

# A Family Study of Adult Twins with and without a History of Childhood Abuse: Stability of Retrospective Reports of Maltreatment and Associated Family Measures

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Childhood sexual abuse (CSA) and physical abuse (CPA) are well-established risk-factors for a wide range of proximal and distal outcomes. The lack of availability of an optimal design for examining abuse and its consequences has resulted in the use of various approaches, each having its own limitations. We describe the Childhood Trauma Study, which ascertained families from a large young adult Australian twin cohort on the basis of twins' responses to screening questions assessing CSA and CPA. We report data from 3407 participants including twins, non-twin siblings, and their parents. Our data demonstrate the feasibility of using a comprehensive assessment to evaluate retrospective history of childhood abuse in an adult sample. We observed that risk for each form of abuse increased incrementally with the number of parents with alcohol problems. Psychometric properties of our measures of CSA and CPA including reasonable long-term stability, construct validity, and evidence of familial corroboration compare favorably with those of other reports in which samples were considerably younger and assessments were repeated over shorter intervals.

**Keywords:** childhood sexual abuse, parental alcoholism, physical abuse, reliability, retrospective recall

Childhood sexual abuse (CSA) and physical abuse (CPA) are well-established risk-factors for a wide range of proximal and distal outcomes (e.g., Caspi et al., 2002; Caspi et al., 2003; Risch et al., 2009). The optimal experimental design for an examination of the long-term consequences of childhood maltreatment, a prospective, naturalistic, longitudinal study, is precluded by ethically-mandated requirements for reporting and intervention. This limitation has necessitated the use of alternative methods for research in this area.

Some investigations have focused on children ascertained via child protective services (Smith et al., 2008; Widom & Shepard, 1996; Widom & Morris,

1997). This approach offers the advantage of reliance on substantiated reports and, in some instances, the additional ability to control for measures consistently employed to reduce the consequences of the abuse. However, since the vast majority of abuse goes unreported (Sedlak & Broadhurst, 1996), it remains unclear how well findings from these studies generalize to population-representative samples. Specifically, maltreatment reported to authorities is likely to be of greater severity and to have more commonly led to removal of the child from the home environment. Interestingly, assessments of adults who experienced abuse in childhood substantiated by contemporaneous reports, have found (Smith et al., 2008; Widom & Shepard, 1996; Widom & Morris, 1997) that in some studies more than 50% do not endorse having experienced abuse (i.e. are false negatives).

A commonly used alternative approach involves retrospective assessment of childhood maltreatment in adults, which in most venues avoids any requirement for reporting and intervention (e.g., Fergusson et al., 1996; Fleming et al., 1997; Mullen et al., 1996). These studies are most frequently criticized for their susceptibility to retrospective bias. In addition, residual concerns from the era of psychotherapies focusing on recovering memories of abuse experiences are sometimes misdirected at studies utilizing retrospective assessment. A review by Hardt and Rutter (2004) of research examining the validity of retrospective reports of adverse childhood experiences determined that false negative are likely much more common than false positive reports. While presenting evidence supporting the existence of limited retrospective bias, these authors conclude that '...such bias is not sufficiently great to invalidate retrospective

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case-control studies of major adversities of an easily defined kind'.

The current report describes the Childhood Trauma Study, a family study of Australian adult twins, their full siblings, and their parents which used twins' reports of CSA or CPA obtained from screening questions in a prior interview to ascertain high-risk and control families, and examines the psychometric properties of retrospectively assessed childhood sexual and physical abuse in this sample. Methods drawn from Hardt and Rutter's (2004) review employed for this purpose include examinations of temporal stability, agreement between family members, and association with an established risk-factor (i.e., parental alcoholism). Using data from twins assessed on multiple occasions, and from their siblings, we are able to complete a fairly extensive investigation of the psychometric properties of adults' reports of CSA and CPA retrospectively assessed either via screening questions (Heath et al., 2001) or a very detailed inventory (Fergusson et al., 1989; Fergusson et al., 1996; Fergusson & Lynskey, 1997).

## Methods

### Participants

Twin participants for the Childhood Trauma Study are members of a large Australian volunteer twin panel maintained by the Australian National Health and Medical Research Council (NHMRC). These individuals were drawn from the younger panel (Cohort II) consisting of twins born between 1964 and 1971 registered as children for participation by their parents in response to appeals via the media and school systems. A mailed questionnaire assessment was undertaken between 1989 and 1992. A semi-structured psychiatric diagnostic interview was conducted via telephone from 1996–2000 (Heath et al., 2001) with 6265 twins (2765 pairs and 735 singletons). High-risk and control families were ascertained for the current project on the basis of twins' responses to screening questions in this interview that retrospectively assessed childhood sexual and physical abuse (see below). Families in which one or more member of the twin pair endorsed either form of abuse were considered high-risk; control families were those in which all interviewed twins did not report either form of abuse. High-risk families in which male twins reported a history of CSA were prioritized for inclusion. A random number generator program that frequency-matched on the basis of twin gender and zygosity was otherwise used to select high-risk and control families.

The design of the Childhood Trauma Study initially involved interviewing all available twins, full siblings, and parents from 500 (high-risk) families and from 500 (control) families. Funding limitations resulting from a major decline in the relative valuation of the US to the Australian dollar necessitated scaling back enrollment by prioritizing finishing existing families and collecting additional high-risk family twins.

### Procedure

Interviewers for the Childhood Trauma Study, primarily master's level psychologists, underwent an extensive training process supervised by an experienced clinical psychologist. Interviewer training emphasized maintenance of confidentiality, sensitivity to respondent's mental state including offering to take a break if a respondent became upset, and importance of asking all questions in a very matter-of-fact manner. Interviewers initially practiced sections of the interview with each other alternatively assuming roles of respondent and interviewer. They then conducted monitored practice interviews with volunteer community respondents. After interviewers were determined to have demonstrated adequate proficiency with community respondents, they were assigned a list of study participants. Data collection began in 2003 and continued through 2008.

