

The association between childhood maltreatment, psychopathology, and adult sexual victimization in men and women: results from three independent samples

K. B. Werner^{1*}, V. V. McCutcheon², M. Challa³, A. Agrawal², M. T. Lynskey⁴, E. Conroy⁵,
D. J. Statham⁶, P. A. F. Madden², A. K. Henders⁷, A. A. Todorov², A. C. Heath², L. Degenhardt⁷,
N. G. Martin⁶, K. K. Bucholz² and E. C. Nelson²

¹George Warren Brown School of Social Work, Washington University, St Louis, MO, USA

²Alcoholism Research Center, Washington University School of Medicine, St Louis, MO, USA

³University of Illinois–Chicago School of Medicine, Chicago, IL, USA

⁴Institute of Psychiatry, Psychology & Neuroscience, King's College, London, UK

⁵Centre for Health Research, University of Western Sydney, Sydney, Australia

⁶QIMR Berghofer Medical Research Institute, Brisbane, Australia

⁷National Drug and Alcohol Research Center, University of New South Wales, Sydney, Australia

Background. Childhood maltreatment (CM) has consistently been linked with adverse outcomes including substance use disorders and adult sexual revictimization. Adult sexual victimization itself has been linked with psychopathology but has predominately been studied in women. The current investigation examines the impact of CM and co-occurring psychopathology on adult sexual victimization in men and women, replicating findings in three distinct samples.

Method. We investigated the association between continuous CM factor scores and adult sexual victimization in the Childhood Trauma Study (CTS) sample ($N = 2564$). We also examined the unique relationship between childhood sexual abuse (CSA) and adult sexual victimization while adjusting for co-occurring substance dependence and psychopathology. We replicated these analyses in two additional samples: the Comorbidity and Trauma Study (CATS; $N = 1981$) and the Australian Twin-Family Study of Alcohol Use Disorders (OZ-ALC; $N = 1537$).

Results. Analyses revealed a significant association with CM factor scores and adult sexual victimization for both men and women across all three samples. The CSA factor score was strongly associated with adult sexual victimization after adjusting for substance dependence and psychopathology; higher odds ratios were observed in men (than women) consistently across the three samples.

Conclusions. A continuous measure of CSA is independently associated with adult sexual trauma risk across samples in models that included commonly associated substance dependence and psychopathology as covariates. The strength of the association between this CSA measure and adult sexual victimization is higher in magnitude for men than women, pointing to the need for further investigation of sexual victimization in male community samples.

Received 4 June 2015; Revised 9 September 2015; Accepted 15 September 2015

Key words: Adult sexual revictimization, childhood sexual abuse, childhood trauma, psychopathology, sex disparities.

Introduction

Individuals exposed to childhood maltreatment (CM) are at increased risk for psychological and global functioning deficits (Adams, 2006; Jonas *et al.* 2011). In adolescence, these individuals are at increased risk for conduct disorder, early onset alcohol and substance

use, depression, and suicidality (Kilpatrick *et al.* 2000; Sartor *et al.* 2013). Maladaptive consequences persist into adulthood, with survivors of childhood physical and sexual abuse exhibiting higher rates of adverse mental health problems such as suicidality, post-traumatic stress disorder (PTSD), major depressive disorder (MDD), and substance dependence (Duncan *et al.* 1996; Kendler *et al.* 2000; Molnar *et al.* 2001). Additionally, studies have consistently found that exposure to CM increases the risk of adult sexual victimization (Fergusson *et al.* 1997; Roodman & Clum, 2001; Nelson *et al.* 2002; Desai *et al.* 2002; Filipas & Ullman,

* Address for correspondence: K. B. Werner, Ph.D., George Warren Brown School of Social Work, Washington University in St Louis, 4560 Clayton Ave., 1000 CID; St. Louis, MO 63110, USA.
(Email: kbwerner@wustl.edu)

2006). As maladaptive outcomes associated with CM – substance misuse, PTSD, MDD – have also been found to increase the risk of adult sexual victimization, it is not surprising that survivors of CM are at increased risk for revictimization (Classen *et al.* 2005). Furthermore, compared to either CM or adult sexual trauma only, sexual revictimization is associated with substance misuse and multiple psychiatric diagnoses including MDD, PTSD, schizophrenia, and bipolar disorder (Classen *et al.* 2005; Walsh *et al.* 2014) highlighting the importance of considering multiple trauma exposures in the psychiatric setting.

Long-term difficulties and sexual revictimization are particularly prevalent in childhood sexual abuse (CSA) survivors. Some have posited that CSA, particularly in women, is one of the strongest predictors of subsequent sexual victimization (Siegel & Williams, 2003; Casey & Nurius, 2005). Estimates from community samples reveal that a history of CSA is associated with a 2–5 times increased risk of adult sexual victimization (Fleming *et al.* 1999; Desai *et al.* 2002) with prevalence estimates of sexual revictimization in survivors of CSA as high as 35% in women and 24–37% in men (Aosved *et al.* 2011; Black *et al.* 2011; Arttime *et al.* 2014). Furthermore, a large community investigation observed a higher CSA-associated revictimization risk in male compared to female CSA survivors (with respective odds ratios of 5.5 and 1.8; Desai *et al.* 2002). Similar findings were reported by Nelson and colleagues suggesting that male CSA survivors represent a high-risk population that deserves further examination (Nelson *et al.* 2002).

Despite the extent of our understanding of risk factors associated with revictimization in women, there is a dearth of literature examining risk in men. When revictimization in men is examined, the population is often not representative, focusing rather on specific subgroups such as gay or undergraduate populations (Kalichman *et al.* 2001; Aosved *et al.* 2011). The scant findings in community samples have found a history of CSA in men is associated with increased likelihood of adult sexual victimization (Coxell *et al.* 1999; Desai *et al.* 2002; Nelson *et al.* 2002). However, further research is needed to extend findings by comparing risk factors of sexual revictimization among males and females.

