

Childhood sexual abuse and adult developmental outcomes: Findings from a 30-year longitudinal study in New Zealand.

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Abstract

Objectives: Childhood sexual abuse (CSA) has been associated with many adverse medical, psychological, behavioral and socioeconomic outcomes in adulthood. This study aims to examine the linkages between CSA and a wide range of developmental outcomes over a protracted time period to age 30.

Methods: Data from over 900 members of the New Zealand birth cohort the Christchurch Health and Development Study were examined. CSA prior to age 16 was assessed at ages 18 and 21 years, in addition to: mental health, psychological wellbeing, sexual risk-taking behaviors, physical health and socioeconomic outcomes to age 30.

Results: After statistical adjustment for confounding by 10 covariates spanning socio-demographic, family functioning and child factors, extent of exposure to CSA was associated with increased rates of (*B, SE, p*): major depression (0.426, 0.094, <0.001); anxiety disorder (0.364, 0.089, <0.001); suicidal ideation (0.395, 0.089, <0.001); suicide attempt (1.863, 0.403, <0.001); alcohol dependence (0.374, 0.118, <0.002); and illicit drug dependence (0.425, 0.113, <0.001). In addition, at age 30 CSA was associated with higher rates of PTSD symptoms (0.120, 0.051, 0.017); decreased self-esteem (-0.371, 0.181, 0.041); and decreased life satisfaction (-0.510, 0.189, 0.007). Childhood sexual abuse was also associated with decreased age of onset of sexual activity (-0.381, 0.091, <0.001), increased number of sexual partners (0.175, 0.035, <0.001); increased medical contacts for physical health problems (0.105, 0.023, <0.001); and welfare dependence (0.310, 0.099, 0.002). Effect sizes (Cohen's *d*) for the significant outcomes from all domains ranged from .14 to .53, while the attributable risks for the mental health outcomes ranged from 5.7% to 16.6%.

Conclusions: CSA is a traumatic childhood life event in which the negative consequences increase with increasing severity of abuse. CSA adversely influences a number of adult developmental outcomes that span: mental disorders, psychological wellbeing, sexual risk-

taking, physical health and socioeconomic wellbeing. While the individual effect sizes for CSA typically range from small to moderate, it is clear that accumulative adverse effects on adult developmental outcomes are substantial.

Keywords: Child sexual abuse; Longitudinal; Psychological problems; Sexual risk-taking, Physical health; Socioeconomic

Over the past three decades, there has been extensive research into the impact of childhood sexual abuse (CSA) on psychological wellbeing (Fergusson & Mullen, 1999; Hillberg, Hamilton-Giachritsis, & Dixon, 2011; MacMillan et al., 2009; Maniglio, 2009; Putnam, 2003). The weight of the evidence from this research suggests that exposure to CSA (and particularly CSA involving sexual penetration) is associated with a wide range of medical, psychological, behavioral and sexual disorders including: mental health problems (Cutajar et al., 2010; Dinwiddie et al., 2000; Fergusson, Horwood, & Lynskey, 1996; Hillberg, et al., 2011; Maniglio, 2010; Putnam, 2003), substance use disorders (Fergusson, Horwood, et al., 1996; Kendler et al., 2000; Nickel et al., 2004), suicidal behaviors and self-harm (Neumann, Houskamp, Pollock, & Briere, 1996; Nickel, et al., 2004; Paolucci, Genuis, & Violato, 2001), sexual risk-taking (Fergusson, Horwood, & Lynskey, 1997; Paul, Catania, Pollack, & Stall, 2001; Roberts, O'Connor, Dunn, Golding, & The ALSPAC Study Team, 2004; Senn, Carey, & Coury-Doniger, 2011), Post-Traumatic Stress Disorder (PTSD) (Paolucci, et al., 2001; Putnam, 2003), lowered self-esteem (Griffing et al., 2006; Jumper, 1995; Mullen, Martin, Anderson, Romans, & Herbison, 1996; Roberts, et al., 2004), lowered life satisfaction (Nickel, et al., 2004; Roberts, et al., 2004), physical health problems (Anda, Tietjen, Schulman, Felittei, & Croft, 2010; Irish, Kobayashi, & Delahanty, 2010; Najman, Nguyen, & Boyle, 2007) and educational underachievement (Boden, Horwood, & Fergusson, 2007; Currie & Spatz Widom, 2010; Noll et al., 2010).

