347-001 [PubMed: 23379612]

Schumm JA, O'Farrell TJ, Murphy CM, Fals-Stewart W. Partner violence before and after couples-based alcoholism treatment for female alcoholic patients. J Consult Clin Psychol. 2009; 77(6):1136–1146. 2009-22711-012 [pii]. 10.1037/a0017389 [PubMed: 19968389]

Schumm JA, O'Farrell TJ, Murphy CM, Murphy M, Muchowski P. Test of a Conceptual Model of Partner Aggression Among Women Entering Substance Use Disorder Treatment. J Stud Alcohol Drugs. 2011; 72(6):933–942. [PubMed: 22051207]

Selzer ML, Vinokur A, van Rooijen L. A self-administered Short Michigan Alcoholism Screening Test (SMAST). J Stud Alcohol. 1975; 36(1):117–126. [PubMed: 238068]

Sher KJ, Descutner C. Reports of paternal alcoholism: reliability across siblings. Addict Behav. 1986; 11(1):25–30. 0306-4603(86)90005-5 [pii]. [PubMed: 3716913]

Shrout PE, Bolger N. Mediation in experimental and nonexperimental studies: new procedures and recommendations. Psychol Methods. 2002; 7(4):422–445. [PubMed: 12530702]

Smith, GR.; Babor, T.; Burnam, MA.; Mosley, CL.; Rost, K.; Burns, B. Substance Abuse Outcomes Module User's Manual. Little Rock, AR: University of Arkansas for Medical Sciences; 1996.

Smith GR, Burnam MA, Mosley CL, Hollenberg JA, Mancino M, Grimes W. Reliability and validity of the substance abuse outcomes module. Psychiatr Serv. 2006; 57(10):1452–1460. 57/10/1452 [pii]. 10.1176/appi.ps.57.10.1452 [PubMed: 17035565]

Smith PH, Homish GG, Leonard KE, Cornelius JR. Intimate partner violence and specific substance use disorders: findings from the National Epidemiologic Survey on Alcohol and Related Conditions. Psychol Addict Behav. 2012; 26(2):236–245. [pii]. 10.1037/a00248552011-16753-001 [PubMed: 21823768]

Sorensen HJ, Manzardo AM, Knop J, Penick EC, Madarasz W, Nickel EJ, Mortensen EL. The contribution of parental alcohol use disorders and other psychiatric illness to the risk of alcohol use disorders in the offspring. Alcohol Clin Exp Res. 2011; 35(7):1315–1320.10.1111/j.1530-0277.2011.01467.x [PubMed: 21676003]

Straus M. Measuring intrafamily conflict and violence: The conflict tactics scales. Journal of Marriage and the Family. 1979; 41:75–88.

Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB. The revised Conflict Tactics Scales (CTS2): Development and preliminary psychometric data. Journal of Family Issues. 1996; 17:283–316.

Sullivan TP, Cavanaugh CE, Buckner JD, Edmondson D. Testing posttraumatic stress as a mediator of physical, sexual, and psychological intimate partner violence and substance problems among women. J Trauma Stress. 2009; 22(6):575–584.10.1002/jts.20474 [PubMed: 19960546]

Sullivan TP, Cavanaugh CE, Ufner MJ, Swan SC, Snow DL. Relationships Among Women's Use of Aggression, Their Victimization, and Substance Use Problems: A Test of the Moderating Effects of Race/Ethnicity. Journal of Aggression, Maltreatment & Trauma Violence Abuse. 2013; 18(6): 646–666.