Most investigations into the association between CM and adult sexual victimization only investigate the impact of CSA and childhood physical abuse (CPA), neglecting to account for other commonly co-occurring psychopathology associated with childhood and adult trauma. Specifically, substance use disorders (SUDs), PTSD, and depression have all consistently been linked to CM, but are rarely investigated as covariates when predicting adult revictimization. One study investigating

revictimization in a population of female sexual abuse victims reported PTSD symptoms and alcohol use mediated the relationship between CSA and adult sexual assault, suggesting CSA may only indirectly increase adult sexual victimization risk (Ullman *et al.* 2009). The impact of SUDs and other psychopathology on the association between CSA and adult victimization has yet to be addressed in male populations.

Methodological limitations also exist in the current revictimization literature. When investigating the impact of CM on later victimization, trauma exposure is often considered dichotomously (identifying the presence or absence of trauma), not addressing information pertaining to the severity or type of trauma exposure (Bernstein *et al.* 1997; Bulik *et al.* 2001; Sartor *et al.* 2012b). CSA is the most common CM examined, but other childhood interpersonal trauma such as CPA and witnessing parental partner abuse (PPA) also predict adult sexual victimization (Desai *et al.* 2002). Furthermore, considering these childhood interpersonal trauma factors dimensionally would allow for more robust and informative measure of childhood trauma.

The present study aimed to overcome these limitations through considering the impact of childhood interpersonal trauma factors of CSA, CPA, and PPA [identified through confirmatory factor analysis; see S. Kristjansson *et al.* unpublished data], SUDs, PTSD, and MDD on adult sexual victimization in three independent community samples (all including men and women). Furthermore, sex disparities in the association among childhood trauma factors, psychopathology and adult sexual victimization will be explored in each sample.

Method

Participants and procedures

Detailed descriptions of the Childhood Trauma Study (CTS; Nelson *et al.* 2010; Sartor *et al.* 2012a), Comorbidity and Trauma Study (CATS; Conroy *et al.* 2009; Shand *et al.* 2011; Nelson *et al.* 2013), and the Australian Twin-Family Study of Alcohol Use Disorders (OZ-ALC; Heath *et al.* 2011) methods have been previously reported; summaries pertaining to the current investigation are provided below. Although each of the samples was ascertained on the basis of either history of CM or substance use, each also included control populations from similar demographic background with a wide range of substance use and trauma exposure.

Primary sample: CTS

Participants were drawn from a large Australian twin cohort (born 1964–1971) based on the twins' responses

to childhood trauma screening questions included in a semi-structured psychiatric diagnostic assessment (conducted between 1996 and 2000 via telephone (Heath *et al.* 2001). From this cohort, high-risk families were identified if one or both twins endorsed a screening question on CSA (5 total) or CPA (4 total) while control families included those in which no interviewed twin reported either form of abuse. Verbal consent, obtained pre-interview, was confirmed through signed consent form allowing use of interview data; procedures were approved by the Queensland Institute of Medical Research (QIMR) Ethics Committee and the Washington University School of Medicine (WUSM) Human Research Protection Office. Follow-up telephone interviews were completed between 2003 and 2008 by 3434 respondents from 524 high-risk and 373 control families; data from 27 interviewed respondents who did not provide post-interview consent were not analyzed. Thirty individuals from the original sample were excluded from the current analyses for missing adult victimization assessment. Data are reported from 2564 respondents from comparable high-risk and control families with childhood trauma assessment available, including 1514 twins (981 female, 64.8%) and 1050 non-twin siblings (618 female, 58.9%). The mean age at interview was 37.2 years (s.d. = 2.3) for twins and 40.6 years (s.d. = 6.3) for siblings.

Replication 1 sample: CATS

Participants in a case-control examination of genetic and environmental factors contributing to liability for opioid dependence (CATS) included 1468 cases (577 female, 39.3%) recruited from opioid replacement therapy (ORT) clinics in the greater Sydney, Australia region and 513 controls (284 female, 55.4%) from the geographic areas in proximity to ORT clinics who denied having used opioids recreationally more than ten times (Conroy *et al.* 2009; Shand *et al.* 2011; Nelson *et al.* 2013). Written informed consent was obtained from all participants as per the institutional review board (IRB) approvals obtained from the University of New South Wales, WUSM, the QIMR, and the ethics committees governing the participating clinics. The mean age at interview was 36.4 years (s.d. = 8.6) for cases and 34.7 years (s.d. = 10.6) for controls.

Replication 2 sample: OZ-ALC

The Alcoholism Research Center (ARC) Project 7 re-assessed the sample from a genome-wide association study of alcohol dependence and heaviness of drinking (OZ-ALC), which partially overlaps with the CTS study sample. The complete sample was ascertained through index cases identified via surveys of two large general-population Australian twin cohorts [cohort 1, born

1890–1964 (mostly 1940–1964), and cohort 2 born 1964–1971], the spouses/partners of cohort 1 twins, and an Australian population-representative sample that ascertained families containing ≥ 5 full siblings. For the current sample, priority was given to individuals from families where childhood trauma was reported at prior assessment, and re-interviews were completed with 1882 participants. Verbal consent was obtained from all participants in compliance with IRB approvals obtained from WUSM and QIMR. When those who participated in the CTS and individuals with missing data were excluded ($n = 345$), a sample of 726 alcohol-dependent cases (270 female, 36.2%) and 811 controls (476 female, 58.7%) were retained. The current sample ($N = 1537$) includes 791 men and 746 women with a mean age of 53.0 (s.d. = 8.3).

Assessments

Childhood trauma history

A computer-assisted diagnostic interview used in each study included the modified Christchurch Trauma Assessment (Fergusson *et al.* 1989; Fergusson & Lynskey, 1997). To provide more robust, continuous measures of trauma in each sample, factor analyses were performed which distilled Christchurch Trauma Assessment component items into three first order factors: CSA, CPA, and PPA experiences prior to the age of 18. The assessment's detailed trauma questions included: CPA [14 items, asked separately about mother, father, and other adult members of the household, covering forms of severe physical punishment (including whether each endorsed form occurred occasionally or frequently) and consequences], CSA (17 items asking about non-contact and contact sexual abuse and additional questions to determine the frequency of abuse occurring during various age periods), and PPA (19 total items including questions about emotional and physical abuse of partner by each parent and additional items querying whether police visited the home, respondent and mother left the home, or if the respondent avoided spending time in the home). This assessment was further modified in the CATS assessment by combining maternal and paternal CPA assessment and combining some of the CSA screening questions (reducing the CSA total from 17 to 11 items).

