

Evidence-Based Report

Childhood Sexual Abuse and Alcohol Use Disorder

Reviewer	Associate Professor Ian Lambie
Literature search	Ariana Krynen, Charlotte Best
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Important Note:

- The purpose of this brief report is to summarise the evidence for the association between childhood sexual abuse and the development of alcohol use disorder, including alcohol abuse and alcohol dependence.
- It is not intended to replace clinical judgement, or be used as a clinical protocol.
- A reasonable attempt has been made to find and review papers relevant to the focus of this report; however, it does not claim to be exhaustive.
- This report is based upon information supplied up to November 2015.

1. Executive Summary

- Childhood sexual abuse can have significant short- and long-term effects, including the subsequent development of alcohol use disorder.
- The purpose of this report is to provide an evidence-based guide on the association between childhood sexual abuse and alcohol use disorder (including alcohol abuse and alcohol dependence) as a teenager/adult. These findings will be used to assist in the decision making process regarding cover and entitlements of those who have experienced childhood sexual abuse and later developed alcohol use disorder.
- A literature search was conducted in November 2015 using Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations, Cochrane Database of Systematic Reviews, PsycINFO, and the Worldwide Web. Further literature was also located through reading the reference list of review articles.
- Findings from the two systematic reviews, one meta-analysis, two cohort studies, and three primary studies identified in this report showed that:
 - There is fair quality evidence that childhood sexual abuse is associated with the development of problematic alcohol use, alcohol abuse and/or dependence with an odds ratio of between 1.4 and 5.88.
 - Evidence from cohort studies in New Zealand and Australia suggest that exposure to childhood sexual abuse increases the risk of subsequent development of alcohol dependence and abuse.
 - There is some evidence that increasing severity of childhood sexual abuse (i.e., childhood sexual abuse involving attempted or completed penetration) is associated with an increased rate of alcohol dependence.
 - There is some evidence that alcohol dependence among those who have experienced childhood sexual abuse may be attributed to family background effects and genetic factors.
 - Limitations of the current research examining the association between childhood sexual abuse and alcohol use disorder include the cross-sectional design of studies, wide variety of definitions of childhood sexual abuse used, abuse being reported retrospectively, and presence of confounding variables.
- Mediators of the link between childhood sexual abuse and subsequent alcohol-related problems may include motives for alcohol consumption (e.g., using alcohol to reduce negative affect and/or increase positive affect).
- Given the identified limitations of the current literature and that there are likely to be many causes of and risk factors for alcohol use disorder, one cannot conclude that childhood sexual abuse is a direct and sufficient cause of alcohol use disorder.

However, there is some fair quality evidence that childhood sexual abuse is likely to be a risk factor for developing alcohol use disorder, including alcohol abuse and dependence.

2. Introduction

Alcohol use disorders are widely dispersed in the population, and they are one of the most commonly experienced mental health disorders (Kessler et al., 2005). In the general population, the estimated lifetime prevalence of alcohol use disorder (encompassing both alcohol abuse and alcohol dependence) is approximately 18% (13% alcohol abuse and 5% alcohol dependence). Alcohol consumption has been identified as a major risk factor for chronic disease, injury, and disability, and contributes to approximately 4% of total mortality (Rehm et al., 2009).

The estimated prevalence of childhood sexual abuse for females is between 8 to 31%, and between 3 to 17% for males; the wide estimate ranges reflecting the heterogeneity of studies (Barth, Bermetz, Heim, Trelle, & Tonia, 2013). Despite the methodological challenges inherent in conducting international systematic reviews and meta-analyses, most studies have consistently shown that worldwide more than 1 out of 5 women, and 1 out of 10 men experience childhood sexual abuse (Pereda, Guilera, Forns, & Gómez-Benito, 2009). However, underreporting of childhood sexual abuse is a well-documented phenomena and likely impacts these prevalence rates (Leclerc & Wortley, 2015).

For victims of childhood sexual abuse, the effects can be devastating both in the short- and long-term. Frequently reported short-term effects include fear, anxiety, depression, aggression, anger and hostility, and sexually inappropriate behaviour. Long-term effects include ongoing depression and anxiety, poor self-esteem, difficulty in trusting others, self-harm and suicide, a tendency toward revictimisation, feelings of isolation and stigma, substance abuse, and a host other mental health problems (Browne & Finkelhor, 1986; Fergusson, McLeod, & Horwood, 2013; Paolucci, Genuis, & Violato, 2001). Another effect of childhood sexual abuse is the development of alcohol use disorder, which is the focus of this report.

3. Background

ACC Research subcontracted Associate Professor Ian Lambie to conduct an evidence-based review to investigate the association between childhood sexual abuse and the subsequent development of alcohol use disorder as a teenager/adult.

This evidence-based report will be used to provide ACC clinical advisors, claims management staff and service providers with an evidence-based guide on the relationship between childhood sexual abuse and the development of alcohol use disorder. In addition, this report will be used to assist in the development of an approach to deciding cover and entitlements for people who have experienced childhood sexual abuse and develop an alcohol use disorder at an older age.

4. Investigation

A search was conducted in November 2015 in the following databases: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations, Cochrane Database of Systematic Reviews, and PsycINFO. Further literature was also located through searching the Worldwide Web and reading the reference list of review articles. Only articles in English and published between 2000 and 2015 were included.

Search terms used included: alcohol abuse, alcohol dependence, alcohol use/use disorder, childhood sexual abuse, child sexual abuse, sexual abuse. Due to limited findings, search terms were revised to include alcoholism, and substance use.

Original Inclusion criteria: systematic reviews[¢] and meta-analyses looking at the relationship between childhood sexual abuse and alcohol use disorder^ˆ.

Original Exclusion criteria: non-English studies, animal or laboratory studies, narrative reviews, letters or editorials; study designs other than systematic review or meta-analysis.

This resulted in identifying 63 articles, of which two systematic reviews were used in this report. Evidence tables were created for the systematic reviews, and these can be found in Appendix 1. A table of the excluded studies can be found in Appendix 2.

Revised criteria: Due to limited scope of findings, inclusion criteria were revised to include published reviews from 2015, cohort studies with a comparison group, and primary studies

[¢] Including articles which conducted a systematic literature search

^ˆ Studies were included in this report if they investigated alcohol use disorder, alcohol abuse and/or alcohol dependence as identified by DSM-IV or ICD diagnostic criteria or validated screening tools. The exception to this were studies outlined in the two systematic reviews and meta-analysis included in this report.

with a comparison group using New Zealand and/or Australian non-clinical samples. This resulted in the identification of two cohort studies and three primary studies with a comparison group examining the association between childhood sexual abuse and alcohol use disorder.

One meta-analysis published in 1998 was also included in this report because no meta-analyses have been published since this time. This meta-analysis was briefly summarised in a 2011 review of meta-analyses (Hillberg et al. 2011^x), but the original study has been reported on in this review.

Evidence tables were created for the two cohort studies and three primary studies identified following the revised inclusion criteria, and can be found in Appendix 3. A description of the excluded studies based on the revised inclusion criteria can be found in Appendix 4.

Any relevant papers were assessed for their methodological quality using the following SIGN¹ criteria:

Levels of evidence (LOE)	
1++	High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1-	Meta-analyses, systematic reviews, or RCTs with a high risk of bias
2++	High quality systematic reviews of case control or cohort or studies High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+	Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2-	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion

^x Hillberg T et al. Review of meta-analyses on the association between child sexual abuse and adult mental health difficulties: A systematic approach. *Trauma, Violence and Abuse* 2011; 12(1): 38-49.

¹ Scottish Intercollegiate Guidelines Network <http://www.sign.ac.uk/>

5. Findings

Systematic Reviews

Two systematic reviews were included in this report: Draucker and Mazurczyk (2013)¹ and Tonmyr et al. (2010)².

The systematic literature search and integrative review by Draucker and Mazurczyk (2013)¹ examined the relationship between childhood sexual abuse and substance use and sexual risk behaviours during adolescence. The authors included 49 articles, of which 29 (describing 22 studies) provided information on the associations between childhood sexual abuse and substance use in adolescence.

Twenty studies examined the relationship between childhood sexual abuse and substance use in adolescence, and eleven studies looked at alcohol use specifically. All 11 studies found an association between childhood sexual abuse and alcohol use. Measures of alcohol use included frequency, consequences, age at initiation, lifetime alcohol use disorder, hazardous and harmful use of alcohol, ever had a drink, and binge drinking.

One study (Dube et al. 2006) found that childhood sexual abuse was associated with higher rates of initiating alcohol use during adolescence. Five studies (Chen et al. 2006, Holmberg & Hellberg 2010, Jones et al. 2011, Moran et al. 2004, Shin et al. 2009) demonstrated that childhood sexual abuse was related to current, frequent, regular and excessive use of alcohol, and two studies (Jirapramukpitak et al. 2005, Oshri et al. 2012) that childhood sexual abuse was related to alcohol use disorders (i.e. abuse and dependency). Studies also found childhood sexual abuse was associated with greater risk of alcohol-related outcomes if physical maltreatment also occurred (Moran et al. 2004), if other adverse childhood events also occurred (Dube et al. 2006), and if it involved contact abuse (e.g. fondling or penetration) rather than non-contact abuse (Chen et al. 2006).

This systematic literature search was of fair methodology (1-). Limitations of the systematic review included the cross sectional design of many studies, limiting interpretations regarding causality; use of self-reported childhood sexual abuse, substance use, and sexual risk behaviours; and the wide variety of definitions of childhood sexual abuse.

The second systematic literature search and review by Tonmyr et al. (2010)² was of fair methodological quality (1-) and examined the relationship between childhood maltreatment and adolescent substance use. The authors included 35 articles comprising 31 studies. Twenty-five studies examined the association between childhood sexual abuse and alcohol use. Alcohol use included past year abuse/dependence of alcohol, binge drinking (past two

weeks), 5+ drinks in a row (past 30 days), ever had alcohol (yes/no), used alcohol (last year), frequency, last month use, and alcohol consumption.

Findings showed an increased risk of alcohol use among youth with a history of sexual abuse (OR = 1.4 to 5.2). History of sexual abuse was also associated with earlier initiation of substance use/abuse. Furthermore, studies addressing the cumulative effect of more than one type of maltreatment found the association between physical and sexual abuse combined and alcohol, drugs and nicotine use was stronger than for sexual and physical abuse individually.