Testa M, Kubiak A, Quigley B, Houston RJ, Derrick JL, Levitt A, Leonard KE. Husband and Wife Alcohol Use as Independent or Interactive Predictors of Intimate Partner Violence. J Stud Alcohol Drugs. 2012; 73(2):268–276. [PubMed: 22333334]

Walton MA, Chermack ST, Blow FC. Correlates of received and expressed violence persistence following substance abuse treatment. Drug Alcohol Depend. 2002; 67(1):1–12. S0376871602000169 [pii]. [PubMed: 12062775]

Walton MACR, Chermack ST, Maio R, Blow FC, Weber J. Correlates of violence history among injured patients in an urban emergency department: gender, substance use, and depression. J Addict Dis. 2007; 26(3):61–75. [PubMed: 18018809]

Walton MA, Cunningham RM, Goldstein AL, Chermack ST, Zimmerman MA, Bingham CR, Blow FC. Rates and correlates of violent behaviors among adolescents treated in an urban emergency department. J Adolesc Health. 2009; 45(1):77–83. S1054-139X(08)00657-5 [pii]. 10.1016/j.jadohealth.2008.12.005 [PubMed: 19541253]

Zucker RA. On method, theory, and the classification of complex disorders. Addiction. 1997; 92(12): 1664–1665.10.1111/j.1360-0443.1997.tb02886.x

Zucker RA, Wong MM, Clark DB, Leonard KE, Schulenberg JE, Cornelius JR, Puttler LI. Predicting risky drinking outcomes longitudinally: what kind of advance notice can we get? Alcohol Clin Exp Res. 2006; 30(2):243–252. ACER33 [pii]. 10.1111/j.1530-0277.2006.00033.x [PubMed: 16441273]