Adult sexual victimization

Adult sexual victimization was defined as responding affirmatively to any of the following: 'Since you turned 18, has anyone attempted to involve you in any sexual behavior by the use of (a) physical violence, (b) threats of physical violence?' or 'Since you turned 18 has anyone had sexual intercourse with you when you did not

want to have intercourse and you made it clear that you did not want to have sex?'.

Psychopathology and substance use

Lifetime diagnoses of nicotine, alcohol, and illicit drug dependence, PTSD and MDD, were assessed via a modified version of the Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA; Bucholz *et al.* 1994). All three studies queried participants using computer-assisted interviews. CTS and OZ-ALC interviews were performed via telephone; CATS interviews were done face-to-face. As all OZ-ALC participants had been assessed previously, lifetime diagnoses of MDD, licit and illicit drug dependence, and PTSD were obtained from previous interview data for some individuals in the current sample. When multiple assessments of an outcome were available on a participant, an affirmative response at any assessment was coded positive. To decrease respondent burden, sections of the interview that were identical in CTS and OZ-ALC (e.g. the depression section) were not re-administered to CTS participants who had been interviewed in OZ-ALC.

Socioeconomic and familial risk factors

A question on respondent's educational attainment that was asked in all three studies was used as a proxy for socioeconomic class (SEC). A binary variable was coded to include individuals who reported ≤ 10 years education without an apprenticeship or diploma (combining the two lowest response categories). A variable for familial risk was coded to reflect not having been raised by both parents until the age of 16. Maternal and paternal alcohol misuse were independently assessed by querying: (a) Has drinking ever caused your biological mother/father to have problems with health, family, job or police, or other problems? and (b) Have you ever felt that your biological mother/father was an excessive drinker? Endorsement of either question for either parent was coded as a measure of parental alcohol misuse.

Statistical analyses

Prevalence rates of CSA, psychopathology, and adult sexual victimization were calculated for each sample. Separate continuous measures of CSA, CPA, and PPA were used in the current study. These CSA, CPA, and PPA factors were generated via confirmatory factor analyses performed in MPlus (Muthen & Muthen, 1998) with each factor created in each sample from the construct-specific component items. Means were centered at zero for all factors (mean = 0, s.d. = 1), with the exception of CSA factor in women

(S. Kristjansson *et al.* unpublished data); therefore odds ratios estimate the change in the risk associated with a standard deviation difference of 1 in the factor. Analyses were performed using SAS v. 9.4 (SAS Institute Inc., USA) for each study separately.

Logistic regression analyses predicting adult sexual victimization in each sample and stratified by sex were used to generate univariate and multivariate odds ratios for childhood trauma factors. The impact of the CSA factor on revictimization adjusting for possible confounding familial risks – parental presence, SEC, and parental alcohol misuse – and SUDs, PTSD, and MDD was studied with sex included as a covariate (with *post-hoc* analyses for the interaction of the CSA factor and sex) and in separate analyses stratified by sex. Family clustering was corrected through the Taylor series variance estimation method – which estimates the covariance matrix of the regression coefficients in clustered data, thus reducing sample bias – implemented in Proc Survey Logistic. To formally test for combined effect across studies, effect sizes for (a) the CSA factor and (b) CSA factor CM sex interaction on revictimization were separately meta-analyzed using an inverse-variance weighted model with fixed and random effects in the R package (R Foundation, Austria) for general meta-analysis.

Results

Primary sample: CTS

Of the CTS sample, lifetime prevalence of psychopathology was as follows: alcohol dependence (21.9%), nicotine dependence (31.1%), cannabis dependence (5.9%), non-cannabis illicit drug dependence (4.3%), MDD (33.7%), and PTSD (11.4%; see Table 1 for prevalence by sex). Thirty-four percent (19.3% of men and 43.1% of women) endorsed any CSA and 29.2% (16.8% of men and 36.6% of women) reported contact CSA. Eight percent of the total sample endorsed adult sexual victimization and women were more likely to experience adult sexual victimization [odds ratio (OR) 4.70, 95% confidence interval (CI) 3.09–7.14].

The CSA, CPA, and PPA factors were independently associated with significant risk for adult sexual victimization in both men and women (Table 2). When childhood trauma factors were simultaneously considered, only CSA and CPA remained significantly associated. With each unit increase in the CSA factor score, the odds of adult sexual victimization increased two times in men; in women, the corresponding increase in risk was 54% for each unit increase in CSA or CPA respectively.

Further analyses were conducted to examine the association of CSA with revictimization after adjusting

Table 1. Prevalence rates for adult victimization, substance dependence, and psychopathology by sample and sex

	CTS (N = 2564)		CATS (N = 1981)		OZ-ALC (N = 1537)	
	Men, n (%)	Women, n (%)	Men, n (%)	Women, n (%)	Men, n (%)	Women, n (%)
Adult sexual victimization	26 (2.7)	184 (11.5)	164 (14.8)	389 (45.6)	13 (1.6)	97 (13.0)
Alcohol dependence	295 (30.8)	263 (16.5)	457 (41.3)	261 (30.7)	456 (57.7)	270 (36.2)
Nicotine dependence	321 (33.5)	472 (29.6)	672 (61.4)	475 (56.4)	333 (42.1)	272 (36.5)
Cannabis dependence	89 (9.2)	61 (3.8)	588 (53.0)	361 (42.3)	60 (7.6)	34 (4.6)
Non-cannabis illicit drug dependence	58 (6.0)	51 (3.2)	927 (83.5)	617 (72.3)	19 (2.4)	18 (2.4)
Major depression	261 (27.2)	598 (37.5)	585 (53.2)	535 (62.9)	220 (28.1)	281 (37.9)
Post-traumatic stress disorder	71 (7.4)	221 (13.8)	300 (27.2)	344 (40.4)	60 (7.6)	81 (10.9)

CTS, Childhood Trauma Study – Men ($n=965$), Women ($n=1599$); CATS, Comorbidity and Trauma Study – Men ($n=1120$), Women ($n=861$); OZ-ALC, Australian Twin-Family Study of Alcohol Use Disorders – Men ($n=791$), Women ($n=746$).