Limitations of the systematic review included the use of school samples that excluded non-attendees; measurement of child maltreatment being retrospective; and some analyses excluded important control variables such as parental substance abuse, sex, age and other maltreatment experiences. In addition, some studies used small sample sizes; there was an absence of valid external measures; and a lack of information about the child's maltreatment (e.g. age of onset, frequency and duration) and substance use (e.g. age of initiation, substances used).

Meta-Analysis

One meta-analysis, Rind et al. (1998)³, fell outside the publication date scope of this report. However, due to the absence of any other meta-analysis studies published since this time, the main findings will be briefly summarised. This meta-analysis was of good methodological quality (1+) and investigated the effects and correlates of childhood sexual abuse, including alcohol problems, among college samples. Alcohol problems were identified based on the Michigan Alcoholism Screening Test (MAST; Brady, Foulks, Childress, & Pertschuk, 1982), the alcohol subscale of the Millon Clinical Multiaxial Inventory (MCMI; Millon, 1982), and investigator-authored items.

The authors reviewed 59 published studies. Eight studies investigated the association between childhood sexual abuse and alcohol problems, and found a small and significant effect size ($r^{\ddagger} = .07^{\phi}$; 95% CI: .02 to .12; $H^{\times} = 2.97$).

[‡] Pearson correlation coefficient; measure of effect size

^ϕ Converted effect size to Odds Ratio = 1.29

[×] within-group homogeneity statistic

Cohort Studies

Two cohort studies are discussed in this report: Fergusson et al. (2013)⁴ and Cutajar et al. (2010)⁵.

The cohort study by Fergusson et al. (2013)⁴ reported on findings from a 30-year longitudinal study conducted in New Zealand. The authors aimed to examine the linkages between childhood sexual abuse and a wide range of developmental outcomes over a protracted time period to age 30.

Data from over 900 members of the New Zealand birth cohort Christchurch Health and Development Study (CHDS) were examined. The CHDS is a longitudinal study of 1,265 children (630 females) born in the Christchurch urban region over a 4-month period during 1977. This cohort has been studied at birth, 4 months, 1 year, annually to age 16, then at ages 18, 21, 25, and 30 using a combination of interviews with parents and participants, standardised testing, teacher report, and official record data. At age 30, 987 (80%; 509 females) of the surviving cohort members were assessed.

Childhood sexual abuse prior to age 16 was assessed at ages 18 and 21 years, and severity of childhood sexual abuse was classified on a 4-point scale: no childhood sexual abuse, non-contact childhood sexual abuse, contact childhood sexual abuse not involving attempted penetration, and childhood sexual abuse involving attempted or completed penetration. At ages 21, 25 and 30 years, mental health, psychological wellbeing, sexual risk-taking behaviours, physical health and socioeconomic outcomes were assessed. Alcohol dependence was determined through use of DSM-IV[‡] criteria.

Extent of childhood sexual abuse was associated with an increased rate of alcohol dependence when unadjusted and adjusted for 10 covariates spanning sociodemographic, family functioning and child factors disorder symptoms ($B = 0.290$, $SE = 0.100$, $p = .004$ and $B = 0.374$, $SE = 0.118$, $p = .002$, respectively; $d^{\ddagger} = .40$). Increasing exposure to childhood sexual abuse (i.e., childhood sexual abuse involving attempted or completed penetration) was associated with an increased rate of alcohol dependence ($p = .004$). Childhood sexual abuse was also associated with a range of additional outcomes, such as psychological wellbeing, sexual risk-taking and physical health, and severity of childhood sexual abuse was linked with severity of various adult outcomes.

This cohort study was of adequate methodological quality (2+). Limitations of the study include findings being based on a specific birth cohort studied in a historical context; the use of self-

[‡] Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (American Psychiatric Association)

[‡] Cohen's d is the estimated standardized comparison of no exposure to childhood sexual abuse versus any exposure to childhood sexual abuse

report interview data; and that the number of cohort members who had sought treatment for the effects of childhood sexual abuse was unknown.

The second cohort study by Cutajar et al. (2010)⁵ looked at psychopathology in a large cohort of sexually abused children up to 43 years in Australia. Forensic medical records of 2,759 sexually abused children assessed between 1964 and 1995 were linked with a public psychiatric database between 12 and 43 years later. Cases were compared to control subjects matched on gender and age groupings drawn from the general population through a random sample of the electoral database.

The authors found that exposure to sexual abuse significantly increased the risk of subsequent alcohol abuse (OR = 5.88, 95% CI: 3.26 to 10.63, $p < .001$), as well as psychotic disorders, affective disorders, anxiety disorders, posttraumatic stress disorder, drug abuse and a number of personality disorders. No significant difference was found between female and male cases for the rates of alcohol abuse ($p = .137$).

This cohort study was of adequate methodological quality (2+). Limitations of the study included the extent of available information collected on cases and controls for purposes other than intended for the study (i.e., information on potentially confounding covariates such as family history of mental illness and social background factors could not be taken into account and controlled for). The authors also noted that caution should be taken when interpreting results on sexual abuse variables as not all cases had information collected and recorded by forensic medical examiners on sexual abuse variables.

Primary Studies

Because of the limited studies identified following the revised inclusion criterion, three primary studies with a comparison group using New Zealand and/or Australian non-clinical samples were also reported. The evidence tables for these studies can be found in Appendix 3. These findings further extend knowledge regarding the relationship between childhood sexual abuse and the development of alcohol use disorder.

The most recent study by Nelson et al. (2010)⁶ found a history of childhood sexual abuse was associated with higher lifetime alcohol consumption ($p < .003$) and alcohol dependence risk (OR = 2.03; 95% CI: 1.40 to 2.92). The authors found support for a genotype x environment interaction for the H2 haplotype protecting against childhood sexual abuse effects on alcohol dependence risk (OR = 0.42; 95% CI: 0.20 to 0.89) and alcohol consumption ($\beta^\emptyset = -0.41$; 95% CI: -0.75 to -0.08).

[∅] standardised regression coefficient

Two studies examined the association between childhood sexual abuse and lifetime psychiatric symptoms and diagnoses of alcohol dependence using large twin studies: Nelson et al. (2002)⁷ and Dinwiddie et al. (2000)⁸.

Nelson et al. (2002)⁷ found individuals reporting a history of childhood sexual abuse had increased risk for alcohol dependence (female and male HR^Ψ = 2.98; 95% CI: 2.31 to 3.83 and 1.67; 95% CI: 1.18 to 2.37, respectively). Individuals reporting a history of childhood sexual abuse which involved intercourse had the highest risk for all examined adverse outcomes^{*} compared to childhood sexual abuse-negative concordant twin pairs and childhood sexual abuse-positive individuals not involving intercourse. Furthermore, individuals without a history of childhood sexual abuse but with a co-twin with a history of childhood sexual abuse had significantly higher risks for all adverse outcomes (other than major depression and divorce) when compared to members of childhood sexual abuse-negative concordant pairs (OR = 1.43; 95% CI: 1.03 to 1.97). The latter finding is consistent with the hypothesis of a significant family background effect contributing to adverse outcome risk.

Dinwiddie et al. (2000)⁸ found individuals reporting a history of childhood sexual abuse had increased risk for alcohol dependence (female and male adjusted OR = 2.81; 95% CI: 1.89 to 4.17 and 1.91; 95% CI: 1.08 to 3.39, respectively). Associations between childhood sexual abuse and psychiatric disorders were attenuated in the co-twin-control analyses, with non-abused twins having non-significantly different risk for psychopathology than abused twins. The authors noted that this later finding suggests that risk for psychopathology may be due to shared vulnerability factors rather than solely from childhood sexual abuse. However, based on their findings, the authors were unable to reject the hypothesis of a direct causal contribution of history of childhood sexual abuse to risk of lifetime psychopathology, including alcohol dependence.

^Ψ Hazard Ratios (HR): risk for adverse outcomes subsequent to reported childhood sexual abuse occurrence
^{*} major depressive disorder, suicide attempt, conduct disorder, alcohol and/or nicotine dependence, social anxiety, rape occurring >18 years, divorce.

6. Additional Information

Other Risk Factors of Alcohol Use Disorder

Although not the focus of this report, other causes and/or risk factors for the development of alcohol use disorder will give context to the evidence about childhood sexual abuse. One source was used (with no formal methodological appraisal): *DynaMed*^{TM***}.

DynaMedTM

Likely risk factors:

- alcohol dependence reported to have substantial heritable basis
 - based on classic twin study with 3,372 twin pairs
- problematic alcohol use during adolescence associated with increased risk for adult alcohol use disorder, substance use disorder, depression and antisocial personality disorder symptoms
 - based on study of 940 persons interviewed at age 14-18 years and again at age 24 years
 - other factors during adolescence that increased risk for adult alcohol use disorder were daily smoking, conduct/oppositional defiant disorder and father with alcohol use disorder
- starting drinking before age 14 years associated with higher likelihood of alcohol dependence compared to starting drinking after age 21 years
 - based on survey of 43,093 adults

Possible risk factors:

- bariatric surgery associated with increased risk of alcohol use disorder
 - based on prospective cohort study
 - preoperative factors associated with increased risk of alcohol use disorder after bariatric surgery included male gender, younger age, smoking, regular alcohol consumption (≥ 2 drinks/week), alcohol use disorder, recreational drug use, lower sense of belonging, and having Roux-en-Y gastric bypass procedure
- college students have increased risk of alcohol abuse

*** a clinical reference resource tool created by physicians for physicians and other health care professionals with conclusions based on the best available clinical evidence which has been consistently and systematically identified, evaluated and selected

- based on cross-sectional study of 6,352 young adults aged 19-21 years in United States 2001
- prenatal alcohol exposure associated with increased risk of drinking problems at age 21 years
 - based on study of 433 subjects
- past severe traumatic events associated with alcohol use disorders
 - based on interviews of 432 American Indian adolescents and young adults
 - number of traumas associated with increased risk in dose-dependent fashion
- working > 48 hours/week associated with small increase in risky alcohol use
 - based on pooled analysis of individual patient data from observational studies
 - systematic review of 61 published and nonpublished observational studies with data to assess association between working hours and alcohol use in 333,693 individuals from 14 countries
 - risky alcohol use defined as > 14 drinks/week in women and > 21 drinks/week in men
 - compared to standard work week of 35-40 hours in analysis of individual patient data from 18 studies, increased risk of new-onset risky alcohol use associated with
- combat exposure associated with increased risk of alcohol use problems in military personnel
 - based on cohort study of 48,481 active duty, Reserve or National Guard personnel
- use of alcohol to fall asleep associated with increased risk of hazardous drinking
 - based on cross-sectional study of 1,984 patients answering primary care questionnaire
- depiction of alcohol use in movies associated with increased risk of adolescent binge drinking
 - based on cross-sectional study of 16,551 youth (mean age 13.4 years) from 6 European countries

Mediators of the Association between Childhood Sexual Abuse and Alcohol Problems

Understanding of possible mediators can provide further insight into the association between childhood sexual abuse and alcohol problems, such as alcohol use disorder. Researchers have attempted to develop models to explain the relationship between childhood sexual abuse and subsequent alcohol-related problems. Here, focus is given to the model which theorises

individuals with experiences of childhood sexual abuse drink alcohol as means of coping or regulating negative and positive emotional experiences. Three sources were used (with no formal methodological appraisal): Grayson and Nolen-Hoeksema (2005), Hannan et al. (2015), and Smith et al. (2014).