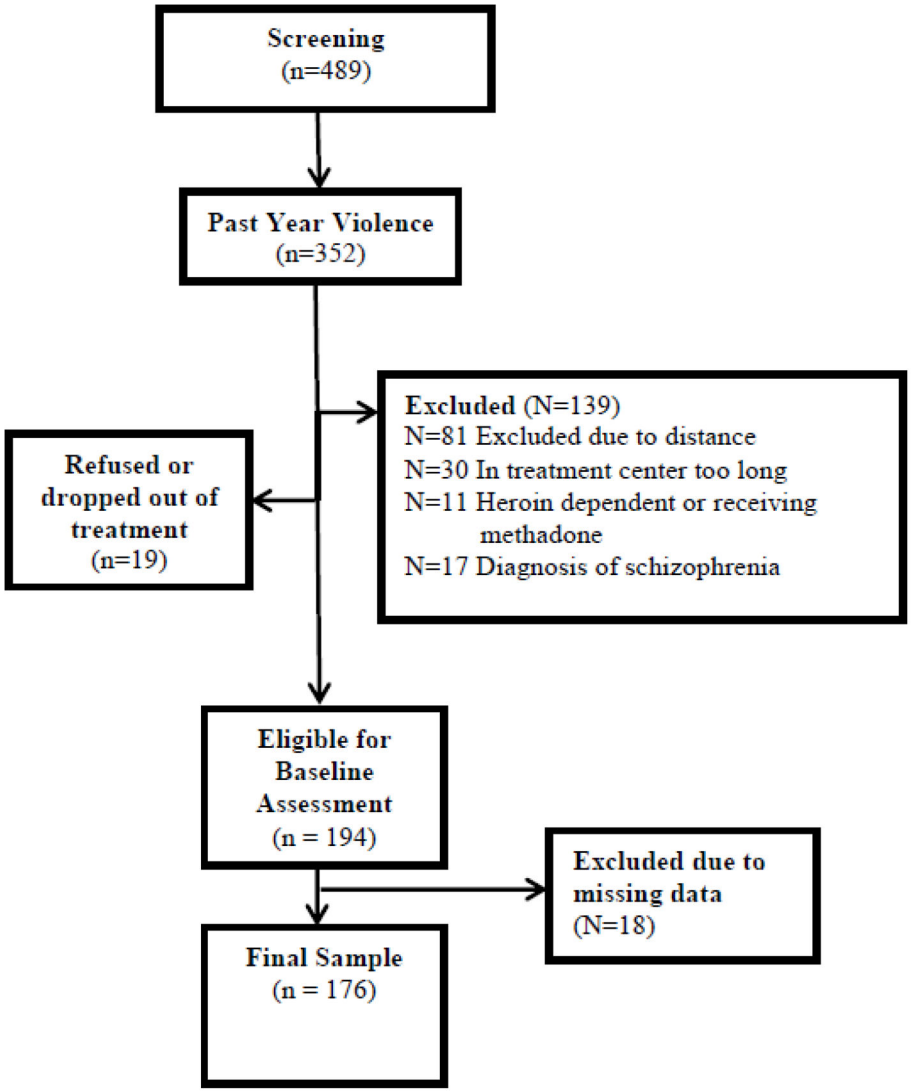



**Figure 1.**
Study Flow Chart

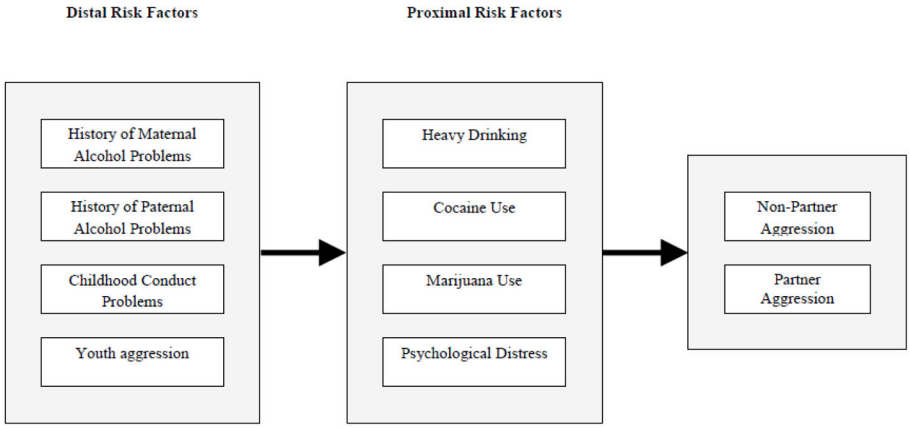
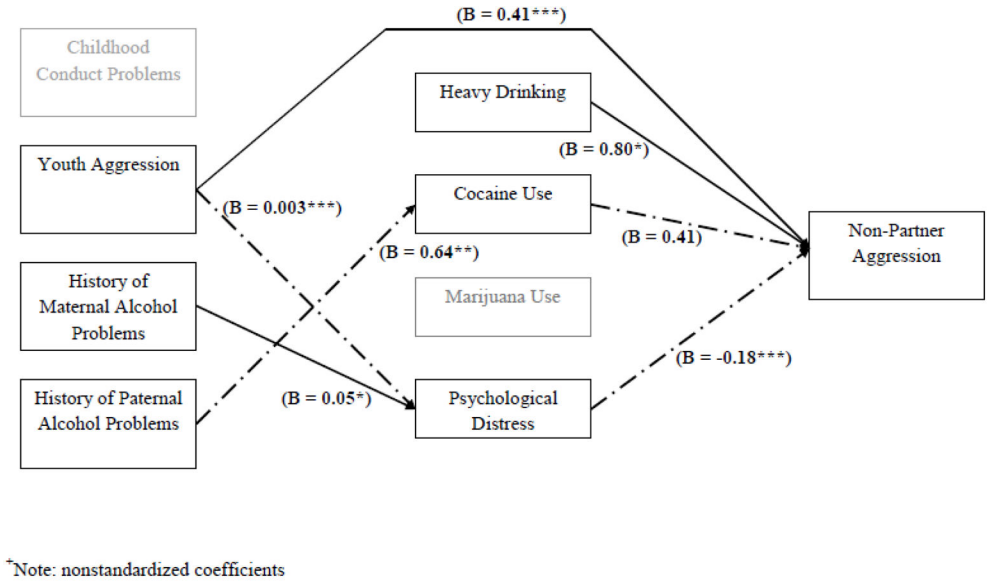
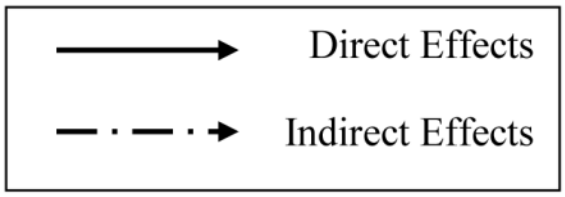