Table 2. Logistic regression analyses examining risk^a of adult sexual victimization associated with childhood trauma factors

	Univariate model			Multivariate model		
	Total ^b aOR (95% CI)	Men OR (95% CI)	Women OR (95% CI)	Total ^b aOR (95% CI)	Men OR (95% CI)	Women OR (95% CI)
CTS (N = 2564)						
CSA	1.94 (1.71–2.21)	2.40 (1.78–3.25)	1.87 (1.62–2.15)	1.60 (1.37–1.86)	2.00 (1.35–2.98)	1.54 (1.30–1.82)
CPA	1.88 (1.66–2.12)	1.93 (1.48–2.51)	1.87 (1.64–2.13)	1.53 (1.28–1.83)	1.43 (0.93–2.20)	1.54 (1.27–1.88)
PPA	1.63 (1.43–1.85)	1.84 (1.35–2.50)	1.59 (1.39–1.83)	1.02 (0.84–1.23)	1.01 (0.63–1.62)	1.01 (0.82–1.25)
CATS (N = 1981)						
CSA	1.98 (1.77–2.21)	2.36 (1.95–2.86)	1.80 (1.58–2.06)	1.81 (1.60–2.04)	2.23 (1.83–2.71)	1.61 (1.38–1.88)
CPA	1.59 (1.43–1.77)	1.49 (1.27–1.75)	1.68 (1.45–1.93)	1.26 (1.09–1.46)	1.28 (1.03–1.58)	1.29 (1.06–1.58)
PPA	1.38 (1.24–1.54)	1.34 (1.14–1.58)	1.41 (1.23–1.60)	1.00 (0.86–1.15)	0.99 (0.79–1.23)	1.00 (0.83–1.20)
OZ-ALC (N = 1537)						
CSA	1.89 (1.62–2.21)	2.25 (1.68–3.02)	1.78 (1.50–2.13)	1.72 (1.45–2.04)	1.99 (1.36–2.93)	1.64 (1.36–1.99)
CPA	1.49 (1.27–1.74)	1.84 (1.38–2.45)	1.40 (1.19–1.65)	1.20 (1.00–1.45)	1.27 (0.84–1.92)	1.16 (0.96–1.41)
PPA	1.48 (1.27–1.73)	1.88 (1.38–2.55)	1.40 (1.18–1.67)	1.13 (0.94–1.36)	1.44 (1.06–1.96)	1.09 (0.88–1.36)

aOR, Adjusted odds ratio; CI, confidence interval; CTS, Childhood Trauma Study; CATS, Comorbidity and Trauma Study; OZ-ALC, Australian Twin-Family Study of Alcohol Use Disorders; CSA, childhood sexual abuse factor; CPA, childhood physical abuse factor; PPA, parental partner abuse factor.

^a Odds ratios estimate risk associated with a 1 s.d. change in the specific childhood trauma factor score.

^b Adjusted for sex.

Multivariate model includes all trauma factors simultaneously.

simultaneously for co-occurring psychopathology: alcohol, nicotine, cannabis, and other illicit drug dependence, PTSD, and MDD. In the multivariate model, CSA score remained significantly associated with sexual victimization risk (Table 3). Sex was reported to be significantly associated with revictimization [adjusted odds ratio (aOR) 4.81, 95% CI 2.91–7.97]; however, *post-hoc* analyses did not reveal a significant interaction between CSA score and sex (aOR 0.82, 95% CI 0.57–1.18) in this sample. Increased risk of victimization was associated with CSA factor score in men (aOR 2.13, 95% CI 1.40–3.25) and women (aOR 1.32, 95%

CI 1.09–1.59). MDD was associated with increased risk of victimization in both men and women; however, nicotine dependence and PTSD were only associated with adult sexual victimization in women.

Replication sample 1: CATS

As the CATS oversampled participants with opioid dependence, high rates of lifetime cannabis dependence (48.3%) and non-cannabis illicit drug dependence (78.7%) were reported (Table 1). A lifetime history of alcohol dependence was found in 36.7%, while 59.3%

Table 3. Multivariate regression analyses examining risk^a of adult sexual victimization associated with childhood sexual abuse, substance dependence, depression and PTSD

	CSA	AD	ND	CD	IDD	MDD	PTSD
CTS (N = 2564)							
Total**	1.41 (1.19–1.67)	1.42 (0.96–2.09)	1.51 (1.07–2.14)	1.81 (0.93–3.50)	1.42 (0.75–2.70)	2.24 (1.59–3.14)	2.94 (1.97–4.40)
Men	2.13 (1.40–3.25)	1.03 (0.42–2.54)	0.67 (0.24–1.89)	2.62 (0.94–7.32)	1.53 (0.41–5.75)	3.74 (1.45–9.65)	0.72 (0.19–2.73)
Women	1.32 (1.09–1.59)	1.52 (0.99–2.31)	1.66 (1.15–2.41)	1.52 (0.66–3.50)	1.57 (0.75–3.29)	2.10 (1.46–3.03)	3.52 (2.28–5.45)
CATS (N = 1981)							
Total**	1.66 (1.46–1.87)	1.38 (1.08–1.78)	1.55 (1.20–2.00)	1.03 (0.81–1.32)	1.73 (1.26–2.40)	1.34 (1.04–1.72)	1.73 (1.35–2.22)
Men	2.14 (1.73–2.65)	1.39 (0.95–2.04)	1.75 (1.12–2.72)	0.87 (0.59–1.30)	1.34 (0.76–2.37)	2.04 (1.36–3.06)	1.36 (0.91–2.03)
Women	1.45 (1.24–1.69)	1.42 (1.02–1.99)	1.41 (1.03–1.95)	1.16 (0.84–1.60)	1.93 (1.31–2.84)	1.02 (0.74–1.42)	2.02 (1.46–2.79)
OZ-ALC (N = 1537)							
Total**	1.59 (1.31–1.93)	1.41 (0.89–2.21)	1.58 (1.01–2.48)	1.13 (0.51–2.52)	0.75 (0.28–2.05)	2.21 (1.43–3.40)	1.78 (0.95–3.35)
Men	2.02 (1.34–3.04)	1.06 (0.19–5.82)	3.16 (0.68–14.71)	3.04 (0.83–11.04)	0.97 (0.14–6.74)	0.50 (0.16–1.52)	1.92 (0.31–12.07)
Women	1.49 (1.20–1.86)	1.44 (0.89–2.31)	1.49 (0.92–2.43)	0.77 (0.30–2.00)	0.86 (0.30–2.46)	2.64 (1.66–4.19)	1.83 (0.94–3.55)