Grayson and Nolen-Hoeksema (2005)

This study examined whether motives for alcohol consumption (e.g., using alcohol to reduce negative affect and/or increase positive affect) mediated the relationship between childhood sexual abuse and alcohol-related problems in adult women. The sample consisted of a random community sample of 697 women, ranging from 25 to 75 years.

The authors proposed two separate models to help explain why women with a history of childhood sexual abuse exhibit alcohol-related problems in adulthood: the distress coping model and the emotion regulation model. The distress coping model suggests only one drinking motive (i.e., drinking alcohol to reduce negative affect) mediates the relationship between childhood sexual abuse and alcohol-related problems. The emotion regulation model suggests two drinking motives (i.e., drinking alcohol to reduce negative affect and to enhance positive affect) mediate the relationship between childhood sexual abuse and alcohol-related problems. Both models suggest that childhood sexual abuse is related to general psychological distress, which in turn is related to drinking motive(s).

The authors found that both the enhancement motive and the coping motive partially mediated the relationship between childhood sexual abuse and alcohol-related problems. Effects were small, but reliable. The authors concluded that their findings suggest that women with a history of childhood sexual abuse are vulnerable to ineffective emotion regulation strategies. Clinical interventions that help clients develop adaptive strategies may be particularly effective in alleviating psychological distress and increasing positive emotional states as well as preventing the negative outcomes associated with maladaptive strategies such as heavy drinking.

Hannan et al. (2015)

This study expanded upon Grayson and Nolen-Hoeksema's (2005) model by examining whether symptoms of posttraumatic stress disorder, adolescent sexual assault, and drinking motives mediate the relationship between a history of childhood sexual abuse and subsequent alcohol-related problems among college women. The sample consisted of 579 female

students at a Midwestern university. Participants were recruited as part of a larger longitudinal study.

The authors found constructs mediated the relationship between childhood sexual abuse and alcohol-related problems via two separate paths. In path one, childhood sexual abuse was associated with posttraumatic stress disorder, which in turn predicted drinking to regulate emotional experiences, which then associated with alcohol-related problems in adulthood. In path two, childhood sexual abuse was related to adolescent sexual assault, which in turn predicted drinking to regulate emotional experiences, which was then associated with alcohol-related problems in adulthood.

The authors concluded that their finding suggest individuals with a history of childhood sexual abuse are more likely to experience both revictimisation in adolescence and posttraumatic symptoms in adulthood, which may lead to alcohol-related problems via drinking to regulate emotional experiences. This suggests that incorporating skills training in adaptive emotion regulation strategies into treatment for individuals with a history of childhood sexual abuse and adolescent sexual assault is important.

Smith et al. (2014)

This study examined several mechanisms which may help explain the relationship between childhood sexual abuse and problem alcohol use. The authors examined whether (i) distress mediated the relationship between childhood sexual abuse and both heavy drinking and alcohol consequences, and (ii) coping motives for drinking moderated the paths between distress and both heavy drinking and alcohol consequences, and whether these relationships remained significant after controlling for other forms of abuse/trauma. The sample consisted of 395 undergraduate women, ranging from 17 to 23 years.

The authors found support for a moderated-mediation model in which distress mediated the relationship between childhood sexual abuse and alcohol consequences, but only among those who endorsed coping motives for drinking. When adjusting for other forms of abuse/trauma, childhood sexual abuse remained a significant predictor of alcohol consequences through a direct pathway; however, the moderated-mediation pathway was no longer significant.

The authors concluded that their findings provide support for tension-reduction models of alcohol use among childhood sexual abuse-exposed women (i.e., alcohol is consumed to reduce tension or ameliorate distress) and demonstrates the moderating role of coping

motives. Future research should explore mechanisms and contextual variables to help explain the childhood sexual abuse/alcohol-use pathway.

7. Conclusions

The two systematic reviews, one meta-analysis, two cohort studies, and three primary studies included in this report found:

- Fair quality evidence (i.e., the review was of fair methodological quality (1+/1-)) from one systematic review that a history of childhood sexual abuse is associated with alcohol use during adolescence, including higher rates of initiating alcohol use during adolescence, current, regular, frequent and excessive use of alcohol, and alcohol use disorders (no raw data provided)¹.
- Fair quality evidence from one systematic review that childhood sexual abuse is associated with an increased risk of alcohol use among youth (OR = 1.4 to 5.2), as well as earlier initiation of substance use/abuse².
- Good quality evidence (i.e., the research was of good methodological quality (1++)) from one meta-analysis of a small and significant association between childhood sexual abuse and alcohol problems ($r^{\ddagger} = .07$)³.
- Adequate evidence (i.e., the study/review was of adequate methodological quality (2+)) from one cohort study conducted in New Zealand that the extent of childhood sexual abuse is associated with an increased rate of alcohol dependence at age 30 ($d^{\ddagger} = .40$)⁴.
- Adequate evidence from one cohort study conducted in Australia that exposure to sexual abuse significantly increases the risk of subsequent alcohol abuse (OR = 5.88)⁵.
- Evidence from three primary studies that childhood sexual abuse is associated with higher risk for alcohol dependence (OR = 2.03⁶; female and male HR = 2.98 and 1.67, respectively⁷; female and male adjusted OR = 2.81 and 1.91, respectively⁸).

Using Bradford Hill's guide to causation (Appendix 5), the strength of association between childhood sexual abuse and the development of problematic alcohol use, alcohol abuse and/or dependence is in the order of 1.4 to 5.88 increased odds, with studies demonstrating some consistency of this association. Temporality (i.e. that the abuse occurs before the development of alcohol use disorder) is not able to be established due to largely retrospective study designs.

The biological gradient (i.e., more exposure results in greater risk of developing alcohol use disorder) was investigated by three authors^{1,4,7}. One systematic review identified one study which found a greater risk of alcohol-related outcomes when the childhood sexual abuse

[‡] Pearson correlation coefficient; measure of effect size

[‡] Cohen's d is the estimated standardized comparison of no exposure to childhood sexual abuse versus any exposure to childhood sexual abuse

involved contact (e.g. fondling or penetration) rather than non-contact abuse¹. One cohort study found increasing severity of childhood sexual abuse (i.e., childhood sexual abuse involving attempted or completed penetration) was associated with an increased rate of alcohol dependence⁴. In addition, one primary study found childhood sexual abuse involving intercourse was associated with the highest risk for various adverse outcomes, including alcohol dependence⁷.

In relation to plausibility, there may be evidence for genetic traits, vulnerability factors, and/or family background effects contributing to the development of alcohol dependence among those who have experienced childhood sexual abuse^{6,7,8}. In addition, there may be evidence for the role of motives for alcohol consumption (e.g., using alcohol to reduce negative affect and/or increase positive affect) as mediators of the link between childhood sexual abuse and subsequent alcohol-related problems.

Limitations of the current research examining the association between childhood sexual abuse and alcohol use disorder include the largely cross-sectional design of studies, wide variety of definitions of childhood sexual abuse, abuse being reported retrospectively, and presence of confounding variables.

Given the identified limitations of the current literature and that there are likely to be many causes of and risk factors for alcohol use disorder, one cannot conclude that childhood sexual abuse is a direct and sufficient cause of alcohol use disorder. However, there is some fair quality evidence that childhood sexual abuse is likely to be a risk factor for developing alcohol use disorder, including alcohol abuse and dependence.

8. Limitations of this report

As only English language articles were included, the presence of publication bias in this report is a possibility. In addition, only focusing on systematic reviews, meta-analyses, reviews, cohort studies with comparison groups, and primary studies utilising New Zealand and Australian samples may have missed more recent research. The dearth of systematic reviews and meta-analyses mean research findings need to be replicated in order to more fully investigate and understand the aetiology of alcohol use disorder with regard to childhood sexual abuse.