Initial contact was made via a brief letter informing twins that a new investigation was underway and that, unless they indicated otherwise, they would receive a screening telephone call that would provide additional information. This call included a short description of the study, a request for authorization to contact siblings and parents and to update contact information for these individuals, and permission to mail more detailed information including a consent form and respondent booklet. If both twins agreed to allow family members to be contacted, and at least one twin agreed to participate, the family was enrolled in the study. For each scheduled interview, the consent was first read aloud to the respondent who had a written copy on hand to follow along. Respondents were then allowed to ask any questions before verbal consent was obtained. After verbal consent was provided, the interviewer requested to audiotape the interview. The first series of interviews conducted by each interviewer were checked by experienced editors to verify correct administration. Additional interviews were periodically spot-checked to monitor for interviewer drift. As an additional safeguard for maintaining confidentiality, each interviewer was only allowed to interview a single member of any participating family. After completing the interview, respondents were required to return a written consent that allowed for inclusion of their data in the study database. These procedures were approved by the Ethics Committee of the Queensland Institute of Medical Research and by the Washington University School of Medicine Human Subjects Committee.

## Measures

### Screening Questions from the Prior Interview (Time 1)

The CSA screening questions (described previously) (Nelson et al., 2002; 2006) included descriptions of sexual behaviors they were designed to assess. CSA status was determined from five questions contained in three sections of the interview [conduct disorder (1), home environment (2 and 3), and traumatic events (4 and 5)]: (1) 'Before age 18, were you ever

forced into sexual intercourse or any other form of sexual activity?’ (2) ‘Before you were 16 years old, were there any sexual contacts between you and anyone other than a family member who was 5 or more years older than you were? By sexual contact I mean their touching your sexual parts, you touching their sexual parts, or sexual intercourse.’ (3) ‘Before you were 16 years old, were there any sexual contacts between you and any family members, like a parent, grandparent, uncle, aunt, brother or sister, or cousin (with sexual contact defined as in the previous question)?’ (4) (Respondents were first directed to a list of traumatic events.) ‘How about event #5 [You were raped (someone had sexual intercourse with you when you did not want to, by threatening you or using some degree of force).]?’ (5) ‘Apart from event #5 [You were raped] did event #6 [You were sexually molested (someone touched or felt your genitals when you did not want them to)].’ Individuals who endorsed any of these items and reported first occurrence before age 18 were considered to have experienced CSA unless the sexual activity was consensual and involved a family member described as another child.

The CPA screening questions were more vague, focusing either on consequences (i.e., ‘Hurt the next day’; ‘Physically hurt’) or endorsement of the construct (i.e., ‘You were physically abused’). Four questions from two sections of the interview [home environment (1, 2, and 3), and traumatic events (4)] were used to determine CPA status: (1), (2) ‘How often did your mother/father physically punish you so hard that you hurt the next day?’ (3) ‘Were you ever physically injured or hurt on purpose as a child by an adult? Examples of such injuries would include: broken bones, being hit so hard you developed bruises, punishments that included scalding water, or any other physical injuries.’ A follow-up question assessed the relationship of this individual to the respondent. (4) ‘Did event #8 (you were physically abused as a child) ever happen to you?’ Individuals were considered to have experienced CPA if they responded *Sometimes* or *Often* (the two highest frequency response levels) to the ‘hurt the next day’ questions for either parent, reported purposeful physical injury by an adult who the follow-up determined to be a relative, or endorsed the experienced physical abuse question and reported first occurrence before age 18.

#### Childhood Trauma Study Interview and Questionnaires (Time 2)

The Childhood Trauma Study assessment was administered as a computer-assisted diagnostic interview. It included sections derived from the SSAGA (Bucholz et al., 1994; Hesselbrock et al., 1999) that assessed DSM-IV diagnoses of alcohol abuse and dependence, illicit drug abuse and dependence (separately for cannabis, opioids, stimulants, sedatives, cocaine, hallucinogens, and an other drug category that included PCP, solvents, and inhalants), nicotine dependence, major depressive disorder, panic disorder and agoraphobia, conduct disorder, and post-traumatic stress

disorder. Additional axis II diagnostic sections modified from the SIDP (Pfohl et al., 1995; Pilkonas et al., 1995) assessed cluster B and C personality disorder diagnoses. Twins and all available full siblings completed an extensive evaluation of early trauma and items on adult trauma exposure modified from the Christchurch Trauma Assessment (Fergusson et al., 1989; Fergusson et al., 1996; Fergusson & Lynskey, 1997) which included very detailed questions about both CSA and CPA. Other non-diagnostic sections of the interview included demographics, suicidal thoughts and behavior, family psychiatric history (Rice et al., 1995), and adult relationships. Mailed self-report questionnaires included the Parental Bonding Inventory (Parker, 1986; Parker, 1989), modified Neglect Scale (Straus et al., 1995), Social Provisions Scale (Cutrona & Russell, 1987), Experiences in Close Relationships (Brennan et al., 1998), Conners’ Adult Attention Deficit Hyperactivity Disorder Rating Self-Report Short Version (Conners et al., 1999), NEO-MPQ (Costa & McRae, 1992), Parenting Beliefs Questionnaire, and the First Use Questionnaire.

To decrease respondent burden, sections of the interview that were unchanged from prior assessment were not readministered to twins previously interviewed in the Cohort II assessment or subsequent genetic studies that focused on nicotine and alcohol or siblings who participated in the latter projects. The parental interview did not include the conduct disorder section and the Christchurch Trauma Assessment; parents also were not asked to complete mailed questionnaires.