Values given are adjusted odds ratios and 95% confidence intervals.

CTS, Childhood Trauma Study; CATS, Comorbidity and Trauma Study; OZ-ALC, Australian Twin-Family Study of Alcohol Use Disorders; CSA, childhood sexual abuse; AD, alcohol dependence; ND, Nicotine dependence; CD, cannabis dependence; IDD, non-cannabis illicit drug dependence; MDD, major depressive disorder; PTSD, post-traumatic stress disorder.

^a All disorders included in the model simultaneously and all models adjusted for parental presence, socio-economic class, and parental alcohol misuse; odds ratios estimate risk associated with a 1 s.d. change in childhood trauma factor.

^bAdjusted for sex.

of individuals met criteria for lifetime nicotine dependence. Twenty-eight percent of individuals endorsed adult sexual victimization, over half endorsed MDD (57.4%), and a third met criteria for PTSD lifetime (32.9%). Forty-four percent (29.2% of men and 64.7% of women) endorsed any CSA and 39.8% (28.1% of men and 56.9% of women) reported contact CSA. Women were found to be at almost five times increased risk for adult sexual victimization (OR 4.84, 95% CI 3.91–5.99).

Univariate regression analyses revealed CSA, CPA, or PPA scores were independently associated with risk of adult sexual victimization in the total sample and when stratified by sex (Table 2). When considering childhood trauma factors in a multivariate model predicting adult victimization, CSA and CPA were significant predictors while PPA no longer contributed to risk. Both men and women with a history of CSA or CPA were revealed to be at increased risk of adult victimization when stratified by sex.

Multivariate analyses examining the unique risk associated with CSA for adult victimization while also considering substance dependence and psychopathological factors, revealed a significant contribution of CSA to adult victimization (aOR 1.63, 95% CI 1.45–2.84) (Table 3). *Post-hoc* analyses revealed significant interaction between CSA score and sex (aOR 0.72, 95% CI 0.57–0.92); thus men with a history of CSA were more likely to experience revictimization. Increased risk for adult victimization associated with CSA was elevated in men (aOR 2.14, 95% CI 1.73–2.65) and women (aOR 1.45, 95% CI 1.24–1.69). Nicotine dependence increased risk of victimization in both men and women; however, MDD was associated with increased risk of victimization in men only, while alcohol dependence, non-cannabis illicit substance dependence, and PTSD were only associated with adult victimization in women.

Replication sample 2: OZ-ALC

A large percentage of individuals in the OZ-ALC sample met criteria for a lifetime history of alcohol dependence (47.2%) or nicotine dependence (39.4%, Table 1). Lifetime diagnosis of cannabis dependence and other illicit drug dependence was found to be 6.1% and 2.4%, respectively. Of the total population, 7.2% had a history of adult sexual victimization, 32.8% endorsed a lifetime MDD, and 9.2% had a history of PTSD. Thirty-two percent (22.1% of men and 41.6% of women) endorsed any CSA and 25.6% (18.1% of men and 33.5% of women) reported contact CSA. Women were nine times more likely to experience adult sexual victimization (OR 8.94, 95% CI 4.94–16.19) than men.

CSA, CPA, and PPA were independently associated with significant risk for adult (re)victimization in the total sample when controlling for sex and in both men and women when considered separately (Table 2). When childhood trauma factors were considered in a multivariate model, CSA and CPA factors remained significant predictors in the complete sample. When analyses were conducted within sexes, the CSA factor was associated with increased risk of adult victimization in both sexes, but increased adult victimization risk was associated with the PPA factor only in men.

Multivariate analyses examining the unique association of CSA, substance dependence, and other psychopathology with adult victimization revealed CSA score remained associated with increased risk of victimization in the total sample and when men and women were considered separately (Table 3). *Post-hoc* analyses in this sample did not reveal significant interaction between CSA and sex (aOR 0.77, 95% CI 0.54–1.09). MDD was associated with increased risk of adult victimization in women only.

Meta-analysis

For the relationship between the CSA factor and revictimization, adjusting for sex and related psychopathology, a significant fixed effect was observed (OR 1.57, 95% CI 1.44–1.72; Fig. 1) indicating an overall effect for the CSA factor on revictimization. Likewise, across all samples, the fixed effect for CSA factor \times sex interaction was significant (OR 0.75, 95% CI 0.64–0.90; Fig. 1) above and beyond sex alone and related psychopathology. There was no evidence for heterogeneity of effect sizes across samples ($p > 0.10$).

Discussion

This is the first investigation to examine and replicate the associated risk of dimensionally measured childhood trauma for adult sexual victimization in both men and women. We sought to assess the unique association of childhood trauma factors (CSA, CPA, PPA), SUDs (alcohol, nicotine, cannabis, and illicit other), PTSD, and MDD with the risk of adult sexual victimization for women and men. Across all three studies, multivariate regression analyses revealed that, of the childhood trauma factors, CSA and CPA exposure consistently increased risk for adult sexual victimization. When considering the impact of childhood trauma in men and women separately, only the CSA factor was associated with adult victimization in all three studies. Furthermore, across all studies, we found every one standard deviation increment increase in CSA factor score conferred an increased risk for adult sexual victimization in fully adjusted models.