**Figure 2.**
Proposed Indirect Effects Model for Non-Partner and Partner Aggression




*Note: nonstandardized coefficients

**Figure 3.**
Significant Direct and Indirect Effects for Non-Partner Aggression



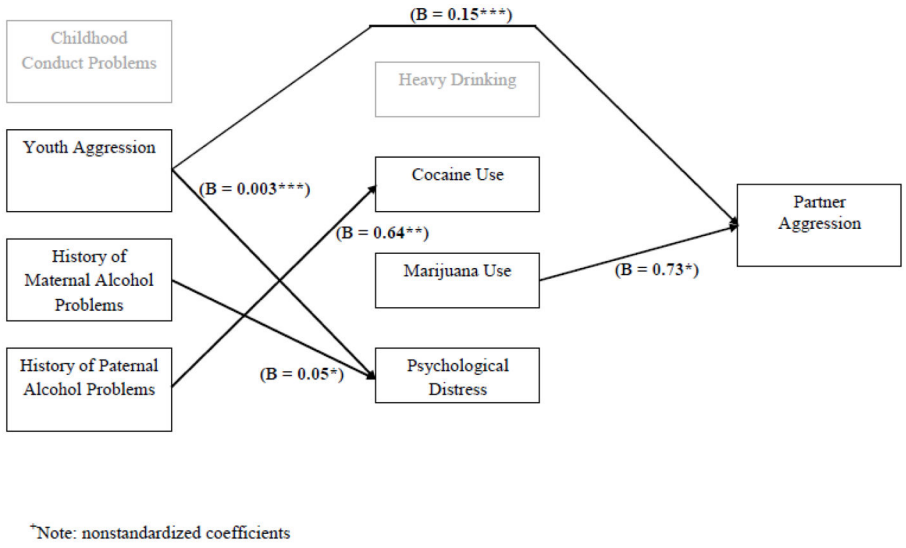



**Figure 4.**
Significant Direct and Indirect Effects for Partner Aggression

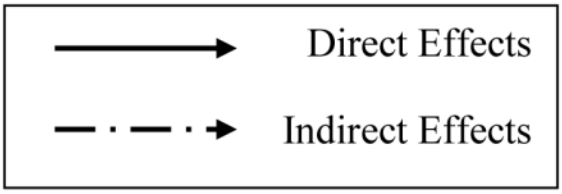


**Table 1**

Demographic and Descriptive Data (n=176)

| Variables | N (%) | M(SD) |
|---|---|---|
| Age | n/a | 35.8(10.8) |
| Female | 42 (23.9%) | - |
| Caucasian (vs. African Am./Other) | 88 (50.0%) | - |
| Residential (vs. Outpatient) | 109 (61.9%) | - |
| Alcohol (Heavy Drinking Days) | 112 (63.6%) | 8.0 days (9.5) |
| Cocaine | 114 (64.8%) | 9.1 (10.3) |
| Marijuana | 95 (54.0%) | 7.4 (10.6) |
| Psychological Distress | 174 (99.9%) | 1.2 (0.8) |
| History of Maternal Alcohol Problems | 64 (36.4%) | 1.2 (2.2) |
| History of Paternal Alcohol Problems | 100 (56.8%) | 3.1 (3.3) |
| Childhood Conduct Problems | 167 (94.9) | 3.7 (1.5) |
| Partner Aggression | 133 (75.6%) | 23.0 (42.5)* |
| Minor | 130 (73.9%) | 14.8 (24.2) |
| Severe | 94 (53.4%) | 8.2 (20.7) |
| Non-Partner Aggression | 142 (80.7%) | 31.5 (55.6) |
| Minor | 138 (78.4%) | 15.3 (26.3) |
| Severe | 123 (69.9%) | 16.2 (30.5) |
| Both Partner & Non-Partner | 113 (58.2%) | - |
| Youth Aggression | 168 (95.5%) | 68.1 (73.7)** |
| Minor | 167 (94.9%) | 35.9 (36.2) |
| Severe | 157 (89.2%) | 32.5 (40.5) |

*Mean number of aggressive acts in the past year.