9. Appendix 1: Evidence Table for Original Inclusion Criteria

Reference and study design	Studies	Results												
<p>Draucker & Mazurczyk (2013).</p> <p>“Relationships between childhood sexual abuse and substance use and sexual risk behaviors during adolescence: An integrative review.”</p> <p><u>Nursing Outlook</u> 61:291-310</p> <p>United States</p> <p><u>Included studies:</u> <i>Total:</i> Al Mamun et al. (2007); Hayatbakhsh et al. (2009b); Hayatbakhsh et al. (2009c); Hayatbakhsh et al. (2009a); Arata et al. (2005); Bornovalova et al. (2008); Brown et al. (2004); Buffardi et al. (2008); Champion (2011); Bailey & McCloskey (2005); Bergen et al. (2004); Boden et al. (2006); Fergusson et al. (2008); Chen et al. (2006); Dube</p>	<p><u>Number of studies:</u> Total = 49 articles describing 41 studies</p> <p>Childhood sexual abuse and substance use= 29 articles describing 22 studies</p> <p><u>Total number of participants in the studies:</u> N = ~269,000</p> <p>Child sexual abuse and substance use: N = ~136,255</p> <p><u>Inclusion criteria:</u> (a) reported on a primary research study, (b) appeared in a peer-reviewed journal, (c) published since 2002, (d) written in English, and (e) explored the relationship between CSA and any substance use and/or sexual risk behaviours or outcomes (pregnancy and sexually transmitted infections [STIs]) during adolescence (ages 10e25).</p>	<p><u>Overview of results from articles (N = 20) examining the association between childhood sexual abuse and alcohol use, abuse and/or dependence</u></p> <table border="1"> <thead> <tr> <th data-bbox="878 480 1070 523">Author/year</th> <th data-bbox="1070 480 1317 523">CSA definition*</th> <th data-bbox="1317 480 1563 523">Substance Abuse Variable/s</th> <th data-bbox="1563 480 2042 523">Main Results^Y</th> </tr> </thead> <tbody> <tr> <td data-bbox="878 767 1070 842">Arata et al. (2005)</td> <td data-bbox="1070 528 1317 1066">Someone trying to touch in a sexual way or having to touch another, being threatened into doing something sexual, being made to do or watch sexual things, being molested, believing to have been sexually abused; occurred when “growing up”</td> <td data-bbox="1317 671 1563 922">Frequency of alcohol, marijuana, and drug use within the past year; substance use scale constructed</td> <td data-bbox="1563 751 2042 847">CSA did not contribute significantly to substance abuse (unless accompanied by some other form of abuse)</td> </tr> <tr> <td data-bbox="878 1166 1070 1257">Bailey & McCloskey (2005)</td> <td data-bbox="1070 1102 1317 1326">Contact and noncontact; at or before the age of 14; by individual 5 or more years older; severity index constructed</td> <td data-bbox="1317 1054 1563 1326">Index of substance abuse including frequency, quantity, and consequences of drug and alcohol use</td> <td data-bbox="1563 1150 2042 1262">CSA was significantly related to a substance abuse index; relationship was mediated by behavioural self-control</td> </tr> </tbody> </table>	Author/year	CSA definition*	Substance Abuse Variable/s	Main Results ^Y	Arata et al. (2005)	Someone trying to touch in a sexual way or having to touch another, being threatened into doing something sexual, being made to do or watch sexual things, being molested, believing to have been sexually abused; occurred when “growing up”	Frequency of alcohol, marijuana, and drug use within the past year; substance use scale constructed	CSA did not contribute significantly to substance abuse (unless accompanied by some other form of abuse)	Bailey & McCloskey (2005)	Contact and noncontact; at or before the age of 14; by individual 5 or more years older; severity index constructed	Index of substance abuse including frequency, quantity, and consequences of drug and alcohol use	CSA was significantly related to a substance abuse index; relationship was mediated by behavioural self-control
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<p>et al. (2006); Duncan et al. (2008); Haley et al. (2004); Hillis et al. (2004); Hodson et al. (2006); Holmberg & Hellberg (2010); Houck et al. (2010); Huang et al. (2011); Roberts et al. (2008); Shin et al. (2009); Jirapramukpitak et al. (2005); Jones et al. (2010); Johnson et al. (2006); Jun et al. (2008); Kaltman et al. (2005); Kim & Williams (2009); Kingston & Raghavan (2009); Klanecky et al. (2009); Klanecky et al. (2012); Lin et al. (2011); Merrill et al. (2003); Moran et al. (2004); Noll et al. (2003); Olley (2008); Oshri et al. (2012); Pallitto & Murillo (2008); Randolph & Mosack (2006); Rothman et al. (2011); Roy et al. (2011); Saewyc et al. (2004); Saewyc et al. (2008); Shin et al. (2010); Voisin (2005); Young et al. (2011)</p>	<p><u>Exclusion criteria:</u> Not explicitly reported.</p> <p><u>Databases used:</u> Cumulative Index to Nursing and Allied Health Literature, PubMed, and PsycINFO. Ancestry searching was also conducted using the reference lists of articles obtained from the database searches.</p> <p><u>Description of the methodological assessment of studies:</u> not conducted</p> <p><u>Fixed or variable effects:</u> not applicable</p> <p><u>Heterogeneity^Σ:</u> not discussed</p>	<p>Bergen et al. (2004) Occurrence and level of distress</p> <p>Chen et al. (2006) An array of unwanted sexual behaviours; before the age of 16; classification: contact or noncontact</p> <p>Dube et al. (2006) Being touched or fondled, touched or fondled another, attempted or actual intercourse; first 18 years; by adult/ person 5 years older</p> <p>Fergusson et al. (2008) An array of abuse experiences from noncontact abuse to completed intercourse; classification: none; noncontact</p>	<p>Frequency of use of a number of substances in last year; classification: serious and extreme</p> <p>Current tobacco use (ever smoked in past 30 days), current alcohol use (one or more drinks in past 30 days), ever been drunk (lifetime), ever been injured when drunk</p> <p>Age at initiation of alcohol use among ever drinkers; classification: early adolescence, mid adolescence, late adolescence, adulthood</p> <p>Frequency of illicit drug use, cigarette use, alcohol use, cannabis abuse each year from 16 to 25,</p>	<p>For boys at time 3, CSA was associated with serious and extreme SU (aOR =3.6, 4.7, respectively). For girls at time 3, CSA was associated with serious and extreme SU (aOR = 2.2, 2.6, respectively)</p> <p>Noncontact SA was associated with had one or more drinks of alcohol in past 30 days (OR = 1.24), have ever been drunk (OR =.80), and have ever been accidentally injured when drunk (OR = .88); contact SA was associated with had one or more drinks of alcohol in past 30 days (OR = 2.73), have ever been drunk (OR = 3.60), and have ever been accidentally injured when drunk (OR = 5.36).</p> <p>Among ever drinkers, contact CSA was associated with initiating alcohol use during early adolescence (aOR =2.8), mid adolescence (aOR =1.5), and late adolescence (aOR = 1.1); risk increases with additional ACEs.</p> <p>CSA was associated with illicit drug use and abuse/ dependence</p>
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^Σ Heterogeneity is the variation between the results of a set of studies.

			only; contact, no attempted or completed intercourse; attempted or completed oral, anal, or vaginal intercourse	problems associated with use of drugs for each year to construct diagnosis of drug abuse or dependence each year from 16 to 25	
		Hayatbakhsh et al. (2009c)	Pressured or forced to have undesired sexual contact; classification: none, once or twice, three or more times	Lifetime AUD by age 21; Frequency of amphetamine use in the last 12 months (never used, not used in the past year, used a few times during the year, used a few times a month, used a few times a week), classification: never used or ever used	Frequent (3 or more times) CSA was associated with amphetamine use (aOR = 2.0) and AUD (OR = 2.9)
		Hodson et al. (2006)	Completed and attempted molestation	Frequency of use of an array of substances during the prior 6 months; polysubstance use	CSA did not uniquely predict polysubstance abuse
		Holmberg & Hellberg (2010)	Sexual acts that were unpleasant,	Tobacco (everyday smoker),	CSA was associated with increased consumption of alcohol, and use of narcotics (especially amphetamines)

			disgusting, or frightening; by adults	alcohol (alcohol at least once a month), and drug use (have taken sedatives, any psychotropic drug)	
		Jirapramukpitak et al. (2005)	At least one penetrative sexual abuse event; before age 16; person(s) at least 5 years older; with or without consent CSA according to Child Protective Services records; two trajectories: no allegations, curvilinear trajectory (highest level of allegations between ages 4 and 8, lower levels at younger and older ages).	Abuse and dependence of illicit substances; alcohol problems (hazardous and harmful use of alcohol)	CSA was associated only with alcohol use disorders (aOR = 19.9)
		Jones et al. (2010)	CSA according to Child Protective Services records; two trajectories: no allegations, curvilinear trajectory (highest level of allegations between ages 4 and 8, lower levels at younger and older ages).	Ever had a drink	Curvilinear CSA trajectory was associated with increased risk of engaging in alcohol use; other experiences of maltreatment contributed to risk
		Kim & Williams (2009)	Frequency and severity of abuse incidents; before the age of 14	Frequency of alcohol use in past 6 months, typical frequency of cigarette,	For females, CSA was associated with higher levels of cigarette, marijuana, and illicit drug use; relationships completely mediated by variable called God's love CSW

		Kingston & Raghavan (2009)	Unwanted vaginal, anal, or oral sex or touching of breasts and genitalia; occurred before age of substance use initiation	marijuana, and other illicit drug use First use (age drank five or more alcoholic drinks in a single day or used substances not prescribed by a doctor); one or more experiences of engaging in risky behaviours (e.g., getting hurt, getting arrested) while under the use of substances	CSA was not associated with first substance use
		Klanecky et al. (2012)	Coerced/forced and noncoerced/forced events; before age 18	Problematic alcohol use (e.g., binge drinking, unable to remember because of drinking)	CSA was related to problematic alcohol use; relationship mediated by desire to dissociate
		Lin et al. (2011)	An array of unwanted sexual behaviours; before the age of 16; classification: contact or noncontact	Number of days smoked a cigarette in the past 30 days (ever smoked), number of days using alcohol (using alcohol), number of days having 5 or	CSA was associated with ever smoking (aOR = 2.14) and binge drinking (aOR = 2.68)

			<p>more drinks in one drinking episode(binge drinking)</p> <p>Frequency of tobacco (cigarette or chewing tobacco) use; classification: none, once or twice, some use, high use; frequency of alcohol consumption (none, once or twice, some use, high use), frequency of illicit drug use (none, once or twice, some use, moderate use, high use)</p>	<p>CSA was associated with tobacco (aOR = 3.00), alcohol (aOR = 3.14), and illicit drug use (aOR = 3.86). Risk increased with physical maltreatment</p> <p>CSA was associated with past year alcohol abuse and dependence symptoms and co-occurring alcohol use and sexual activity; CSA was negatively associated with drug abuse and dependence symptoms; alcohol use and dependence symptoms mediated the relationships between CSA and alcohol use co-occurring with sex</p> <p>Incest or rape before the age of 14 was associated with initiation into drug injection (aHR = 1.98) for boys (not girls)</p>
		<p>Moran et al.(2004)</p> <p>Undesired sexual things, made to do undesired sexual things; someone in family or another person</p>		
		<p>Oshri et al. (2012)</p> <p>Sexual abuse during childhood or adolescents; classification: always, sometimes, rarely, never</p>	<p>Past year substance abuse or dependence symptoms</p>	
		<p>Roy et al. (2011)</p> <p>Incest or rape with or without vaginal or anal penetration</p>	<p>Early substance abuse (alcohol)</p>	

			binging before 14, drug binging before 15), last month drug use patterns, current daily alcohol use; initiation of drug injection exposure or peer influence		
		Shin et al. (2009)	Touched in sexual way, forced to touch another in a sexual way, forced to have sexual relationships; by the start of sixth grade; parents or other adult caregivers	Binge drinking (consuming five or more drinks in a row at least 2-3 times per month) during past 12 months	CSA was associated with adolescent binge drinking (aOR = 2.26)
		Shin et al. (2010)	Someone trying to touch in a sexual way or having to touch another, being threatened into doing something sexual, being made to do or watch sexual things, being molested, believing to have been sexually abused; when	Lifetime use of six illicit substances, classification for girls: abstainers/low users, moderate alcohol and cannabis users, high alcohol/cannabis and moderate amphetamine/cocaine users, heavy polysubstance	For females, CSA was associated with moderate alcohol and cannabis use (OR= 2.61), high alcohol/ cannabis or moderate amphetamine/cocaine use (OR = 4.75), and heavy polysubstance use (OR = 4.85). For males, CSA was not Associated with substance abuse classes