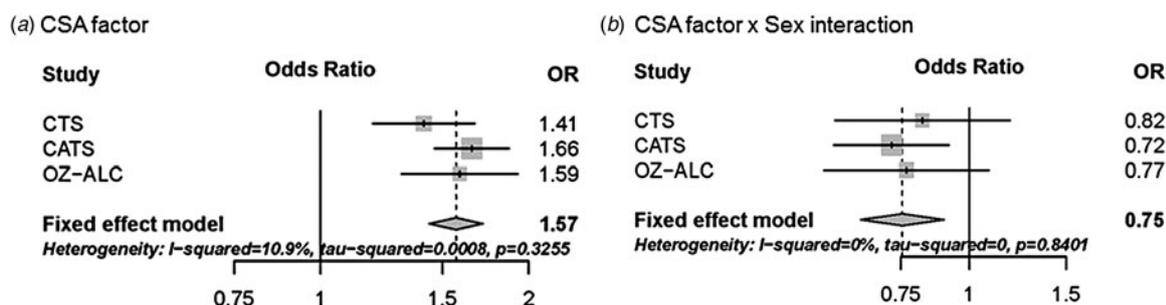


Fig. 1. Meta-analysis of (a) association of CSA factor and (b) CSA factor \times sex interaction with revictimization across all three samples.

Our findings across multiple populations are consistent with previous research and provide strong evidence for CSA as a significant risk factor for adult victimization in both men and women (Roodman & Clum, 2001; Classen *et al.* 2005). Although CSA factor scores were associated with adult sexual victimization at a higher magnitude in men, greater overall risk for revictimization was observed for women. Two previous studies investigated the association between CSA (binary present/absent) and adult sexual victimization in both sexes reporting similar associations between CSA and adult sexual revictimization. In a partially overlapping sample, Nelson and colleagues found, in survival analyses, the hazard ratios for adult rape (age ≥ 18) associated with a history of CSA were 3.6 in women and 26.7 in men (Nelson *et al.* 2002). Furthermore, Desai *et al.* (2002) reported CSA-associated risk of adult sexual victimization of 1.8 in women and 5.5 in men. Our results fully support and build upon those results as CSA score was found to increase risk for adult sexual victimization even after adjusting for co-occurring psychopathology and substance dependence. In addition to CSA contributing to increased risk for adult sexual victimization, Desai *et al.* (2002) also found increased risk for adult sexual assault associated with physical abuse in both men and women. These findings were only partially supported in the current investigation; although CPA was associated with adult sexual victimization in univariate analyses, multivariate associations taking into account CSA and PPA revealed CPA was only associated with adult victimization in both men and women in the CATS sample. In the CTS sample multivariate regression, CPA was only associated with adult victimization in women and no significant association between CPA and adult victimization was revealed in the OZ-ALC sample.

With regards to the association of adult sexual victimization and psychopathology, findings are consistent with previous prospective research in women showing PTSD and substance abuse increase risk for revictimization (Messman-Moore *et al.* 2009). In the

CTS sample multivariate analyses, adjusting for psychiatric and substance co-morbidity, significant risk for adult sexual victimization was observed in women with alcohol and nicotine dependence, major depression, and PTSD. In men from this sample, MDD was the only disorder associated with significant risk for adult victimization. Men in the CATS with a history of MDD or nicotine dependence also conferred increased risk for adult victimization. Similar risk was found in the CATS women with alcohol, nicotine, and illicit drug dependence. In the OZ-ALC study, increased risk was only associated with MDD in women. In addition, the CSA factor score was associated with a significant increased risk of adult victimization in both men and women. These findings support discrete risk associated with psychopathology in men and women for adult sexual victimization. However, the directionality of these relationships remain unclear (i.e. whether substance dependence has a larger impact on revictimization in women than men or revictimization takes a larger toll on women who then turn to substances for self-medication).

A main strength of this study is consistency of results across different samples. By design, CTS oversampled individuals with childhood trauma, CATS oversampled individuals at high-risk of substance dependence, and OZ-ALC oversampled individuals at high-risk of alcohol dependence. Despite differences in sample size, population characteristics, and ascertainment strategies, meta-analysis overall revealed CSA was associated with increased risk of adult sexual victimization across the three studies. An additional strength is the inclusion of both men and women as very few investigations are able to contrast the impact of sexual abuse by sex. Male survivors of childhood and adult sexual victimization are notoriously underrepresented in this field. Of studies that have examined sexual revictimization in men, studies were limited by only including men (disallowing for sex comparisons) and mostly men who have sex with men (Classen *et al.* 2005) which limits the generalizability of findings to community samples. Our

meta-analysis for the interaction of the CSA factor and sex revealed men with a history of CSA are at increased risk for experiencing adult sexual revictimization. Additionally, our findings supports previous observations in a study of college men where revictimized men report significantly higher PTSD and depression than non-victimized men (Aosved *et al.* 2011).

The current findings also have clinical implications. Those who experience childhood trauma – and more severe trauma – are more likely to experience revictimization which has been found to increase risk and be an associated outcome of psychopathology including PTSD, MDD, and SUDs (Breslau, 2002; Classen *et al.* 2005; Collishaw *et al.* 2007; Cinamon *et al.* 2014; Walsh *et al.* 2014). Therefore, our findings point to the importance of considering CSA (and severity) as a risk factor and adult victimization as both a risk factor and possible outcome associated with psychopathology in community and psychiatric populations.

The current study is not without limitations. All samples included were Australian cohorts and results in other nations may differ. Self-report measures were utilized in all of the studies; therefore recall bias may impact our observations. Trauma exposure is particularly of concern as it is especially vulnerable to reporting biases, although research has shown that differences in prevalence of CM do not have a large impact on the strength of the association observed (Fergusson *et al.* 2000). This study utilized logistic regression methodology and did not take into account the causal relationship of psychopathology to adult sexual victimization. By definition, CSA always predates adult victimization and is associated with downstream risk for the psychiatric disorders we included as covariates. Therefore, the reduction in CSA-associated risk with inclusion of these disorders in the models thus provides a conservative estimate of risk mediated via this route (i.e. psychopathology). Since additional trauma exposure (i.e. revictimization) further increases risk for these illnesses, survival analyses taking into account age of onset, time varying measures, and longitudinal methodology would be necessary to mitigate this limitation and confirm our results.