**Mean number of youth aggression acts reported.

**Table 2**

Correlation Matrix for All Variables (n=176)

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Age | -- | .20** | −.04 | .05 | .02 | − .35** | .01 | − .20** | − .22** | −.14 | −.11 | −.13 | −.04 |
| 2. Race | | -- | .13 | −.01 | −.07 | −.07 | −.14 | −.07 | .09 | −.06 | −.10 | .05 | −.02 |
| 3. Gender | | | -- | −.03 | −.17* | −.01 | − .24** | .25** | .15* | −.04 | −.03 | .12 | −.03 |
| 4. Heavy Drinking | | | | -- | .12 | .13 | .20* | .08 | .05 | .12 | .08 | .17* | .10 |
| 5. Cocaine Use | | | | | -- | .18* | .22** | .00 | .07 | .13 | .23** | .11 | .23** |
| 6. Marijuana Use | | | | | | -- | .14 | .15* | .16* | .19* | −.00 | .20** | .24** |
| 7. Psychological Distress | | | | | | | -- | .16* | .30** | .20** | .16* | .18* | .27** |
| 8. Child. Conduct Prob. | | | | | | | | -- | .30** | .03 | .10 | .20** | .13 |
| 9. Youth Aggression | | | | | | | | | -- | .12 | .15* | .56** | .34** |
| 10. Maternal Alc. Problems | | | | | | | | | | -- | .09 | .01 | .19* |
| 11. Paternal Alc. Problems | | | | | | | | | | | -- | .04 | .22** |
| 12. Non-Partner Aggression | | | | | | | | | | | | -- | .39** |
| 13. Partner Aggression | | | | | | | | | | | | | -- |

* $p \leq .05$,

** $p \leq .01$;

**Note:** In the case of correlations between nominal and continuous variables, the values reflect a point biserial correlation. In the case of correlations between nominal variables, the values reflect a phi coefficient. In all other cases, the values reflect a Pearson moment correlation.

## Table 3

Regression Analyses for Multiple Indirect Effects on Non-Partner Aggression (n = 176)

| | Unstandardized B | (SE) |
|---|---|---|
| **Direct Effects** | | |
| **a paths (Distal Factors → Proximal Factors)** | | |
| Childhood Conduct Problems → | | |
| Heavy Drinking | 0.66**** | 0.53 |
| Cocaine Use | 0.11**** | 0.56 |
| Marijuana Use | 0.57**** | 0.56 |
| Psychological Distress | 0.07**** | 0.04 |
| Youth Aggression → | | |
| Heavy Drinking | 0.00**** | 0.01 |
| Cocaine Use | 0.01**** | 0.01 |
| Marijuana Use | 0.01**** | 0.01 |
| Psychological Distress | 0.003*** | 0.00 |
| Maternal Alcohol Problems → | | |
| Heavy Drinking | 0.50**** | 0.34 |
| Cocaine Use | 0.49**** | 0.36 |
| Marijuana Use | 0.70**** | 0.36 |
| Psychological Distress | 0.05**** | 0.02 |
| Paternal Alcohol Problems → | | |
| Heavy Drinking | 0.17**** | 0.22 |
| Cocaine Use | 0.64**** | 0.23 |
| Marijuana Use | −0.20**** | 0.23 |
| Psychological Distress | 0.02*** | 0.02 |
| **b paths (Proximal Factors → Non-Partner Aggression)** | | |
| Heavy Drinking | 0.80**** | 0.38 |
| Cocaine Use | 0.41**** | 0.36 |
| Marijuana Use | 0.54**** | 0.36 |
| Psychological Distress | −0.18**** | 5.36 |
| **c paths (Distal Factors → Non-Partner Aggression)**[a] | | |
| Childhood Conduct Problems | 0.91*** | 2.60 |
| Youth Aggression | 0.43*** | 0.05 |