#### Parental Alcohol Problems

Twins and siblings were asked (in separate questions for each parent) if drinking ever caused their mother/father to have problems with health, family, job, police, or other problems. Excellent within-pair twin agreement for these questions was observed (see Table 3). These items were asked of all twin and sibling respondents and, thus, more data were available for them than from direct parental interviews. In addition, offspring report of parental alcohol problems was also associated with significant risk of parental non-participation for mothers [OR 2.02 (95%CI 1.14–3.57)] and fathers [OR 2.11 (95%CI 1.54–2.90)]. Agreement with available parental interview data further supports the usefulness of these offspring report measures. For those respondents whose parents were interviewed, paternal self-reported alcohol dependence was significantly associated with offspring report of paternal alcohol problems [OR 4.13 (95%CI 2.63–6.48)]; a considerably stronger association was found between maternal self-reported alcohol dependence and similar offspring report [OR 49.43 (95%CI 19.29–126.67)]. The magnitude of observed associations is substantial, particularly given the advanced age of many interviewed parents that may have compromised the accuracy of their endorsement of the full extent of their lifetime alcohol use.

Offspring report of parental alcohol problems were thus used for analyses reported below.

#### **Christchurch Trauma Assessment**

**CSA.** Respondents were asked whether they experienced various unwanted sexual experiences before age 18. The 17 items ranged from questions about someone exposing sexual organs in the presence of the respondent to attempted or completed intercourse, oral sex, or anal sex. For the analyses reported here, CSA was defined as any unwanted sexual contact (i.e., excluded non-contact forms of abuse) involving either intra- or extra-familial perpetrators occurring before age 18.

**CPA.** Respondents were asked questions about physical punishment (9 items) or consequences of physical maltreatment including injury (3 items), medical care (3 items), or missed school (1 item) that they might have experienced before age 18. This series of questions was asked first about the respondent's mother and then repeated in reference to the respondent's father and finally any other adult member of their household. The instrument thus appropriately operationalizes CPA to include only intra-familial perpetrators. All endorsed physical punishment items were followed by a question to determine whether the punishment occurred occasionally or frequently. Responses to the questions about the consequences of physical maltreatment were recorded as *Yes* or *No*. For the current analyses, CPA was operationalized as endorsement (regardless of perpetrator) of: (1) a physical punishment item other than spanking with hands or object; or (2) any item reflecting having experienced negative consequences of physical maltreatment.

#### **Data Analysis**

All analyses were performed using SAS version 9.13 (SAS Institute, 2004). Multinomial logistic regression analysis was used to determine whether cohort II high-risk twins reporting a history of parental alcoholism or lower levels of parental education (used as a proxy for family of origin socioeconomic status) were less likely to agree to participate in the Childhood Trauma Study. Parental alcohol problems were operationalized as the number of parents reported to have alcohol problems. Parental education variables were first recoded separately for each parent by collapsing eight-level responses into four-level variables in which each level combined two response categories and the lowest level of education completion was defined as the comparison group. A single parental educational attainment variable was then created by taking the highest educational level reported for either parent. For all regression analyses, Huber-White robust variance estimators were used to adjust 95% confidence intervals for the presence in the sample of multiple members of individual families. High-risk versus control comparisons were made for subsample composition and demographic measures with t-tests used to determine if differences reached significance.

Tetrachoric correlations were calculated as measures of within-individual agreement for responses to the Cohort II screening questions and the Childhood Trauma Study detailed assessment. Kappa coefficients were calculated for the composite CSA and CPA measures because these variables are the most comparable to the time 2 measures. Agreement between twin pair members' reports of environmental stressors was similarly examined with tetrachoric correlations calculated separately for same-sex and opposite-sex twin pairs. Logistic regression analyses were performed to examine the risk for CSA and physical abuse associated with offspring report of the number of their parents with alcohol problems. Risk for each form of abuse associated with maximal parental educational attainment was also examined in separate logistic regression analyses. For these analyses, separate dummy variables for created for three higher category levels with the lowest level, 10 years or less completed without any degree, serving as the comparison group. Prevalence estimates of CSA and CPA were compared between high-risk and control families, separately by gender and family member type (twin or non-twin sibling). Logistic regression was used to examine (non-twin) sibling CSA and CPA risk by twin pair abuse status reported via the Childhood Trauma Study interview. Variables were dummy-coded for these analyses to indicate twins' report of that form of abuse (i.e., reported, denied, or data missing) and the analysis examining CSA risk also controlled for gender.

## **Results**

### **Sample Description**

Interviews were completed by 3434 respondents from 524 high-risk and 373 control families. A small number of interviewed respondents either returned consents requesting that their data not to be used for analysis ( $N = 17$ ) or failed to return their consents ( $N = 10$ ). Data from these individuals were not analyzed or reported.

The remaining 3407 respondents included 1532 twins, 1062 non-twin siblings, 466 mothers, and 347 fathers. The breakdown of twins by zygosity and gender is as follows (the number of complete pairs is shown in parentheses): 400 MZ female (176), 177 MZ male (76), 367 DZ female (157), 165 DZ male (66), and 423 DZ opposite-sex (169). Twins include 899 from high-risk and 633 from control families. High-risk and control twins did not differ significantly in sex distribution (high-risk twins are 34.4% male; control twins 35.9%). The mean age at interview of high-risk twins, 37.38 ( $SD$  2.31), is slightly, albeit significantly, older than that of control twins [37.05 ( $SD$  2.17)]. Siblings ( $N = 1062$ ) include 519 (39.5% male) from high-risk and 543 (42.7% male) from control families. High-risk [mean age 40.37 ( $SD$  6.26)] and control [mean age 40.89 ( $SD$  6.40)] siblings did not differ significantly in gender or age at interview. Interviews were completed by a mean of 4.22 individuals in control families significantly more than the



similar value (3.50) for high-risk families, a difference that likely resulted from our prioritizing completion of additional high-risk family twin interviews near the end of data collection.