Conclusion

Despite these limitations, this research strengthens our understanding of the relationship between CSA and adult revictimization in women and adds unique impact to the literature in male survivors of CSA. CSA is directly associated with adult sexual trauma above and beyond childhood physical abuse and commonly associated substance dependence and psychopathology. The strength of the association between CSA and adult sexual victimization is more elevated in

men than women, pointing to the need for further investigation of sexual victimization in male community samples. Furthermore, additional attention should be given to male survivors of CSA, in order to decrease risk of future victimization. Although CSA factor scores were consistently associated with adult sexual victimization, findings involving other psychopathology are less clear and thus more difficult to interpret. Additional research will be needed to understand the relationship between SUDs, PTSD, and MDD with adult victimization and the timing and interplay between and among these factors.

Acknowledgements

The authors thank Yi-Ling Chou for her statistical assistance with the meta-analysis. This work was primarily supported by National Institute of Health grants to E.C.N. (AA13446; DA017305; AA011998_5978); support for CATS was also received from the National Drug and Alcohol Research Centre (NDARC) and the Australian National Health and Medical Research Council (to L.D.). Additional support includes grants to A.C.H. (AA10249, AA07728, AA11998, AA13321, AA17688), N.G.M. (AA13326), P.F.M. (DA12854; DA027995; AA13446; DA017305; AA011998_5978), VVM (AA018146), A.A. (DA23668; DA32573), L.D. (Australian National Health and Medical Research Council Principal Research Fellowship no. 1041742), and K.B.W. (T32 DA15035).

Declaration of Interest

None.

References

- Adams CM (2006). The consequences of witnessing family violence on children and implications for family counselors. *The Family Journal* 14, 334–341.
- Aosved AC, Long PJ, Voller EK (2011). Sexual revictimization and adjustment in college men. *Psychology of Men & Masculinity* 12, 285.
- Arttime TM, McCallum EB, Peterson ZD (2014). Mens acknowledgment of their sexual victimization experiences. *Psychology of Men & Masculinity* 15, 313.
- Bernstein DP, Ahluvalia T, Pogge D, Handelsman L (1997). Validity of the Childhood Trauma Questionnaire in an adolescent psychiatric population. *Journal of American Academy of Child and Adolescent Psychiatry* 36, 340–348.
- Black MC, Basile KC, Breiding MJ, Smith SG, Walters ML, Merrick MT, Stevens MR (2011). *National Intimate Partner and Sexual Violence Survey*. CDC. Centers for Disease Control and Prevention: Atlanta, GA.