| | Unstandardized B | (SE) |
|---|---|---|
| Maternal Alcohol Problems | −1.34**** | 1.67 |
| Paternal Alcohol Problems | −0.71**** | 1.08 |
| **Omnibus Test of Total Effects** | **$R^2$ = 0.29** | **F = 18.19*** ** |
| **c' paths (Distal Factors → Non-Partner Aggression)[b]** | | |
| Childhood Conduct Problems | 0.05*** | 2.59 |
| Youth Aggression | 0.41*** | 0.05 |
| Maternal Alcohol Problems | −2.31**** | 1.68 |
| Paternal Alcohol Problems | −1.00**** | 1.09 |
| **Omnibus Test of Direct Effects** | **$R^2$ = 0.24** | **F = 15.50*** ** |
| **Indirect Effects (ab paths)** | | |
| Childhood Conduct Problems → | | |
| Heavy Drinking | 0.52 | (0.52) |
| 95% CI | (−0.3052 – 1.7339) | |
| Cocaine Use | 0.04 | (0.49) |
| 95% CI | (−0.9252 – 1.1350) | |
| Marijuana Use | 0.31 | (0.54) |
| 95% CI | (−0.4432 – 1.7164) | |
| Psychological Distress | −0.01 | (0.04) |
| 95% CI | (−0.0050 – 0.1638) | |
| Youth Aggression → | | |
| Heavy Drinking | 0.00 | (0.01) |
| 95% CI | (−0.0172 – 0.0227) | |
| Cocaine Use | 0.00 | 0.01 |
| 95% CI | (−0.0101 – 0.0328) | |
| Marijuana Use | 0.01 | (0.01) |
| 95% CI | (−0.0096 – 0.0328) | |
| Psychological Distress | **−0.0006** | **(0.0014)** |
| 95% CI | **(0.0001 – 0.0056)** † | |
| Maternal Alcohol Problems → | | |
| Heavy Drinking | 0.40 | (0.36) |
| 95% CI | (−0.1391 – 1.2579) | |

| | Unstandardized B | (SE) |
|---|---|---|
| Cocaine Use | 0.20 | (0.37) |
| 95% CI | (−0.1644 – 1.2692) | |
| Marijuana Use | 0.38 | (0.41) |
| 95% CI | (−0.0473 – 1.5349) | |
| Psychological Distress | −0.01 | (0.03) |
| 95% CI | (−0.0017 – 0.1116) | |
| Paternal Alcohol Problems → | | |
| Heavy Drinking | 0.13 | (0.21) |
| 95% CI | (−0.2426 – 0.6255) | |
| Cocaine Use | **0.26** | **0.32** |
| 95% CI | **(0.0157 – 1.2301)**† | |
| Marijuana Use | −0.11 | (0.22) |
| 95% CI | (−0.6502 – 0.2120) | |
| Psychological Distress | −0.00 | (0.02) |
| 95% CI | (−0.0079 – 0.0530) | |

*a* c path represents the TOTAL effects of distal risk factors on outcome variable (i.e., does not control for influences of mediators on outcome variable);

*b* c' path represents the DIRECT effects of distal risk factors on outcome variable, taking into account the variance explained by the mediators;

* $p \leq .05$,

** $p \leq .01$,

*** $p \leq .001$,

† significant indirect effect

## Table 4

Regression Analyses for Multiple Indirect Effects on Partner Aggression (n = 176)

| | Unstandardized B | (SE) |
|---|---|---|
| **Direct Effects** | | |
| **a paths (Distal Factors → Proximal Factors)** | | |
| Childhood Conduct Problems → | | |
| Heavy Drinking | 0.66**** | 0.53 |
| Cocaine Use | 0.11**** | 0.56 |
| Marijuana Use | 0.57**** | 0.56 |
| Psychological Distress | 0.07**** | 0.04 |
| Youth Aggression → | | |
| Heavy Drinking | 0.00**** | 0.01 |
| Cocaine Use | 0.01**** | 0.01 |
| Marijuana Use | 0.01**** | 0.01 |
| Psychological Distress | 0.003*** | 0.00 |
| Maternal Alcohol Problems → | | |
| Heavy Drinking | 0.50**** | 0.34 |
| Cocaine Use | 0.49**** | 0.36 |
| Marijuana Use | 0.70**** | 0.36 |
| Psychological Distress | 0.05**** | 0.02 |
| Paternal Alcohol Problems → | | |
| Heavy Drinking | 0.17**** | 0.22 |
| Cocaine Use | 0.64**** | 0.23 |
| Marijuana Use | −0.20**** | 0.23 |
| Psychological Distress | 0.02**** | 0.02 |
| **b paths (Proximal Factors → Partner Aggression)** | | |
| Heavy Drinking | 0.05**** | 0.32 |
| Cocaine Use | 0.46**** | 0.30 |
| Marijuana Use | 0.73**** | 0.31 |
| Psychological Distress | 4.38**** | 4.49 |
| **c paths (Distal Factors → Partner Aggression)** | | |
| Childhood Conduct Problems | 1.33*** | 2.19 |
| Youth Aggression | 0.18*** | 0.04 |
| Maternal Alcohol Problems | 2.86*** | 1.40 |