		<p>growing up; at least low to moderate</p> <p>abuse users; classification for boys: abstainers/low users, high alcohol/cannabis and low amphetamine users, heavy polysubstance users</p> <p>F, female; M, male; OR, odds ratio; aOR, adjusted odds ratio; RR, risk ratio; HR, hazard ratio; aHR, adjusted hazard ratio.</p> <p>* When provided in articles, types of sexual activities, upper age limit of childhood, and relationship with perpetrator that constitute operational definition of CSA are presented.</p> <p>† When provided in articles, ORs, RRs, and HRs are presented. Many studies controlled for confounding variables such as demographic, family functioning, and psychosocial health factors, in which cases ORs, RRs, and HRs are presented.</p>
<p>Conclusions</p> <p><u>Author's conclusions:</u> Despite wide variations in study designs, samples and settings, operational definitions of CSA, and substance use and sexual risk behaviour/outcome variables, most studies revealed significant correlations between CSA and adolescent health risks. Eleven studies provided evidence for an association between CSA and alcohol use during adolescence. CSA was shown to be related to higher rates of initiating alcohol use during adolescence, current, regular, frequent, and excessive use of alcohol, and alcohol use disorders (i.e., abuse and dependency). Problematic alcohol use, which includes drinking concurrently with sexual activity and being accidentally injured when drunk, was also associated with CSA.</p> <p><u>Reviewer's conclusions:</u> This systematic literature search presents evidence suggestive of an association between childhood sexual abuse and alcohol use during adolescence, including alcohol use disorders, but is not definitive.</p> <p>Study type: Systematic literature search with an integrative review</p> <p>Quality: 1-</p> <p>Comments: Systematic literature search and integrative review with no meta-analysis. Adequate search of multiple databases. No formal methodological assessment.</p>		

Reference and study design	Studies	Results																											
<p>Tonmyr et al. (2010). “A review of childhood maltreatment and adolescent substance use relationship.” <u>Current Psychiatry Reviews</u> 6:223-234 Canada <u>Included studies:</u> <i>Total:</i> Acierno <i>et al.</i>, 2000; Kilpatrick <i>et al.</i>, 2000 ; Champion <i>et al.</i>, 2004 Clark <i>et al.</i>, 2004 ; Fergusson <i>et al.</i>, 1997; 1996; Behnken <i>et al.</i>, 2010; Bergen <i>et al.</i>, 2004; Chandy <i>et al.</i>, 1997; Choquet <i>et al.</i>, 1997; Edgardh & Ormstad, 2000; Erickson & Rapkin, 1991; Frederiksen <i>et al.</i>, 2008; Garnefski & Arends, 1998; Hamburger <i>et al.</i>, 2008; Hernandez <i>et al.</i>, 1992; 1993; Hibbard <i>et al.</i>, 1988; Hibbard <i>et al.</i>, 1990; Howard <i>et al.</i>, 2005; Lau <i>et al.</i>, 2003;</p>	<p><u>Number of studies:</u> Total = 35 articles describing 31 studies Childhood sexual abuse and alcohol use = 25 studies <u>Total number of participants in the studies:</u> N = ~140,445 Child sexual abuse and alcohol use: N =111,756 <u>Inclusion criteria:</u> studies examining youth in grades 6-12; representing ages 12-18 years (core of sample); child maltreatment [i.e., abuse, violence and neglect, perpetrated by an adult in a position of trust (caregiver)]; substances (nicotine, alcohol and any of the drugs specified below); and empirical quantitative data. <u>Exclusion criteria:</u> Articles were excluded if they were based on qualitative</p>	<p><u>Magnitude of association between sexual abuse and alcohol:</u> OR 1.4 to 5.2 The association between physical and sexual abuse combined and alcohol, drugs and nicotine use was stronger than for sexual and physical abuse individually. <u>Overview of results from articles (N = 25) examining the association between childhood sexual abuse (CSA) and alcohol use, abuse and/or dependence</u></p> <table border="1" data-bbox="869 619 2051 1394"> <thead> <tr> <th data-bbox="869 619 1077 703">Author/year</th> <th data-bbox="1077 619 1317 703">CSA measure and prevalence</th> <th data-bbox="1317 619 1749 703">Substance Abuse Variable/s and prevalence</th> <th data-bbox="1749 619 2051 703">Significance of association between CSA and alcohol (p<.05)</th> </tr> </thead> <tbody> <tr> <td data-bbox="869 703 1077 799">Kilpatrick <i>et al.</i>, 2000</td> <td data-bbox="1077 703 1317 799">sexual assault (8%)</td> <td data-bbox="1317 703 1749 799">smoked cigarettes last 30 days * 8.5% (m); 8.9% (f); past year abuse/dependence of alcohol *4%; hard drugs *1%; marijuana *4%</td> <td data-bbox="1749 703 2051 799">Sig</td> </tr> <tr> <td data-bbox="869 799 1077 895">Champion <i>et al.</i>, 2004</td> <td data-bbox="1077 799 1317 895">sexual victimization *2.8% (m), *7.1% (f)</td> <td data-bbox="1317 799 1749 895">age of first drink (≤12-20years) (alcohol) *(5.3%-25.2%); binge drinking past two weeks *11.2%; use of marijuana past 30 days *10%</td> <td data-bbox="1749 799 2051 895">Sig</td> </tr> <tr> <td data-bbox="869 895 1077 991">Fergusson <i>et al.</i>, 1997</td> <td data-bbox="1077 895 1317 991">sexual abuse *10.4%</td> <td data-bbox="1317 895 1749 991">nicotine dependence; abuse/dependence of: alcohol *(13.8%/5.7%); cannabis *7.2%</td> <td data-bbox="1749 895 2051 991">Results vary with measures</td> </tr> <tr> <td data-bbox="869 991 1077 1086">Behnken <i>et al.</i>, 2010</td> <td data-bbox="1077 991 1317 1086">sexual abuse *11%</td> <td data-bbox="1317 991 1749 1086">five or more drinks in a row past 30 days: alcohol (yes/no) *23%</td> <td data-bbox="1749 991 2051 1086">Sig</td> </tr> <tr> <td data-bbox="869 1086 1077 1182">Bergen <i>et al.</i>, 2004</td> <td data-bbox="1077 1086 1317 1182">sexual abuse *(T1-T3) 1.6-2.0% (m); *(T1-T3)</td> <td data-bbox="1317 1086 1749 1182">used in the last year: alcohol; tobacco; marijuana; acid or LSD; sniffed glue, petrol, or solvents;</td> <td data-bbox="1749 1086 2051 1182">Results vary with measures</td> </tr> </tbody> </table>				Author/year	CSA measure and prevalence	Substance Abuse Variable/s and prevalence	Significance of association between CSA and alcohol (p<.05)	Kilpatrick <i>et al.</i> , 2000	sexual assault (8%)	smoked cigarettes last 30 days * 8.5% (m); 8.9% (f); past year abuse/dependence of alcohol *4%; hard drugs *1%; marijuana *4%	Sig	Champion <i>et al.</i> , 2004	sexual victimization *2.8% (m), *7.1% (f)	age of first drink (≤12-20years) (alcohol) *(5.3%-25.2%); binge drinking past two weeks *11.2%; use of marijuana past 30 days *10%	Sig	Fergusson <i>et al.</i> , 1997	sexual abuse *10.4%	nicotine dependence; abuse/dependence of: alcohol *(13.8%/5.7%); cannabis *7.2%	Results vary with measures	Behnken <i>et al.</i> , 2010	sexual abuse *11%	five or more drinks in a row past 30 days: alcohol (yes/no) *23%	Sig	Bergen <i>et al.</i> , 2004	sexual abuse *(T1-T3) 1.6-2.0% (m); *(T1-T3)	used in the last year: alcohol; tobacco; marijuana; acid or LSD; sniffed glue, petrol, or solvents;	Results vary with measures
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<p>Logan <i>et al.</i>, 2009; Luster & Small, 1997; Nagy <i>et al.</i>, 1994; Nelson <i>et al.</i>, 1994; Moran <i>et al.</i>, 2004; Pedersen & Skrondal, 1996; Perkins & Jones, 2004; Riggs <i>et al.</i>, 1990; Shin <i>et al.</i>, 2009; Simantov <i>et al.</i>, 2000; Southwick-Bensley <i>et al.</i>, 1999; Watts & Ellis, 1993; Yen <i>et al.</i>, 2008.</p> <p><u>Databases used:</u> CINAHL, PsycINFO, ERIC, Medline, Social Policy & Practice and PubMed from inception of the databases to March 2010.</p> <p><u>Description of the methodological assessment of studies:</u> not conducted</p> <p><u>Fixed or variable effects:</u> not applicable</p> <p><u>Heterogeneity:</u> not discussed</p>	<p>research; adult and clinical samples, victimization by peers/unknown perpetrator; only parental substance abuse as a risk factor for maltreatment; studies comprising only of adolescents who were maltreated without a comparison or control group; aggregated data across types of substances or of maltreatment.</p>	<p>5.4-6.7% (f)</p> <p>Chandy <i>et al.</i>, 1997</p> <p>Choquet <i>et al.</i>, 1997</p> <p>Edgardh & Ormstad, 2000</p> <p>Erickson & Rapkin, 1991</p> <p>Garnefski & Arends, 1998</p> <p>Hamburger <i>et al.</i>, 2008</p> <p>Hernandez <i>et al.</i>, 1992; 1993</p>	<p>sexual abuse *2.2%</p> <p>sexual abuse *(rape 0.8%; attempted rape 2.1%; another sexual assault 1.9%)</p> <p>sexual abuse *3.1% (m); *11.2% (f)</p> <p>unwanted sexual experiences *15%</p> <p>sexual abuse *6%</p> <p>sexual abuse *8.9%; physical abuse *22.3%; witnessing domestic violence *32.4%</p> <p>Sexual abuse (incest, extra familiar) *10% (f, m) *6.8(m); physical abuse *9.1</p>	<p>injected illegal drugs (heroin, speed); oral stimulants (speed, crack, ecstasy), magic mushrooms</p> <p>use of: alcohol; tobacco; marijuana</p> <p>consumption: alcohol; drug; cigarette smoking</p> <p>alcohol (drunk before 15 years old) *37.1% (m), 28.3% (f); tried illicit drugs *7.3% (m), *5.4% (f)</p> <p>frequency of use alcohol; drugs</p> <p>last month use of alcohol; last year use of marijuana</p> <p>ever drink alcohol *59%; age of initiation</p> <p>use cigarettes; alcohol: frequency of intoxication and amount of alcohol, drinking problem; use drugs (marijuana; inhalants; speed; cocaine; crack)</p>	<p>N.S</p> <p>Significant for males N.S for females</p> <p>Sig</p> <p>Sig</p> <p>Sig</p> <p>Sig</p> <p>Sig</p> <p>Sig</p>
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		Hibbard <i>et al.</i> , 1988	physical abuse *10.3%; sexual abuse *4.1%	smoking cigarettes; ever use: alcohol; marijuana; drugs	Sig
		Hibbard <i>et al.</i> , 1990	physical abuse *9.0%; sexual abuse *4.3%	use: alcohol; marijuana	N.S
		Howard <i>et al.</i> , 2005	sexual abuse *5.1% (m); *10.2% (f)	during the past 30 days on days you smoked cigarettes (1 or less- 2) *8.77% to 16.63%); have five or more drinks of alcohol (1-5/6+ days) *(11.1-16.4); any form of cocaine or glue *24.3%	Sig
		Luster & Small, 1997	sexual abuse *currently 1%; before *7%	binge drinking	Sig
		Nagy <i>et al.</i> , 1994	sexual abuse *12.6%	use alcohol; used drugs past month	Sig
		Nelson <i>et al.</i> , 1994	sexual abuse *20.9%	smoked cigarettes; past 30 days use: alcohol; marijuana; ever used cocaine	Sig
		Moran <i>et al.</i> , 2004	emotional/verbal abuse *9.5%; physical abuse *10.6%; sexual abuse *5.5%	chewing tobacco; frequency of use cigarettes; alcohol; drugs (marijuana, cocaine, barbiturates and heroin)	Sig
		Pedersen & Skrondal, 1996	sexual abuse *1% (m); *17% (f)	alcohol consumption (alcohol related diagnosis by RAPI (23 questions)	Sig