- Breslau N (2002). Epidemiologic studies of trauma, posttraumatic stress disorder, and other psychiatric disorders. *Canadian Journal of Psychiatry* **47**, 923.
- Bucholz KK, Cadoret R, Cloninger CR, Dinwiddie SH, Hesselbrock VM, Nurnberger JI Jr, Reich T, Schmidt I, Schuckit MA (1994). A new, semi-structured psychiatric interview for use in genetic linkage studies: a report on the reliability of the SSAGA. *Journal on Studies of Alcohol and Drugs* **55**, 149–158.
- Bulik CM, Prescott CA, Kendler KS (2001). Features of childhood sexual abuse and the development of psychiatric and substance use disorders. *British Journal of Psychiatry* **179**, 444–449.
- Casey EA, Nurius PS (2005). Trauma exposure and sexual revictimization risk comparisons across single, multiple incident, and multiple perpetrator victimizations. *Violence Against Women* **11**, 505–530.
- Cinamon J, Muller R, Rosenkranz S (2014). Trauma severity, poly-victimization, and treatment response: adults in an inpatient trauma program. *Journal of Family Violence* **29**, 725–737.
- Classen CC, Palesh OG, Aggarwal R (2005). Sexual revictimization a review of the empirical literature. *Trauma, Violence, & Abuse* **6**, 103–129.
- Collishaw S, Pickles A, Messer J, Rutter M, Shearer C, Maughan B (2007). Resilience to adult psychopathology following childhood maltreatment: evidence from a community sample. *Child Abuse and Neglect* **31**, 211–229.
- Conroy E, Degenhardt L, Mattick RP, Nelson EC (2009). Child maltreatment as a risk factor for opioid dependence: comparison of family characteristics and type and severity of child maltreatment with a matched control group. *Child Abuse and Neglect* **33**, 343–352.
- Coxell A, King M, Mezey G, Gordon D (1999). Lifetime prevalence, characteristics, and associated problems of non-consensual sex in men: cross sectional survey. *British Medical Journal* **318**, 846–850.
- Desai S, Arias I, Thompson MP, Basile KC (2002). Childhood victimization and subsequent adult revictimization assessed in a nationally representative sample of women and men. *Violence and Victims* **17**, 639–653.
- Duncan RD, Saunders BE, Kilpatrick DG, Hanson RF, Resnick HS (1996). Childhood physical assault as a risk factor for PTSD, depression, and substance abuse: findings from a national survey. *American Journal of Orthopsychiatry* **66**, 437–448.
- Fergusson DM, Horwood LJ, Lynskey MT (1997). Childhood sexual abuse, adolescent sexual behaviors and sexual revictimization. *Child Abuse and Neglect* **21**, 789–803.
- Fergusson DM, Horwood LJ, Shannon FT, Lawton JM (1989). The Christchurch Child Development Study: a review of epidemiological findings. *Paediatric and Perinatal Epidemiology* **3**, 302–325.
- Fergusson DM, Horwood LJ, Woodward LJ (2000). The stability of child abuse reports: a longitudinal study of the reporting behaviour of young adults. *Psychological Medicine* **30**, 529–544.
- Fergusson DM, Lynskey MT (1997). Physical punishment/maltreatment during childhood and adjustment in young adulthood. *Child Abuse & Neglect* **21**, 617–630.
- Filipas HH, Ullman SE (2006). Child sexual abuse, coping responses, self-blame, posttraumatic stress disorder, and adult sexual revictimization. *Journal of Interpersonal Violence* **21**, 652–672.
- Fleming J, Mullen PE, Sibthorpe B, Bammer G (1999). The long-term impact of childhood sexual abuse in Australian women. *Child Abuse & Neglect* **23**, 145–159.
- Heath AC, Howells W, Kirk KM, Madden PAF, Bucholz KK, Nelson EC, Slutske WS, Statham DJ, Martin NG (2001). Predictors of non-response to a questionnaire survey of a volunteer twin panel: findings from the Australian 1989 twin cohort. *Twin Research* **4**, 73–80.
- Heath AC, Whitfield JB, Martin NG, Pergadia ML, Goate AM, Lind PA, McEvoy BP, Schrage AJ, Grant JD, Chou Y-L, Zhu R, Henders AK, Medland SE, Gordon SD, Nelson EC, Agrawal A, Nyholt DR, Bucholz KK, Madden PAF, Montgomery GW (2011). A quantitative-trait genome-wide association study of alcoholism risk in the community: findings and implications. *Biological Psychiatry* **70**, 513–518.
- Jonas S, Bebbington P, McManus S, Meltzer H, Jenkins R, Kuipers E, Cooper C, King M, Brugha T (2011). Sexual abuse and psychiatric disorder in England: results from the 2007 adult psychiatric morbidity survey. *Psychological Medicine* **41**, 709–719.
- Kalichman SC, Benetsch E, Rompa D, Gore-Felton C, Austin J, Luke W, DiFonzo K, Buckles J, Kyomugisha F, Simpson D (2001). Unwanted sexual experiences and sexual risks in gay and bisexual men: associations among revictimization, substance use, and psychiatric symptoms. *Journal of Sex Research* **38**, 1–9.
- Kendler KS, Bulik CM, Silberg J, Hettema JM, Myers J, Prescott CA (2000). Childhood sexual abuse and adult psychiatric and substance use disorders in women: an epidemiological and cotwin control analysis. *Archives of General Psychiatry* **57**, 953–959.
- Kilpatrick DG, Acierno R, Saunders B, Resnick HS, Best CL, Schnurr PP (2000). Risk factors for adolescent substance abuse and dependence: data from a national sample. *Journal of Consulting and Clinical Psychology* **68**, 19–30.
- Messman-Moore TL, Ward RM, Brown AL (2009). Substance use and PTSD symptoms impact the likelihood of rape and revictimization in college women. *Journal of Interpersonal Violence* **24**, 499–521.
- Molnar BE, Buka SL, Kessler RC (2001). Child sexual abuse and subsequent psychopathology: results from the national comorbidity survey. *American Journal of Public Health* **91**, 753–760.
- Muthen L, Muthen B (1998). *Mplus users Guide*, 5th edn. 1998–2007. Muthen & Muthen: Los Angeles, CA.
- Nelson EC, Heath AC, Madden PAF, Cooper ML, Dinwiddie SH, Bucholz KK, Glowinski A, McLaughlin T, Dunne MP, Statham DJ, Martin NG (2002). Association between self-reported childhood sexual abuse and adverse psychosocial outcomes: results from a twin study. *Archives of General Psychiatry* **59**, 139–145.

- Nelson EC, Lynskey MT, Heath AC, Madden PAF, Martin NG** (2010). A family study of adult twins with and without a history of childhood abuse: stability of retrospective reports of maltreatment and associated family measures. *Twin Research and Human Genetics* **13**, 121–130.
- Nelson EC, Lynskey MT, Heath AC, Wray N, Agrawal A, Shand FL, Henders AK, Wallace L, Todorov AA, Schrage AJ, Saccone NL, Madden PAF, Degenhardt L, Martin NG, Montgomery GW** (2013). ANKK1, TTC12, and NCAM1 polymorphisms and heroin dependence: importance of considering drug exposure. *JAMA Psychiatry* **70**, 325–333.
- Roodman AA, Clum GA** (2001). Revictimization rates and method variance: a meta-analysis. *Clinical Psychology Review* **21**, 183–204.
- Sartor CE, Grant JD, Lynskey MT, McCutcheon VV, Waldron M, Statham DJ, Bucholz KK, Madden PAF, Heath AC, Martin NG, Nelson EC** (2012a). Common heritable contributions to low-risk trauma, high-risk trauma, posttraumatic stress disorder, and major depression. *Archives of General Psychiatry* **69**, 293–299.
- Sartor CE, McCutcheon VV, Nelson EC, Duncan AE, Bucholz KK, Heath AC** (2012b). Investigating the association between childhood sexual abuse and alcohol use disorders in women: does it matter how we ask about sexual abuse? *Journal on Studies of Alcohol and Drugs* **73**, 740–748.
- Sartor CE, Waldron M, Duncan AE, Grant JD, McCutcheon VV, Nelson EC, Madden PA, Bucholz KK, Heath AC** (2013). Childhood sexual abuse and early substance use in adolescent girls: the role of familial influences. *Addiction* **108**, 993–1000.
- Shand FL, Degenhardt L, Slade T, Nelson EC** (2011). Sex differences amongst dependent heroin users: histories, clinical characteristics and predictors of other substance dependence. *Addictive Behaviors* **36**, 27–36.
- Siegel JA, Williams LM** (2003). Risk factors for sexual victimization of women results from a prospective study. *Violence Against Women* **9**, 902–930.
- Ullman SE, Najdowski CJ, Filipas HH** (2009). Child sexual abuse, post-traumatic stress disorder, and substance use: predictors of revictimization in adult sexual assault survivors. *Journal of Child Sexual Abuse* **18**, 367–385.
- Walsh K, Resnick HS, Danielson CK, McCauley JL, Saunders BE, Kilpatrick DG** (2014). Patterns of drug and alcohol use associated with lifetime sexual revictimization and current posttraumatic stress disorder among three national samples of adolescent, college, and household-residing women. *Addictive Behaviors* **39**, 684–689.