An important issue in this area of research concerns the measurement of CSA. In many studies, the assessment of CSA has been obtained retrospectively from reports of adults describing their childhood. These measures may be subject to errors of reminiscence including forgetting and recall biases (Gilbert et al., 2009; Spatz Widom & Morris, 1997). For these reasons, some authors have advocated using samples of children coming to official attention for CSA (Spatz Widom & Morris, 1997). This design makes it possible to conduct

fully prospective studies of the associations between CSA and subsequent outcomes.

However, these advantages are offset by the fact that samples of children coming to official attention for CSA are unlikely to be representative of all children subject to CSA. This factor introduces unknown sources of sample selection bias into studies based on these samples. An alternate approach is to use retrospectively collected information to develop statistical models of reporting error and recall bias.

In a recent paper, we have examined the extent to which retrospective reports of CSA obtained at ages 18 and 21 in a New Zealand birth cohort were subject to recall bias using a general structural equation model (Fergusson, Horwood, & Boden, 2011). This analysis suggested the contemporaneous effects of mental state on the reporting of CSA were negligible and that the observed correlations between reports of CSA and mental health outcomes closely approximated the correlations between CSA and mental health outcomes corrected for both reporting error and recall bias. These findings suggest that claims about the limitations of retrospective reporting of CSA may have been overstated and that well collected retrospective reports may provide valid measures of CSA. In this paper, we use this approach by using a composite measure of CSA which combines reports gathered at ages 18 and 21 years.

Another issue in the assessment of the impact of CSA on adult outcomes concerns the possible role of confounding factors. It has been well documented that CSA is correlated with a range of other childhood adversities. These adversities span, for example, measures of socioeconomic disadvantage, family violence and other forms of child maltreatment (Fassler, Amodeo, Griffin, Clay, & Ellis, 2005; Felitti et al., 1998; Frothingham et al., 2000; Hecht & Hansen, 2001; Nash, Hulsey, Sexton, Harralson, & Lambert, 1993; Putnam, 2003). Therefore, it is important to adjust associations between CSA and later outcomes for social and contextual factors correlated with CSA. The best approach for achieving this is through a

longitudinal design in which associations between CSA and subsequent outcomes are adjusted for prospectively assessed covariate factors.

While there has been a growing literature in the psychosocial consequences of CSA, most studies have focused on a limited range of outcomes. Few studies have examined the consequences of CSA across a wide range of outcomes assessed over a protracted time period. One exception to this was the research reported by Trickett, Noll and Putnam (2011). This study comprised of 84 females with substantiated CSA and a matched sample of 82 controls over a 23-year period on a large number of outcome variables. This study concluded that sexually abused females showed deleterious sequelae across a host of biopsychosocial domains. However, the findings of this study were limited by: a) the use of a selected sample coming to official attention; b) restriction of the study to females; and c) limited control of confounding factors.

In this paper, we address these issues by using data gathered over the course of a 30-year longitudinal study to examine the linkages between reports of CSA at ages 18 and 21 and subsequent mental health from 18 to 30 years, psychological wellbeing at 30 years, sexual risk-taking behaviors to age 30, physical health at 30 years and socioeconomic outcomes to age 30. This longitudinal design had the following advantages:

1. As noted above, the longitudinal design made it possible to examine the effects of contemporaneous mental state on the reporting of CSA and to take into account reporting error.
2. The longitudinal design made it possible to adjust the associations between reports of CSA and subsequent outcomes for prospectively measured covariate factors. These factors included socio-demographic background, family functioning and child factors known to be correlated with reported CSA (see Table 2).

3. The longitudinal design made it possible to examine the linkages between CSA and a wide range of developmental outcomes over a protracted time period (up to 30 years).