Although respondents were told that they could refuse to answer any items, refusal rates for childhood trauma questions were quite low: 0.4% for CSA, 0.6% for CPA (includes those replying *Not sure* throughout), and 2% for parental partner mistreatment (including those who replied *Can't say*, a response option). The supplementary questionnaire was completed and returned by 2297 (88.6%) of the 2594 interviewed twins and sibs who provided consent for their data to be used.

#### Temporal Stability of Self-Reported CSA and CPA

The mean time interval between assessments was 7.16 years (*SD* 1.41). Considering this substantial time lag between interviews, and the differences in the content and approach of these abuse assessments, the endorsement of CSA at reinterview observed for each of the endorsed CSA screening questions was quite reasonable (see Table 1). For each of these items, and for the composite variable representing endorsement of any screening question, more than 80% of those who reported this experience in the cohort II interview provided a history of contact CSA at reinterview. Tetrachoric correlations ranging in value from 0.62–0.86 are also indicative of very good agreement. The kappa coefficient value for agreement between the composite variable and CSA at reinterview was 0.64 (95%CI 0.60–0.69).

The endorsement rates of CPA at reinterview for each of the endorsed screening questions were also fairly good, particularly given that three of the four questions did not include descriptive details and, on the whole, they assessed a relatively limited range of behaviors and consequences (see Table 2). For these questions, reinterview reports of CPA ranged from a low of 77.6% for the dad hurt the next day item to a high of 86.5% for the item asking if the respondent had experienced CPA. Tetrachoric correlations ranging from 0.67–0.76 were also indicative of reasonable agreement. The kappa coefficient value for agreement

**Table 1**

Prevalence of CSA Reported at Reinterview and Agreement, by Initial Interview Items Endorsed

Initial interview item	Endorsement cohort II sample ( <i>N</i> = 6265)		Sexual abuse at reinterview ( <i>N</i> = 1532)	Tetrachoric correlation
	Women	Men		
Non-family	4.4%	2.9%	90.1%	0.76
Family	6.9%	1.1%	86.2%	0.73
Forced sex	14.4%	4.3%	81.5%	0.81
Molested	12.9%	4.3%	86.7%	0.85
Raped	5.1%	1.4%	80.7%	0.62
Composite	17.5%	6.0%	80.8%	0.86

**Table 2**

Prevalence of CPA Reported at Reinterview and Agreement, by Initial Interview Item

Screening interview item	Endorsement cohort II sample ( <i>N</i> = 6265)		CPA at reinterview ( <i>N</i> = 1532)	Tetrachoric correlation
	Women	Men		
Mom — hurt next day	5.0%	3.9%	79.0%	0.68
Dad — hurt next day	5.5%	4.6%	77.6%	0.67
Adult hurt — family	7.0%	6.5%	80.4%	0.76
CPA	4.2%	2.9%	86.5%	0.73
Composite	9.9%	9.5%	74.7%	0.76

**Table 3**

Within-pair Twin Agreement Shown Separately for Same-Sex and Opposite Sex Pairs — Tetrachoric Correlations

Measures	Twin pair correlations	
	Same sex ( <i>N</i> = ~468)	Opposite sex ( <i>N</i> = ~157)
CSA	<b>0.57</b>	–0.27
CPA – any	<b>0.55</b>	0.25
# of parents with alcohol problems – twin report	<b>0.82</b>	<b>0.74</b>
Not raised by both parents through age 16	<b>0.98</b>	<b>0.97</b>

Note: Bolded values are significant at a level of  $p < 0.05$

between the composite variable and CPA at reinterview was 0.48 (95%CI 0.43–0.54).

#### Agreement Between Family Members: Within-Pair Twin Agreement

Given the greater potential for individual-specific environment sources to contribute to risk for CSA (since perpetrators could be intra- or extra-familial), it is somewhat surprising that estimates of within-pair agreement for twins from same-sex pairs are virtually identical for CSA and CPA (see Table 3). Estimates of within-family environment are sometimes assumed to be consistent for members of same-sex and opposite-sex twin pairs. Contrary to this assumption, the tetrachoric correlation used as a measure of agreement in report of CPA between members of opposite-sex twin pairs was of modest magnitude not differing significantly from zero. The estimate for agreement in report of CSA provided by opposite-sex twins was negative in value and also of modest magnitude. Much higher within-pair agreement, with little differences in magnitude between same-sex and opposite-sex pairs, was observed for reports of the number of parents with alcohol problems and for not having been raised by both parents until age 16.