		Riggs <i>et al.</i> , 1990	sexual abuse *5.4%; physical abuse *5.2%	use of cigarettes *25%; alcohol *44%; drugs (marijuana *24%; drugs *28%)	N.S
		Shin <i>et al.</i> , 2009	before grade 6: physical abuse; sexual abuse; neglect	binge drinking *11.2%	Sig
		Southwick-Bensley <i>et al.</i> , 1999	abuse *11%; sexual molestation *5.8%	heavy and light: alcohol *(7.4% and 25.5%); drug use (marijuana, cocaine, inhalants or other drugs, hallucinogens, amphetamines, tranquilliser, heroin, uppers, downers) *(10.7% and 7.9%)	Sig
		Watts & Ellis, 1993	sexual molestation *8.7%	Life time use of: drugs; narcotics *1.8%; marijuana*16.4%; cocaine *4.3%; crack *0.9%, methamphetamine *10.6%, barbiturate *6.6%; inhalants *12.8%; steroids *0.7%; hallucinogens *9.8%; designer drugs *7.5%; last year use of cigarettes *2.9%; chew *5.4; alcohol *58.1%; drugs; marijuana *13.9%; cocaine *3.3%; barbiturate *4.3%; methamphetamine *7.5%; inhalants *7.8%; hallucinogens *7.8%; designer drugs *4.8%; steroids *0.6%; last month use of alcohol; drugs; marijuana *7.6%; cocaine *1.9%; methamphetamine *3.6%; barbiturate *2.7%; inhalants *3.7%; hallucinogens *4.3%; steroids *0.3%	Sig
Sig = statistically significant; N.S = non-significant; f = female; m = male; * = prevalence estimate					

Conclusions

Author's conclusions: The majority of the studies provided a statistically significant association between sexual abuse and the use of alcohol. Childhood sexual abuse has been associated with adolescents' earlier use of substances. The association between physical and sexual abuse combined and alcohol, drugs and nicotine use was stronger than for sexual and physical abuse individually. We cannot conclude that a direct causal relationship exists between maltreatment and adolescent substance use/abuse; however, prospective longitudinal research would provide further insight.

Reviewer's conclusions: This systematic review presents evidence suggestive of an association between childhood sexual abuse and the use of alcohol during adolescence, but is not definitive.

Study type: Systematic literature search with review

Quality: 1-

Comments: Systematic literature search with no meta-analysis. Adequate search of multiple databases. No formal methodological assessment.

10. Appendix 2: Exclusion Study Table for Original Inclusion Criteria

The 61 studies excluded from this report are presented in the table below. These studies had the term “review”, “systematic review”, and/or “meta-analysis” stated in its title and/or abstract.

An additional 789 articles were identified by the literature searches conducted. However, these articles were not included in this report based on the exclusion criteria (i.e., non-English studies, animal or laboratory studies, narrative reviews, letters or editorials; study designs other than systematic review or meta-analysis).

Reference	Include/Exclude
Abbey et al. 2001	Focus is not on childhood sexual abuse and alcohol use disorder causation
Becker & Walton-Moss, 2001	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Beghi et al. 2013	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Bensley et al. 2000	Focus is not on childhood sexual abuse and alcohol use disorder causation
Briken et al. 2000	Not in English; Focus is not on childhood sexual abuse and alcohol use disorder causation
Bronisch & Lieb, 2008	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Campbell et al. 2009	Focus is not on childhood sexual abuse and alcohol use disorder causation
Clay et al. 2000	Review
Cohen & Galynker, 2002	Focus is not on childhood sexual abuse and alcohol use disorder causation
Courbasson et al. 2011	Book chapter
Davey, 2005	Review of article; Focus is not on childhood sexual abuse and alcohol use disorder causation
Davis & Loftus, 2004	Book chapter; Focus is not on childhood sexual abuse and alcohol use disorder causation
Davis et al. 2013	Book chapter
Deas, 2006	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Devieux et al. 2015	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Esquivel-Santovena et al. 2013	Focus is not on childhood sexual abuse and alcohol use disorder causation
Foshee et al. 2009	Book chapter; Focus is not on childhood sexual abuse and alcohol use disorder causation

Francisco et al. 2008	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Friedman et al. 2011	Focus is not on childhood sexual abuse and alcohol use disorder causation
Gidycz & Dardis, 2014	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Grant et al. 2012	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Grubb & Turner, 2012	Focus is not on childhood sexual abuse and alcohol use disorder causation
Heaphy et al. 2010	Focus is not on childhood sexual abuse and alcohol use disorder causation
Hetrick et al. 2010	Focus is not on childhood sexual abuse and alcohol use disorder causation
Holovits et al. 2009	Not in English
Hughes, 2003	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Javidi & Yadollahie, 2012	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Kerr-Correa et al. 2000	Not in English
Kochanski-Ruscio et al. 2014	Focus is not on childhood sexual abuse and alcohol use disorder causation
Kubiak et al. 2008	Book chapter; Focus is not on childhood sexual abuse and alcohol use disorder causation
Kuzma & Black, 2008	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Lackamp et al. 2009	Book chapter; Focus is not on childhood sexual abuse and alcohol use disorder causation
Lalor & McElvaney, 2010	Focus is not on childhood sexual abuse and alcohol use disorder causation
Lalumiere et al. 2005	Book chapter; Focus is not on childhood sexual abuse and alcohol use disorder causation
Latthe et al. 2006	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Lloyd & Operario, 2012	Focus is not on childhood sexual abuse and alcohol use disorder causation
Looman et al. 2004	Focus is not on childhood sexual abuse and alcohol use disorder causation
Mash & Barkley, 2006	Book; Focus is not on childhood sexual abuse and alcohol use disorder causation
McCall & Lauridsen-Hoegh, 2014	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
McLaughlin & Miller, 2008	Focus is not on childhood sexual abuse and alcohol use disorder causation
McNamara et al. 2010	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation

O'Leary et al. 2006	Focus is not on childhood sexual abuse and alcohol use disorder causation
Pao et al. 2000	Focus is not on childhood sexual abuse and alcohol use disorder causation
Relf, 2001	Focus is not on childhood sexual abuse and alcohol use disorder causation
Renner & Whitney, 2012	Corrigendum
Rich et al. 2004	Book chapter; Focus is not on childhood sexual abuse and alcohol use disorder causation
Sageman, 2003	Review and case reports; Focus is not on childhood sexual abuse and alcohol use disorder causation
Seto & Lalumiere, 2010	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Seto et al. 2015	Focus is not on childhood sexual abuse and alcohol use disorder causation
Simkin, 2002	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Simpson & Miller, 2002	Review
Stewart & Israeli, 2002	Focus is not on childhood sexual abuse and alcohol use disorder causation
Testa & Livingston, 2009	Focus is not on childhood sexual abuse and alcohol use disorder causation
Testa, 2004	Focus is not on childhood sexual abuse and alcohol use disorder causation
Tyler, 2002	Review
Ullman, 2004	Review; Focus is not on childhood sexual abuse and alcohol use disorder causation
Walitzer & Dearing, 2006	Focus is not on childhood sexual abuse and alcohol use disorder causation
Walsh et al. 2012	Focus is not on childhood sexual abuse and alcohol use disorder causation
Widom et al. 2001	Review
Zelgowski, 2012	Book review
Zlotnik, 2014	Dissertation