Methods

Participants

Participants were members of the Christchurch Health and Development Study (CHDS) birth cohort. 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, four months, one 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. All phases of the study have been subject to ethical approval by the Canterbury Regional Health and Disabilities Ethics Committee. The data collection was conducted with the signed consent of the study participants. The following measures were included in this analysis:

Childhood sexual abuse

Childhood exposure to sexual abuse was assessed at ages 18 and 21. Cohort members were questioned about their exposure to any forms of CSA prior to age 16; if anyone had ever attempted to involve them in any of a series of 15 sexual activities when they did not want this to happen. These activities included: a) non-contact episodes involving indecent exposure, public masturbation or unwanted sexual propositions; b) episodes involving sexual contact in the form of sexual fondling, genital contact or attempts to undress the respondent; and c) episodes involving attempted or completed vaginal, oral or anal intercourse. Sample members who reported an incident of abuse were then questioned in depth about the context

of the abuse including: the frequency of abuse episodes, the characteristics of the perpetrator(s), abuse disclosure and related factors (Fergusson, Horwood, et al., 1996; Fergusson, Lynskey, & Horwood, 1996). For the purposes of this analysis, participants were classified on a four-point scale reflecting the severity of the abuse exposure (from none to most severe) based on the most severe form of CSA reported at either 18 or 21. This scale was: no CSA (85.9% of the sample), non-contact CSA (2.7% of the sample), contact CSA not involving attempted or completed sexual penetration (5.1% of the sample), and severe CSA involving attempted or completed sexual penetration including vaginal, oral and anal intercourse (6.3% of the sample).

The validity of this repeated measures assessment of reported CSA has been examined in previous papers using both a latent class analysis (Fergusson, Horwood, & Woodward, 2000) and a structural equation model designed to estimate the effects of current mental state on the reporting of CSA (Fergusson, et al., 2011). These analyses showed that the retrospective reports of CSA had good validity as a measure of CSA and that the effects of current mental state on the reporting of CSA were negligible. These findings imply that the best estimate of CSA exposure was obtained by combining the measures obtained at 18 and 21 as described above.

Outcomes

At ages 21, 25 and 30, respondents were questioned on a range of outcomes using a 1.5 to 3 hour structured interview. All interviews were delivered by trained interviewers; the majority of interviews were conducted face-to-face (95% at age 21; 76% at age 25; 74% at age 30) with the remaining interviews conducted by telephone. The following outcomes were assessed:

Mental health problems (18–30 years)

At ages 21, 25 and 30 years, cohort members were questioned about mental health problems since the previous assessment, using questionnaires based on the Composite International Diagnostic Interview (CIDI) (World Health Organization, 1993), supplemented by additional custom-written items for the assessment of suicidal behaviors. At each assessment, responses to the interview questions were used to determine the presence or absence of a series of psychiatric disorders based on DSM-IV criteria (American Psychiatric Association, 1994) (see Fergusson, Horwood, & Lynskey (1996) for a more detailed explanation of the criteria used). Using these data, a series of measures of the respondent's history of psychiatric disorder over the period from 18–30 years were constructed. These measures included:

1. Whether the respondent had met DSM-IV criteria for: major depression, anxiety disorders (generalized anxiety disorder, panic disorder, agoraphobia, social phobia or specific phobia), alcohol dependence or illicit drug dependence over the period from 18–30 years.
2. Whether the respondent had reported suicidal ideation or made a suicide attempt over the period from 18–30 years.
3. To summarize overall trends in mental health scores, two summary measures were constructed. The first was a diversity score representing the number of mental health problems (including suicidal behavior) that the respondent had reported over the period from 18–30 years. The second was a dichotomous measure of any mental health problem occurring over the period from 18–30 years.

Psychological wellbeing (30 years)

Post-Traumatic Stress Disorder (PTSD) symptoms score (30 years). At age 30, respondents were questioned about their experience of PTSD symptoms in the past five years using a questionnaire based on the Diagnostic Interview Schedule (DIS) (Shulman, Scharf, Lumer, & Maurer, 2001). Confirmatory factor analysis showed that the symptoms items

formed a unidimensional scale representing the extent of PTSD symptoms (Mulder, Fergusson, & Horwood, 2013). A measure of PTSD was constructed from the sum of responses reported by each respondent. This scale had high internal consistency ($\alpha=0.90$).

Self-esteem score (30 years). Self-esteem was assessed using the 10-item Rosenberg Self-Esteem Scale (Rosenberg, 1965). Items were scored on a 4-point scale (1= Strongly agree to 4= Strongly disagree). An example item is “On the whole I am satisfied with myself”. Five of the items were reverse-coded; an example item is “At times I feel I am no good at all”. The scale scores were calculated by summing the items, whereby higher scores indicated higher self-esteem. This scale had high internal consistency ($\alpha= 0.91$).