#### Association With an Established Risk Factor: Parental Alcoholism

The prevalence of CSA in twins and non-twin siblings was noted to increase incrementally with the number

**Table 4**

CSA and CPA Prevalence and Risk (OR and 95%CI Shown) by the Number of Parents Reported to Have Alcohol Problems

Number of parents with alcohol problems	CSA		CPA	
	Prevalence	Odds ratio (95%CI)	Prevalence	Odds ratio (95%CI)
0	25.8%	1.00 —	20.9%	1.00 —
1	36.1%	1.66 (1.35–2.03)	36.3%	2.46 (2.03–2.98)
2	62.8%	5.05 (2.78–9.20)	57.7%	5.16 (3.15–8.46)

**Table 5**

Prevalence, by Sex and Family Status (High-Risk or Control), of CSA and CPA, Shown Separately for Twins and Non-Twin Siblings

Measures	Female twins		Male twins		Female sibs		Male sibs	
	H-R N = 579	Control N = 404	H-R N = 307	Control N = 226	H-R N = 309	Control N = 310	H-R N = 203	Control N = 229
Contact CSA	<b>56.7%</b>	<b>12.9%</b>	<b>30.0%</b>	<b>5.8%</b>	<b>43.7%</b>	<b>23.3%</b>	15.8%	10.9%
CPA	<b>34.0%</b>	<b>10.9%</b>	<b>40.7%</b>	<b>17.7%</b>	<b>29.1%</b>	<b>16.1%</b>	<b>29.1%</b>	<b>19.7%</b>

Note: Significant high-risk (H-R)–control differences are bolded.

of parents reported to have alcohol problems (see Table 4). A similar relationship was observed between parental alcohol problems and prevalence of CPA. Separate logistic regression models for each form of abuse found that, compared to individuals not reporting parental alcohol problems, significant risk was associated with report of alcohol problems involving one parent and substantially greater risk was found when problems were reported for both parents.

Risk for each form of abuse was also examined on the basis of maximal parental educational attainment. For CSA, three highest levels of maximal parental education attainment were all noted to be protective versus the comparison group (lowest level) with the highest attainment category only reaching a trend level of significance: college degree or higher OR 0.78 (95%CI 0.58–1.04); some post-secondary education OR 0.69 (95%CI 0.52–0.92); secondary school degree OR 0.65 (95%CI 0.51–0.83). For CPA, only the two highest levels were significantly protective: college degree or higher OR 0.62 (95%CI 0.46–0.85); some post-secondary education OR 0.74 (95%CI 0.55–0.99); secondary school degree OR 0.88 (95%CI 0.68–1.13).

**Comparisons Between Members of High-Risk and Control Families**

A significantly greater prevalence of CSA and CPA was observed in twins from high-risk families than control families (see Table 5). Since families were ascertained on the basis of twins’ responses to childhood abuse screening questions in the cohort II interview, this finding is not surprising. It is interesting to note that, with the detailed questions of the Christchurch Trauma Assessment, considerable endorsement of CSA and CPA was reported at time 2 by control twins. The substantial number of these individuals, assumed to be Time 1 false negatives, suggests that the cohort II screening questions may have

had limited sensitivity. Differences in prevalence found between siblings from high-risk and control families reached significance other than for sexual abuse in males. As expected, some attenuation was observed in prevalence differences found for siblings compared to those seen for twins.

**Abuse Risk in Siblings Examined on the Basis of Twin Pair Abuse Status**

Having observed that both forms of abuse are more prevalent in non-twin siblings from high-risk versus those from control families, we next examined how risk varied in relation to twins’ reported abuse status. The examination of sibling risk for CSA, controlling for gender, found risk of comparable magnitude associated with one or more twin reporting a history of sexual abuse (see Table 6). The similar examination for CPA found a different pattern in which significantly greater risk was observed when both twins, compared to just one, reported a history of CPA (see Table 7). In addition, twins whose data were missing seemingly increased sibling risk in a comparable manner to a twin reporting a history of CPA (i.e., -/? ~ = -/+ ; +/? ~ = +/+).

**Table 6**

Non-Twin Sibling CSA Risk by Twin Pair CSA Status, Controlling for Gender

Twin pair CSA status	Sibling CSA risk – odds ratio (95% CI)
CSA + CSA +	2.81 (1.70–4.63)
CSA + CSA –	2.97 (2.06–4.30)
CSA + ?	3.19 (1.80–5.66)
CSA – ?	1.16 (0.72–1.85)
CSA – CSA –	1.00 —
Female	3.42 (2.45–4.78)

**Table 7**

Non-Twin Sibling CPA Risk by Twin Pair CPA Status

Twin pair CPA status	Non-twin sibling CPA risk – odds ratio (95% CI)
CPA + CPA +	4.29 (2.68–6.85)
CPA + CPA –	1.94 (1.30–2.91)
CPA + ?	4.64 (2.62–8.23)
CPA – ?	2.05 (1.34–3.13)
CPA – CPA –	1.00 —

## Discussion

The current report describes the Childhood Trauma Study and examines retrospectively assessed CSA and CPA in the sample of adult twins, their non-twin siblings, and their parents. Our results demonstrate the feasibility of obtaining a very detailed assessment of childhood maltreatment from individuals largely in their third and fourth decades of life and provide evidence that these data demonstrate strong psychometric properties.

Data from twins provided an opportunity to examine the agreement of screening item endorsement with a comprehensive reassessment administered after an extensive interval that averaged slightly more than 7 years. Although more severe abuse might be expected to display greater temporal stability, the lowest rate of CSA reported at Time 2 was found for those who reported having been raped before age 18. Because the question assessing rape did not mention CSA (abuse status was instead determined from reported of age at first occurrence), lower time 2 CSA endorsement may have resulted from telescoping with respondents near the age cut-off reporting either an earlier or a later onset for the same experience at re-interview. Those who reported they had been physically abused in response to the screening question asking about CPA had the highest endorsement of CPA at reinterview. The relatively high specificity and lower sensitivity of this item is consistent with what other reports (Fricker et al., 2003; Hardt & Rutter, 2004; Thombs et al., 2006) have found for screening questions that assess abuse status without incorporating any descriptors. Consistent with this, the cohort II screening question for sexual molestation that included a behavioral description had comparable specificity, but better sensitivity. For both forms of abuse, lower tetrachoric correlation values were found for screening items that were less frequently endorsed likely due in part to the comprehensive nature of the Christchurch Trauma Assessment; the substantial prevalence of CSA and CPA in control twins also supports this suggestion. Overall, a very acceptable degree of agreement was observed for both sets of abuse items particularly given the 7-year interval and extensive content differences. The kappa coefficient values for the composite CSA and CPA variables are very similar to estimates from other studies (Bifulco et al., 2005; Durrett et al., 2004;