11. Appendix 3: Evidence Tables for Revised Inclusion Criteria

Reference and study design	Studies	Exposure	Outcome measure	Results	Conclusions
<p>Rind et al. (1998)</p> <p>“A meta-analytic examination of assumed properties of child sexual abuse using college samples”</p> <p><u>Psychological Bulletin.</u> 124:22-53.</p> <p>United States</p> <p><u>Included studies:</u> Alexander & Lupfer, 1987; Bailey & Gibbons, 1989; Beckman & Burns, 1990; Bendixen et al. 1994; Bergdahl, 1983; Briere & Runtz, 1988a, b; 1990; Brubaker, 1991; Cole, 1988; Collings, 1995; Edwards & Alexander, 1992;</p>	<p><u>Number of studies:</u> N=59 (published and unpublished), with 54 independent samples</p> <p>Childhood sexual abuse and alcohol problems: N=8</p> <p><u>Number of participants:</u> Prevalence rates: based on 35,703 participants (13,704 men and 21,999 women). Effect size data for psychological correlates: based on 15,824 participants (3,254 men from 18 samples and 12,570 women from 40 samples)</p> <p>All college samples</p> <p>Alcohol problems: N = 1,645</p>	<p>Child sexual abuse</p>	<p>Correlation coefficient (r^{\ddagger}) of later alcohol problems.</p> <p>Alcohol problems as measured by the Michigan Alcoholism Screening Test (MAST; Brady et al. 1982), the alcohol subscale of the Millon Clinical Multiaxial Inventory (MCMI; Millon, 1982), and investigator-authored items.</p> <p>Multiple regression analyses conducted to examine</p>	<p>Childhood sexual abuse and alcohol problems</p> <p>Eight studies found a small and significant effect size for the association between childhood sexual abuse and alcohol problems. ($r = .07$; 95% CI: .02 to .12; $H = 2.97$).</p>	<p><u>Author’s conclusions:</u> CSA was associated with poorer psychological adjustment across the college samples, but the magnitude of this association (i.e., its intensity) was small.</p> <p><u>Reviewer’s conclusions:</u> An adequately conducted meta-analysis which found a small but significant association between CSA and alcohol problems across 8 studies.</p>

[‡] Pearson correlation coefficient; measure of effect size

<p>Everill & Waller, 1995; Finkelhor, 1979, 1984; Fischer, 1991; Fishman, 1991; Fritz et al. 1981; Fromuth, 1984, 1986; Fromuth & Burkhart 1989; Gidycz et al. 1993; Gidycz et al. 1995; Goldman, & Goldman, 1988; Greenwald, 1994; Harter et al. 1988; Hatfield, 1988; Haugaard, & Emery, 1989; Higgins & McCabe, 1994; Hrabowy, 1987; Jackson et al. 1990; Kinzl et al. 1995; Kinzl et al. 1994; Klein-Trull, 1990; Lam, 1994; Landis, 1956; Long, 1993; Maggio, 1984; Moor, 1992; Nash & West, 1985; O'Neill, 1991; Pallotta, 1992; Peters & Range, 1995; Pizzolo, 1990; Predieri, 1992; Preuss, 1988; Rau, 1994; Rew et al. 1991; Risin & Koss 1987; Roland et al. 1989; Sarbo, 1985; Schultz & Jones, 1983; Sedney &</p>	<p><u>Inclusion criteria:</u> Must either have used samples exclusively of college students, or, if noncollege subjects were also included, then results of measures of college students had to be reported separately.</p> <p>For inclusion in analyses of psychological correlates of CSA, studies had to (a) include a control group that contained no students with CSA experiences; (b) use a distinct CSA group, rather than a general "abused" group that could include participants without a history of CSA; (c) report on at least one of the 18 symptoms described below; and (d) provide sufficient data to compute one or more effect sizes. Studies not including reports of psychological correlates were included if they contained data on</p>		<p>moderator variables (sample-level).</p>		
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<p>Brooks, 1984; Silliman, 1993; Smolak et al. 1990; Urquiza, 1989; West & Woodhouse, 1993; White & Strange, 1993; Wisniewski, 1990; Yama et al. 1993; Yama et al. 1992; Zetzer, 1991</p>	<p>reactions to CSA, either retrospectively recalled or current reflections; these data had to be classifiable into mutually exclusive negative, neutral, or positive categories. Studies were also included if they contained data on self- reported effects of CSA.</p> <p><u>Exclusion criteria:</u>. Not stated</p> <p><u>Databases used:</u> PsycLIT, Sociofile, PsycInfo, Dissertation Abstracts International, ERIC.</p> <p><u>Description of the methodological assessment of studies:</u> Not discussed.</p> <p><u>Fixed or variable effects:</u> Not applicable.</p> <p><u>Heterogeneity:</u> <i>H</i> – within-group homogeneity statistic; Cutting or trimming outliers was performed when effect sizes were heterogeneous in an</p>				
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	attempt to reach homogeneity.				
<p>Study type: Meta-Analysis</p> <p>Quality: 1+</p> <p>Comments: Adequately conducted meta-analysis, included published and non-published literature, multiple databases searched. Heterogeneity considered.</p>					

Reference	Data/Participants	Exposure and Outcome Measure	Data Analysis	Results
<p>Fergusson et al. (2013)</p> <p>“Childhood sexual abuse and adult developmental outcomes: Findings from a 30-year longitudinal study in New Zealand”</p> <p><u>Child Abuse & Neglect</u> 37: 664-674.</p> <p>New Zealand</p>	<p>Data: Christchurch Health and Development Study (CHDS) birth cohort</p> <p>The CHDS is a longitudinal study of 1,265 children (630 females) born in the Christchurch (New Zealand) urban region over a 4-month period during 1977. This cohort has been studied at birth, 4 months, 1 year, annually to age 16, then at ages 18, 21, 25, and 30 using a combination of interviews with parents and participants, standardized testing, teacher report, and official record data (Fergusson & Horwood, 2001; Gibb, Fergusson, & Horwood, 2012). At age 30, 987 (80%; 509 females) of the surviving cohort members were assessed.</p> <p>941 respondents assessed at age 30 had completed data on the measurement of CSA and mental health variables</p>	<p>Exposure: Childhood sexual abuse (prior to age 16)</p> <p>Outcome: range of outcomes using a 1.5-3h structured interview. Mental health problems (DSM-IV criteria for alcohol dependence) from age 18 to 30 years.</p>	<p>Generalised linear regression</p>	<p>CSA and Alcohol Dependence</p> <p>Extent of CSA was associated with an increased rate of alcohol dependence when unadjusted and adjusted for 10 covariates spanning sociodemographic, family functioning and child factors disorder symptoms:</p> <p>Unadjusted: B = 0.290, SE = 0.100, p = .004 Adjusted: B = 0.374, SE = 0.118, p = .002 Cohen's d = .40</p> <p>Increasing exposure to CSA was associated with an increased rate of alcohol dependence (p = .004)</p>
<p>Conclusions</p> <p><u>Author's conclusions:</u> The findings of this study generally confirm and extend previous research which has found that exposure to CSA has adverse consequences for a wide range of adult developmental outcomes. In this study, those reporting exposure to CSA had increased risks of mental health problems in adulthood (ages 18–30) and an increase rate of alcohol dependence.</p> <p><u>Reviewer's conclusions:</u> This cohort study provides evidence of an association between CSA and alcohol dependence but is not definitive.</p>				

Study type: Cohort

Quality: 2+

Comments: A well-conducted cohort study (30 year follow-up) with comparison group drawn from the general population.

Reference	Data/Participants	Exposure and Outcome Measure	Data Analysis	Results
<p>Cutajar et al. (2010)</p> <p>“Psychopathology in a large cohort of sexually abused children followed up to 43 years.”</p> <p><u>Child Abuse & Neglect</u> 34: 813-822</p> <p>Australia</p>	<p><u>Data/participants</u>: Forensic medical records of 2,759 sexually abused children assessed between 1964 and 1995 were linked with a public psychiatric database between 12 and 43 years later.</p> <p>Comparison group drawn from a random sample of 4,938 Victorian residents on the electoral role. Control subjects matched on gender and age groupings.</p> <p><u>Average age</u>: Mean age of CSA group at follow-up was 33.82 years</p>	<p><u>Exposure</u>: Childhood sexual abuse (at age 16 years or younger)</p> <p><u>Outcome</u>: Mental health outcomes (from a public psychiatric database; diagnosis generated by treating or responsible psychiatrist using DSM* or ICD[‡])</p>	<p>T-tests, Chi-square, odds ratios, logistic regression, Cox regression.</p>	<p>CSA and Alcohol Abuse</p> <p>CSA significantly increased the risk of subsequent Alcohol Abuse OR = 5.88, 95% CI: 3.26 to 10.63, p <0.001</p> <p>No significant difference found between female and male cases for the rates of Alcohol Abuse (p = .137)</p>
<p>Conclusions</p> <p><u>Author’s conclusions</u>: Overcoming many of the limitations of previous studies (i.e., retrospective nature), this study confirms that sexual abuse in childhood increases the risk for subsequent psychiatric disorders in both childhood and adulthood.</p> <p><u>Reviewer’s conclusions</u>: This cohort study provides evidence of an association between sexual abuse and subsequent risk of alcohol abuse but is not definitive.</p>				
<p>Study type: Cohort</p> <p>Quality: 2+</p> <p>Comments: A well-conducted cohort study (12 to 43 year follow-up) with comparison group drawn from the general population.</p>				

* Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association)

[‡] World Health Organisation International Classification of Disease

Reference	Data/Participants	Exposure and Outcome Measure	Data Analysis	Results
<p>Nelson et al. (2010). “H2 haplotype at chromosome 17q21.31 protects against childhood sexual abuse-associated risk for alcohol consumption and dependence.”</p> <p><u>Addiction Biology</u> 15: 1-11</p> <p>United States [Australian Sample]</p>	<p><u>Data:</u> Subjects were from the Nicotine Addiction Genetics project.</p> <p><u>Participants:</u> 1,128 respondents from 476 families.</p>	<p><u>Exposure:</u> Child sexual abuse (< 18 years).</p> <p><u>Outcome measure:</u> Quantitative alcohol consumption factor score (ACFS) (Agrawal <i>et al.</i> 2009; Grant <i>et al.</i> 2009); binary DSM-IV diagnosis of alcohol dependence.</p> <p>Genotyping (DNA extracted from blood samples).</p>	<p>Linear regression, logistic regression, t-tests.</p>	<p>CSA and ACFS</p> <p>History of CSA is associated with higher lifetime alcohol consumption (main effect for CSA, $p < .003$).</p> <p>No significant main effect for H2 haplotype ($p > 0.77$).</p> <p>Significant G X E² interaction, with the H2 haplotype protecting against CSA-associated effects on alcohol consumption ($\beta^\emptyset = -0.41$; 95% CI: -0.75 to -0.08) **</p> <p>CSA and Alcohol Dependence**</p> <p>History of CSA is associated with lifetime alcohol dependence risk (OR = 2.03; 95% CI: 1.40 to 2.92).</p> <p>No evidence of significant main effect for H2 haplotype on risk for alcohol dependence (OR = 0.92; 95% CI: 0.70 to 1.21).</p> <p>Evidence of a significant GX E interaction for the H2 haplotype protecting against CSA associated effects on alcohol dependence risk (OR = 0.42; 95% CI: 0.20 to 0.89; $p = .023$).</p> <p>** controlling for gender</p>
<p>Conclusions</p> <p><u>Author’s conclusions:</u> A history of CSA is associated with significant risk for alcohol consumption and lifetime DSM-IV alcohol dependence; the H2 haplotype was not associated with risk for either of these outcomes. For both alcohol consumption and dependence, a G X E interaction involving CSA and the H2 haplotype is associated with significant protective effects.</p>				

² Genotype x environment interaction

[∅] standardised regression coefficient

Data suggest that the H2 haplotype is protective against CSA-associated risk for higher lifetime alcohol consumption and alcohol dependence. The extent of these protective effects suggests that one or more of the genes within the H2 haplotype are playing an important role in stress-associated risk for alcohol consumption and dependence.