Life satisfaction score (30 years). Information about life satisfaction was collected using a custom-written questionnaire which required respondents to rate their current satisfaction with each of 12 areas of their life: work, leisure time, partner relationships, relationships with people of the same sex, relationships with people of the opposite sex, social life, money, independence, daily interactions with others, family life, the future and life as a whole. An example item is “All in all how satisfied do you feel about your social life?” Items were scored on a 4-point scale (1= Very unhappy to 4= Very happy) whereby higher scores indicated greater life satisfaction. Confirmatory factor analysis of the item responses showed that these items could be scaled unidimensionally, reflecting the extent of current life satisfaction at age 30. For the purposes of the present analysis, scale scores were created by summing the responses to the 12 items to create a general life satisfaction measure. This scale had good internal consistency ($\alpha= 0.89$).

Partner relationship quality score (30 years). Partnership quality was assessed using the 25-item Scale of Intimate Relationships by Braiker and Kelley (1979). This measure consisted of two subscales: a) Positive partner relations: this subscale was based on 15 items which assessed the extent of the participant’s reported positive relations with their partner;

and b) Negative partner relations: this subscale was based on 10-items which assessed negative aspects of partner relationships. Both scales had good internal consistency (positive partner relations $\alpha=0.89$; negative partner relations $\alpha=0.84$). A total scale score was calculated by subtracting the negative partner relations subscale from the positive partner relations subscale. The partnership quality score was calculated on cohort members either in a current relationship or who had been in a romantic partnership in the past 12 months.

Sexual risk-taking behaviors

Age of onset of sexual activity. At the 18 and 21-year assessments, respondents were asked if they had ever engaged in consensual sexual intercourse with either an opposite-sex or same-sex partner. Those who reported affirmatively were asked to estimate their age at first sexual intercourse.

Number of sexual partners (18–30 years). This measure represented a count of the number of both opposite-sex and same-sex sexual partners, reported by the respondent over the intervals 18–21, 21–25, and 25–30 years.

Number of unplanned pregnancies to age 30. At the 30-year assessment, respondents were asked the total number of times they had ever become pregnant, or got a partner pregnant (males). For each pregnancy reported, participants were questioned as to whether the pregnancy had been planned. This measure represented a count of the number of unplanned pregnancies reported by respondents.

Physical health (30 years)

Number of doctor/hospital contacts (30 years). This measure represented a count of the number of doctor/hospital contacts for physical health problems in the past 12 months (not including contraceptive advice/pregnancy/childbirth).

Socioeconomic outcomes

Left school without qualifications. This dichotomous measure classified respondents who had left school and failed to obtain any form of high school qualification by age 21.

Welfare dependence (25–30 years). This dichotomous measure represented any receipt of a government social welfare benefit (unemployment, domestic purposes benefit or sickness/invalid's benefit) reported from 25 to 30 years of age.

Income (30 years). At age 30 participants were questioned about sources of income over the previous 12 months and were asked to estimate their gross personal income (NZD ,000) for this period.

Covariate factors (0–16 years)

To assess the extent to which associations between CSA and subsequent outcomes could be explained by the effects of confounding factors, a wide range of measures, based on previous research and theory, were chosen from the CHDS database. These covariates were chosen on the grounds that: a) they had been identified in previous research as childhood correlates of CSA (Fassler, et al., 2005; Felitti, et al., 1998; Frothingham, et al., 2000; Hecht & Hansen, 2001; Nash, et al., 1993; Putnam, 2003); and b) they were found to be correlated with CSA in the CHDS sample (see Table 2). The covariates included measures of: socio-demographic background, family functioning and child factors.

Socio-demographic background

Maternal age. Maternal age was assessed in whole years at the time of the cohort member's birth.

Maternal education. Maternal education was assessed at the time of the child's birth using a 3-point scale that reflected the mother's highest level of educational attainment. This scale was: mother lacked educational qualifications; mother had secondary (high school) qualifications; and mother had tertiary (college) qualifications.

Averaged family living standards (0–10 years). Interviewer ratings of family living standards were obtained at every year from 1–10 years. The family's living standards were assessed on a five-point scale that ranged from obviously affluent to obviously poor. For the purposes of this analysis, these ratings were summed over the 10-year study period and averaged to obtain an overall assessment of family living standards during childhood.