Fergusson et al., 2000; Hardt et al., 2006; Mills et al., 2007), which often used the identical instruments for both assessments and had considerably shorter mean intervals between interviews. Fergusson and colleagues (2000) reported very similar kappa statistics for CSA and CPA obtained from their administration of the Christchurch Trauma Assessment to their birth cohort at ages 18 and 21. They conducted latent class analyses with their data and concluded that the primary source of unreliable reports was from false negative responses occurring at either assessment rather than from false positive responses. They observed consistent risk for psychiatric outcomes conditional on exposure to abuse defined variously. One limitation of their analyses was that their model assumed that false positive reports did not occur (apparently, this assumption was necessary for their model to be fully identified).

Our data demonstrate significant relationships between offspring report of parental alcohol problems and self-reported CSA and CPA. These findings, consistent with prior community sample reports which have consistently observed significant risk associated with a history of parental alcoholism for CSA (Fleming et al., 1997; Miller et al., 1999; Dinwiddie et al., 2000; Nelson et al., 2002) and CPA (Dube et al., 2001; Fergusson & Lynskey, 1997; Mullen et al., 1996), offer additional validation of retrospective data collected with the Christchurch Trauma Assessment. A similar dose–response relationship between the number of alcoholic parents and risk for emotional and physical neglect also has been reported (Dube et al., 2001). Analyses using maximal parental educational attainment as a proxy for family-of-origin socioeconomic status observed higher parental educational status was protective against each form of abuse. As poverty-associated risk for child abuse is well established (e.g., Sedlak & Broadhurst, 1996), these findings provide additional evidence validating our abuse constructs. Other investigations (Bifulco et al., 2005; Fergusson et al., 2000) have used risk of distal outcomes as an alternative approach to construct validation. Although we plan to report outcome data in a separate publication, we provide exemplary data on alcohol dependence risk in twins and their non-twin siblings here. Including CSA and CPA in a single logistic model that controlled for gender, significant alcohol dependence risk was associated with CSA [OR 1.44 (95% CI 1.16–1.79)] and PA [OR 1.60 (95% CI 1.30–1.98)].

The significant within same-sex twin pair agreement for both forms for abuse can be viewed as offering evidence of corroboration for these constructs (Hardt & Rutter, 2004). It is somewhat surprising that nearly identical correlations were found in same-sex twins for CSA and CPA given that each twin is reporting about his or her own experience and CSA is not limited to intra-familial abuse. The lower agreement between opposite-sex twins for CPA and the negative correlation for CSA reported by opposite-sex twins is suggestive of gender differences in risk. These findings

are not surprising given that the prevalence of CSA is known to be substantially higher for women (Fergusson & Mullen, 1999) and some gender differences in patterns of response to abuse screening items have been observed (Thombs et al., 2006). One investigation that examined corroboration in adult sisters for retrospective reports of CSA, CPA, and neglect found much stronger corroboration when these individuals were concordant for that form of abuse (Bifulco et al., 1997).

The significant differences between high-risk and control siblings for CSA (females only) and CPA provide additional corroboration of retrospective reports. Given that families were ascertained on the basis of twins' responses to screening questions, it is expected that family status-related differences are somewhat attenuated in siblings. The rates observed for both forms of abuse in high-risk siblings also considerably higher than prevalence estimates from the general population (Fergusson et al., 2000). The lack of a significant difference for CSA in men most likely resulted from lower power due to the lower prevalence. The substantial rates in control twins of both CSA and CPA are presumably reflecting false negative responses due to the limited sensitivity of the screening questions. Other reports have observed similar patterns of response (Fergusson et al., 2000; Hardt et al., 2006; Thombs et al., 2006).

The relationships between twin pair abuse status and sibling abuse risk provide some evidence that familial risk for abuse is type-specific and that patterns of observed risk differ for these two types of abuse. For CSA, comparable risk is seen for any level of twin endorsement. For CPA, greater evidence is found for cumulative loading of familial risk as well as a suggestion that missing data are non-random and indicative of greater liability. Consistent with this latter finding, 11 of the 37 cohort II study respondents (29.7%) who reported that their co-twin was deceased [mean age of death was 24.2 (*SD* 5.49)] gave a history of CPA (Odds Ratio 4.84; 95%CI 2.38–9.86). These results are somewhat consistent with Bifulco and colleagues' (1997) report observing greater concordance between sisters for CPA and neglect than for CSA.

Several limitations of our study need to be considered. No gold standard exists for measures of retrospectively reported childhood abuse. It seems reasonable to assume that the comprehensive Christchurch Trauma Assessment is more sensitive than the cohort II screening questions, but we cannot definitively demonstrate this. Our data can only provide indirect support for the validity of our abuse constructs. Since kappa statistic values are somewhat dependent on population base rates, our sample's enrichment for both forms of abuse may have affected estimates to some degree. Although offspring reports of parental alcohol problems could be biased by abuse history, their use is supported by excellent degree of within-pair twin agreement as well as significant associations both with parental self-report and missing parental interview.

Maximal parental educational attainment is admittedly a rough proxy for socioeconomic status; however, the relative consistency of findings using this measure is promising. It is possible that our ascertainment on the basis of twins' responses to cohort II abuse screening items may have introduced some bias in terms of their willingness to participate. One report (Edwards et al., 2001) found that those with a history of CSA in an HMO population are more likely to participate in research, but found no excess of psychopathology in these participants versus nonparticipants with a history of CSA. Similarly, the change in design necessitated by currency fluctuations may have influenced our findings by increasing participation rates of high-risk twins. Although our prioritization of males who reported a history of CSA at Time 1 may have affected the degree to which our high-risk families are representative of cohort II twins with a history of CSA or CPA, it is encouraging that we found no significant bias involving either parental problems or maximal parental education attainment on time 2 participation of high-risk twins.