| | Unstandardized B | (SE) |
|---|---|---|
| Paternal Alcohol Problems | 2.04*** | 0.91 |
| **Omnibus Test of Total Effects** | **$R^2$ = 0.17** | **F = 8.87*** ** |
| **c' paths (Distal Factors → Partner Aggression)** | | |
| Childhood Conduct Problems | 0.51*** | 2.17 |
| Youth Aggression | 0.15*** | 0.05 |
| Maternal Alcohol Problems | 1.86*** | 1.41 |
| Paternal Alcohol Problems | 1.80*** | 0.92 |
| **Omnibus Test of Direct Effects** | **$R^2$ = 0.09** | **F = 4.93*** ** |
| **Indirect Effects (ab paths)** | | |
| Childhood Conduct Problems → | | |
| Heavy Drinking | 0.03 | (0.27) |
| 95% CI | (−0.5364 – 0.6392) | |
| Cocaine Use | 0.05 | (0.18) |
| 95% CI | (−0.3762 – 0.4093) | |
| Marijuana Use | 0.42 | (0.25) |
| 95% CI | (−0.4838 – 0.5947) | |
| Psychological Distress | 0.32 | (0.03) |
| 95% CI | (−0.0496 – 0.0573) | |
| Youth Aggression → | | |
| Heavy Drinking | 0.00 | (0.00) |
| 95% CI | (−0.0073 – 0.0082) | |
| Cocaine Use | 0.00 | 0.00 |
| 95% CI | (−0.0095 – 0.0108) | |
| Marijuana Use | 0.01 | (0.00) |
| 95% CI | (−0.0099 – 0.0118) | |
| Psychological Distress | 0.01 | (0.00) |
| 95% CI | (−0.0020 – 0.0023) | |
| Maternal Alcohol Problems → | | |
| Heavy Drinking | 0.03 | (0.19) |
| 95% CI | (−0.3704 – 0.4489) | |
| Cocaine Use | 0.23 | (0.19) |
| 95% CI | (−0.3640 – 0.4557) | |

| | Unstandardized B | (SE) |
|---|---|---|
| Marijuana Use | 0.51 | (0.25) |
| 95% CI | (−0.4785 – 0.5715) | |
| Psychological Distress | 0.23 | (0.02) |
| 95% CI | (−0.0351 – 0.0410) | |
| Paternal Alcohol Problems → | | |
| Heavy Drinking | 0.01 | (0.09) |
| 95% CI | (−0.1704 – 0.2104) | |
| Cocaine Use | 0.29 | (0.22) |
| 95% CI | (−0.3947 – 0.4794) | |
| Marijuana Use | −0.15 | (0.10) |
| 95% CI | (−0.2336 – 0.1943) | |
| Psychological Distress | 0.09 | (0.01) |
| 95% CI | (−0.0159 – 0.0194) | |

*a* c path represents the TOTAL effects of distal risk factors on outcome variable (i.e., does not control for influences of mediators on outcome variable);

*b* c' path represents the DIRECT effects of distal risk factors on outcome variable, taking into account the variance explained by the mediators;

* $p \leq .05$,

** $p \leq .01$,

*** $p \leq .001$,

† significant indirect effect