Reviewer's conclusions: This study presents evidence that suggests child sexual abuse is significantly associated with alcohol consumption and alcohol dependence. Genes moderate the CSA-associated risk for alcohol-related outcomes.

Study type: Case Control

Quality: 2+

Comments: An adequately conducted case control study utilising a large sample size.

Reference	Data/Participants	Exposure and Outcome Measure	Data Analysis	Results
<p>Nelson et al. (2002). “Association between self-reported childhood sexual abuse and adverse psychosocial outcomes: Results from a twin study.” <u>Arch Gen Psychiatry</u> 59: 139-145 United States [Australian Sample]</p>	<p><u>Data:</u> Subjects were members of the young adult cohort of the Australian Twin Register, a volunteer twin panel born between January 1 1964 and December 31 1971.</p> <p><u>Participants:</u> Monozygotic (MZ) and dizygotic (DZ) same-sex pairs (N=1,991) in which both twins responded to at least 1 CSA component question. 58.2% female.</p> <p>Average age: 29.9 (2.5) years</p>	<p><u>Exposure:</u> Childhood sexual abuse</p> <p><u>Outcome measure:</u> Lifetime DSM-IV diagnoses of major depressive disorder, conduct disorder and alcohol and/or nicotine dependence.</p>	<p>95% CIs adjusted for the statistical nonindependence of twin-pair observations, logistic regression, survival analysis (Cox proportional hazards regression models), conditional logistic analyses.</p>	<p>CSA and Alcohol Dependence</p> <p>Females: HR[‡] = 2.98; 95% CI: 2.31 to 3.83 Males: adjusted HR = 1.67; 95% CI: 1.18 to 2.37</p> <p>CSA involving intercourse and Alcohol Dependence</p> <p>OR= 3.46; 95% CI: 2.37 to 5.06*</p> <p>Those reporting a history of CSA involving intercourse had the highest risks for all examined adverse outcomes compared to CSA-negative concordant twin pairs and CSA-positive individuals not involving intercourse</p> <p>CSA not involving intercourse and Alcohol Dependence</p> <p>OR = 1.81; 95% CI: 1.34 to 2.46*</p> <p>Those reporting a history of CSA not involving intercourse had significantly higher risks for all adverse outcomes (other than divorce) when compared with individuals from CSA-negative concordant pairs.</p> <p>CSA-negative respondents with co-twin with CSA and Alcohol Dependence</p> <p>OR = 1.43; 95% CI: 1.03 to 1.97*</p> <p>CSA-negative respondents whose co-twin was CSA-positive had significantly higher risks for all adverse outcomes (other than major depression and divorce) when compared to members of CSA-negative concordant pairs</p>

				<p>CSA-positive versus CSA-negative members of discordant pairs and Alcohol Dependence</p> <p>OR = 1.56; 95% CI: 1.01 to 2.40</p> <p>‡<i>Hazard Ratios (HR)</i> – risk for adverse outcomes subsequent to reported CSA occurrence * Comparison with twins from pairs where respondent and co-twin both denied CSA; controlling for gender and family environmental factors</p>
<p>Conclusions</p> <p><u>Author's conclusions:</u> In this large twin study, we found that individuals reporting a history of CSA had increased risk for subsequently occurring adverse outcomes, including alcohol and/or nicotine dependence. Our data suggest that CSA occurs in the context of family background risk factors that contribute to adverse outcome risk. The highest risks for adverse outcomes were associated with CSA involving intercourse.</p> <p><u>Reviewer's conclusions:</u> This co-twin-control study presents evidence that suggests child sexual abuse is significantly associated with alcohol dependence.</p>				
<p>Study type: Case Control</p> <p>Quality: 2+</p> <p>Comments: An adequately conducted case control study utilising a sample of twins, large sample size.</p>				

Reference	Data/Participants	Exposure and Outcome Measure	Data Analysis	Results
<p>Dinwiddie et al. (2000). “Early sexual abuse and lifetime psychopathology: A co-twin-control study.”</p> <p><u>Psychological Medicine</u> 30: 41-52</p> <p>United States [Australian Sample]</p>	<p><u>Data</u>: Subjects were ascertained from the Australian National Health and Medical Research Council (NH & MRC) Twin Register, a volunteer panel established in 1978.</p> <p><u>Participants</u>: 1,341 monozygotic (MZ) pairs (940 female, 401 male), 776 dizygotic (DZ) pairs (540 female, 236 male), and 604 opposite-sex twin pairs, plus data on 553 ‘singleton’ twins (i.e., where data were available on only one member of a twin pair).</p>	<p><u>Exposure</u>: Sexual abuse <18 years</p> <p><u>Outcome measure</u>: Lifetime history of psychiatric symptoms and DSM-III-R diagnoses of alcohol abuse/dependence, major depression, anxiety disorders, and conduct disorder.</p>	<p>Chi-square analyses, Fisher’s exact test, t-tests, logistic regression.</p>	<p>CSA and Alcohol Dependence</p> <p>Females: adjusted OR = 2.81; 95% CI: 1.89 to 4.17 Males: adjusted OR = 1.91; 95% CI: 1.08 to 3.39</p> <p>Reported CSA and lifetime psychopathology</p> <p>Elevated rates among individuals who experienced CSA were seen in all disorders in females, and for all disorders except social phobia in males.</p> <p>CSA and Alcohol Dependence in twin pairs discordant for CSA</p> <p>Females: OR = 2.50; 95% CI: 0.97 to 6.44 (n.s) Males: OR = 1.00; 95% CI: 0.20-4.96 (n.s)</p> <p>Note: for females, the association between CSA and alcohol dependence fell marginally short of statistical significance (p = .06).</p>
<p>Conclusions</p> <p><u>Author’s conclusions</u>: Associations were found between CSA and a variety of psychiatric disorders, including conduct disorder, major depression, suicidal ideation and suicide attempt, panic disorder and alcohol dependence in both men and women, and with social phobia in women. Notably, these associations were attenuated in the co-twin-control analyses, with non-abused twins appearing not to have substantially differing risk for psychopathology. The decrease in odds based on findings from discordant twins may be seen as supporting the hypothesis that a substantial part of the risk for psychopathology might be due to shared vulnerability factors rather than stemming solely from CSA. The association between CSA and psychopathology arises at least in part through the influence of shared familial factors on both risk of victimization and risk of psychopathology.</p> <p>Nonetheless, in analysis of the total sample, rates of psychopathology were elevated among abused twins, and despite the potential informativeness of the twin pair approach for establishing indirect causation, we were in most cases unable to reject the hypothesis of a direct causal contribution of history of CSA to risk of lifetime psychopathology.</p> <p><u>Reviewer’s conclusions</u>: This co-twin-control study presents evidence that suggests child sexual abuse is significantly associated with alcohol dependence. Vulnerability factors may play a role in the development of psychopathology.</p>				

Study type: Case Control

Quality: 2+

Comments: An adequately conducted case control study utilising a sample of twins, large sample size.

12. Appendix 4: Excluded Studies for Revised Inclusion Criteria

789 articles were identified by literature searches conducted. However, these articles were not included in this report based on the exclusion criteria (i.e., non-English studies, animal or laboratory studies, published reviews published prior to 2015, letters or editorials; study designs other than systematic review or meta-analysis, except for cohort studies with comparison groups and primary studies with a comparison group using New Zealand and/or Australian non-clinical samples).

In particular:

- Approximately 616 results were excluded because the focus was not on childhood sexual abuse and Alcohol Use Disorder causation
- Approximately 49 results were excluded because they were a book or book chapter
- Approximately 39 results were excluded because they did not use a New Zealand and/or Australian non-clinical sample
- Approximately 33 results were excluded because they were not community-based samples
- Approximately 27 results were excluded because they did not investigate alcohol use disorder, alcohol abuse and/or alcohol dependence as identified by DSM-IV or ICD diagnostic criteria or well-validated screening tools
- Approximately 16 results were excluded because they were not in English
- Approximately 9 results were excluded because they were included in one of the systematic reviews included in this report

13. Appendix 5: Bradford Hill's Criteria of Causation¹³

A suggested guide to assessing the likelihood of causation

- **Strength of the association:** A small association does not mean that there is not a causal effect, though the larger the association, the more likely that it is causal.
- **Consistency of the association:** Consistent findings observed by different persons in different places with different samples strengthens the likelihood of an effect.
- **Specificity:** Causation is likely if a very specific population at a specific site and disease with no other likely explanation. The more specific an association between a factor and an effect is, the bigger the probability of a causal relationship.
- **Temporality:** The effect has to occur after the cause (and if there is an expected delay between the cause and expected effect, then the effect must occur after that delay).
- **Biological gradient:** Greater exposure should generally lead to greater incidence of the effect. However, in some cases, the mere presence of the factor can trigger the effect. In other cases, an inverse proportion is observed: greater exposure leads to lower incidence.
- **Plausibility:** A plausible mechanism between cause and effect is helpful (but Hill noted that knowledge of the mechanism is limited by current knowledge).
- **Coherence:** Coherence between epidemiological and laboratory findings increases the likelihood of an effect. However, Hill noted that "... lack of such [laboratory] evidence cannot nullify the epidemiological effect on associations".
- **Experiment:** "Occasionally it is possible to appeal to experimental evidence".
- **Analogy:** The effect of similar factors may be considered.

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