## Conclusion

Our study demonstrates the feasibility of using a comprehensive assessment to evaluate retrospective history of childhood abuse in an adult sample. CSA and CPA data that were obtained demonstrate favorable psychometric properties including reasonable long-term stability, construct validity, and evidence of familial corroboration. Overall, the properties of our data appear to compare favorably with those of other reports in which samples were considerably younger and assessments were repeated over shorter intervals (Bifulco et al., 2005; Durrett et al., 2004; Fergusson et al., 2000; Hardt et al., 2006; Mills et al., 2007).

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## References

- Bifulco, A., Bernazzani, O., Moran, P. M., & Jacobs, C. (2005). The childhood experiences of care and abuse questionnaire (CECA.Q): Validation in a community series. (2005). *British Journal of Clinical Psychology*, *44*, 563–581.
- Bifulco, A., Brown, G. W., Lillie, A., & Jarvis, J. (1997). Memories of childhood neglect and abuse: Corroboration in a series of sisters. *Journal of Child Psychology and Psychiatry*, *38*, 365–374.



- Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment: An integrative overview. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46–76). New York: Guilford Press.
- Bucholz, K. K., Cadoret, R., Cloninger, C. R., Dinwiddie, S. H., Hesselbrock, V. M., Nurnberger, J. I. Jr, Reich, T., Schmidt, I., & Schuckit M. A. (1994). A new, semi-structured psychiatric interview for use in genetic linkage studies: A report on the reliability of the SSAGA. *Journal of Studies on Alcohol*, *55*, 149–158.
- Caspi, A., McClay, J., Moffitt, T. E., Mill, J., Martin, J., Craig, I. W., Taylor, A., & Poulton R. (2002). Role of genotype in the cycle of violence in maltreated children. *Science*, *297*, 851–854.
- Caspi, A., Sugden, K., Moffitt, T. E., Taylor, A., Craig, I. W., Harrington, H., McClay, J., Mill, J., Martin, J., Braithwaite, A., & Poulton, R. (2003). Influence of life stress on depression: Moderation by a polymorphism in the 5-HTT gene. *Science*, *301*, 386–389.
- Conners C. K., Erhardt, D., & Sparrow E. (1999). *Conners Adult ADHD Rating Scales (CAARS)*. North Tonawanda, NY: Multi-Health Systems.
- Costa, P. T. Jr., & McCrae, R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) Professional Manual*. Odessa, FL: Psychological Assessment Resources.
- Cutrona, C. E. & Russell, D. (1987). The provisions of social relationships and adaptation to stress. In W. H. Jones & D. Perlman (Eds.), *Advances in personal relationship*. (Vol. 1, pp. 37–68). Greenwich, CT: JAI Press.
- Dinwiddie, S., Heath, A. C., Dunne, M. P., Bucholz, K. K., Madden, P. A. F., Slutske, W. S., Bierut, L. J., Statham, D. B., & Martin, N. G. (2000). Early sexual abuse and lifetime psychopathology: A co-twin-control study. *Psychological Medicine*, *30*, 41–52.
- Dube, S. R., Anda, R. F., Felitti, V. J., Croft, J. B., Edwards, V. J., & Giles, W. H. (2001). Growing up with parental alcohol abuse: Exposure to childhood abuse, neglect, and household dysfunction. *Child Abuse & Neglect*, *25*, 1627–40.
- Durrett, C., Trull, T. J., & Silk, K. (2004). Retrospective measures of childhood abuse: Concurrent validity and reliability in a nonclinical sample with borderline features. *Journal of Personality Disorders*, *18*, 178–92.
- Edwards, V. J., Anda, R. F., Nordenberg, D. F., Felitti, V. J., Williamson, D. F., & Wright, J. A. (2001). Bias assessment for child abuse survey: Factors affecting probability of response to a survey about childhood abuse. *Child Abuse & Neglect*, *25*, 307–312.
- Fergusson, D. M., Horwood, F. T., Lawton, J. M., & Lawton, S. (1989). The Christchurch Child Development Study: A review of epidemiological findings. *Paediatric and Perinatal Epidemiology*, *3*, 302–325.
- Fergusson, D. M., Lynskey, M. T., & Horwood, L. J. (1996). Childhood sexual abuse and Psychiatric disorder in young adulthood: I. Prevalence of sexual abuse and factors associated with sexual abuse. *Journal of American Academy of Child and Adolescent Psychiatry*, *21*, 49–58.
- Fergusson, D. M., Horwood, L. J., & Lynskey, M. T. (1997). Childhood sexual abuse, adolescent sexual behavior and sexual revictimization. *Child Abuse & Neglect*, *21*, 789–803.
- Fergusson, D. M., & Lynskey, M. T. (1997). Physical punishment/maltreatment during childhood and adjustment in young adulthood. *Child Abuse & Neglect*, *21*, 617–630.
- Fergusson, D. M., & Mullen, P. E. (1999). *Childhood sexual abuse: An evidence based perspective*. Thousand Oaks, CA: SAGE Publications.
- Fergusson, D. M., Horwood, L. J., & Woodward, L. J. (2000). The stability of child abuse reports: A longitudinal study of the reporting behaviour of young adults. *Psychological Medicine*, *30*, 529–544.
- Fleming, J., Mullen, P., & Bammer, G. (1997). A study of potential risk factors for sexual abuse in childhood. *Child Abuse & Neglect*, *21*, 49–58.
- Fricker, A. E., Smith, D. W., Davis, J. L., & Hanson, R. F. (2003). Effects of context and question type on endorsement of childhood sexual. *Journal of Traumatic Stress*, *16*, 265–268.
- Hardt, J. & Rutter, M. (2004). Validity of adult retrospective reports of adverse childhood experiences: Review of the evidence. *Journal of Child Psychology and Psychiatry*, *45*, 260–273.
- Hardt, J., Sidor, A., Bracko, M., & Egel, U. T. (2006). Reliability of retrospective assessments of childhood experiences in Germany. *Journal of Nervous and Mental Disease*, *194*, 676–683.
- Heath, A. C., Howells, W., Kirk, K. M., Madden, P. A. F., Bucholz, K. K., Nelson, E. C., Slutske, W. S., Statham, D. J., & Martin, N. G. (2001). Predictors of non-response to a questionnaire survey of a volunteer panel: Findings from the Australian 1989 twin cohort. *Twin Research*, *4*, 73–80.
- Hesselbrock, M., Easton, C., Bucholz, K. K., Schuckit, M., & Hesselbrock, V. (1999). A validity study of the SSAGA: A comparison with the SCAN. *Addiction*, *94*, 1361–1370.
- Miller, B. A., Smyth, N. J., & Mudar, P. J. (1999). Mothers' alcohol and other drug problems and their punitiveness toward their children. *Journal of Studies on Alcohol*, *60*, 632–642.
- Mills, K., Teesson, M., Darke, S., & Ross, J. (2007). Reliability of self-reported trauma exposure among people with heroin dependence: a longitudinal investigation. *Journal of Traumatic Stress*, *20*, 313–323.
- Mullen, P. E., Martin, J. L., Anderson, J. C., Romans, S. E., & Herbison, G. P. (1996). The long-term impact of the physical, emotional, and sexual abuse of children: a community study. *Child Abuse & Neglect*, *20*, 7–21.

- Nelson, E. C., Heath, A. C., Lynskey, M. T., Bucholz, K. K., Madden, P. A. F., Statham, D. J., & Martin, N. G. (2006). Childhood sexual abuse and risks for licit and illicit drug-related outcomes: A twin study. *Psychological Medicine, 36*, 1473–83.
- Nelson, E. C., Heath, A. C., Madden, P. A. F., Cooper, M. L., Dinwiddie, S. H., Bucholz, K. K., Glowinski, A., McLaughlin, T., Dunne, M. P., Statham, D. J., & Martin, N. G. (2002). Association between self-reported childhood sexual abuse and adverse psychosocial outcomes: Results from a twin study. *Archives of General Psychiatry, 59*, 139–145.
- Parker, G. (1986). Validating an experimental measure of parental style: The use of a twin sample. *Acta Psychiatrica Scandinavica, 73*, 22–27.
- Parker, G. (1989). The parental bonding instrument: Psychometric properties reviewed. *Psychiatric Developments, 4*, 314–335.
- Pfohl, B., Blum, N., & Zimmerman, M. (1995). *Structured interview for DSM-IV personality*. Washington, DC: American Psychiatric Press.
- Pilkonis, P. A., Heape, C. L., Proietti, J. M., Clark, S. W., McDavid, J. D., & Pitts T. E. (1995). The reliability and validity of two structured diagnostic interviews for personality disorders. *Archives of General Psychiatry, 52*, 1025–1033.
- Rice, J. P., Reich, T., Bucholz, K. K., Neuman, R. J., Fishman, R., Rochberg, N., Hesselbrock, V. M., Nurnberger, J. I. Jr., Schuckit, M. A., & Begleiter, H. (1995). Comparison of direct interview and family history diagnoses of alcohol dependence. *Alcoholism: Clinical and Experimental Research, 19*, 1018–1023.
- Risch, N., Herrell, R., Lehner, T., Liang, K. Y., Eaves, L., Hoh, J., Griem, A., Kovacs, M., Ott, J., & Merikangas, K. R. (2009). Interaction between the serotonin transporter gene (5-HTTLPR), stressful life events, and risk of depression: A meta-analysis. *Journal of the American Medical Association, 301*, 2462–2471.
- SAS Institute, Inc. (2004). *The SAS System for Windows, Version 9.1.3*. Cary, NC: SAS Institute Inc.
- Sedlak, A. J., & Broadhurst, D. D. (1996). *The Third National Incidence Study of Child Abuse and Neglect*. Washington, DC: US Government Printing Office.
- Smith, C. A., Ireland, T. O., Thornberry, T. P., & Elwyn, L. (2008). Childhood maltreatment and antisocial behavior: Comparison of self-reported and substantiated maltreatment. *American Journal of Orthopsychiatry, 78*, 173–186.
- Straus, M. A., Kinard E. M., & Meyer Williams, L. (1995, July). *The Neglect Scale*. Fourth International Conference on Family Violence Research, Durham, NH.
- Thombs, B. D., Bernstein, D. P., Ziegelstein, R. C., Scher, C. D., Forde, D. R., Walker, E. A., & Stein, M. B. (2006). An evaluation of screening questions for childhood abuse in 2 community samples: Implications for clinical practice. *Archives of Internal Medicine, 166*, 2020–2026.
- Widom, C. S., & Shepard, R. L. (1996). Accuracy of adult recollections of childhood victimization: Part 1. Childhood physical abuse. *Psychological Assessment, 8*, 412–421.
- Widom, C. S., & Morris, S. (1997). Accuracy of adult recollections of childhood victimization: Part 2. Childhood sexual abuse. *Psychological Assessment, 9*, 34–46.