Averaged family income (0–10 years). At each assessment from when the survey child was aged 1–10 years, estimates of the family's gross annual income from all sources for the previous 12-month period were obtained. This information was used to derive a measure reflecting the average income level available to the family over the 10-year study period. The gross income estimates for each year were first classified into deciles of family income, and the resulting decile levels were averaged over the period to obtain an averaged income decile rank for the family.

Family functioning

Parental adjustment problems. When sample members were aged 11, parent(s) were questioned about their history of illicit drug use. At the age 15 assessment, parent(s) were further questioned regarding whether any parent had a history of alcohol problems or criminal offending. From this information three dichotomous variables were constructed representing whether or not the participants' parent(s) reported a history of these adjustment problems.

Interparental violence. The experience of interparental violence during childhood (prior to age 16 years) was assessed via participant self-report at age 18, through a series of eight items derived from the Conflict Tactics Scale (Straus, 1979). The eight items used included: (1) threaten to hit or throw something; (2) push, grab or shove other parent; (3) slap, hit or punch other parent; (4) throw, hit, kick or smash something (in the other parent's presence); (5) kick the other parent; (6) choke or strangle other parent; (7) threaten other

parent with a knife, gun or other weapon; (8) call other parent names or criticize other parent (or put other parent down). An overall measure was created by summing the responses for both father- and mother-initiated violence ($\alpha=0.88$).

Childhood parental change(s) (0–16 years). Comprehensive data on the child's family placement and changes of parents were collected at annual intervals from birth to age 16. To assess the extent of parental change, a measure of the child's exposure to parental change was constructed by counting the number of changes of parents (0–16 years). Parental change was defined as a parent: leaving the home as the result of separation/divorce/death, entering the home due to reconciliation/re-partnering, fostering, or any other change in the custodial parents.

Child factors

Gender. Recorded at birth.

IQ (8–9 years). IQ was assessed at ages 8 and 9 years using the Revised Wechsler Intelligence Scale for Children (WISC-R) (Wechsler, 1974). The split half reliabilities of the scales were 0.93 at age 8 and 0.95 at age 9. For this study, the WISC-R total IQ scores at ages 8 and 9 were combined by averaging over the two administrations.

Childhood physical punishment/maltreatment. Exposure to childhood physical punishment/maltreatment was assessed at ages 18 and 21. Cohort members reported on the extent to which their parents used physical punishment during their childhood (prior to age 16 years). If applicable, separate ratings were made for mother figures and father figures. These ratings were then combined into a single four-point scale of parental physical punishment/maltreatment based on the most severe rating at either the 18- or 21-year interview: (1) parents never used physical punishment (4.5% of the sample); (2) parents seldom used physical punishment (78.0% of the sample); (3) at least one parent regularly used physical punishment (11.2% of the sample); (4) at least one parent used frequent or

severe punishment or treated the participant in a harsh/abusive manner (6.4% of the sample) (Fergusson & Lynskey, 1997).

Statistical methods

Associations between CSA and mental health, psychological wellbeing, sexual risk-taking behaviors, physical health and socioeconomic outcomes to age 30 (Table 1). The associations between CSA, mental health, psychological wellbeing, sexual risk-taking behaviors, physical health and socioeconomic outcomes to age 30 are shown in Table 1. Each association was tested for statistical significance by fitting a generalized linear regression model. The model fitted was:

$$F(Y_i) = B_0 + B_1X + \mu \quad \text{Equation 1.}$$

where Y_i was the i th outcome, X was the measure of CSA and F was the appropriate link function (logistic for dichotomous outcomes; log for count-based outcomes; identity for other continuous variables). With one exception (suicide attempt), a linear model was fitted to the 4-level CSA measure. For suicide attempt there was clear evidence of non-linearity and to address this, the CSA measure was dichotomized into those exposed to severe CSA involving sexual penetration, versus all other sample members.

Identifying covariates (Table 2). To identify potential covariates, associations between CSA and a wide range of socio-demographic, family functioning and child factors were examined. These associations are shown in Table 2, where for the ease of data presentation all covariates were dichotomized and all associations were tested for significance using the Mantel-Haenszel chi-square test for linearity.

Covariate adjustment (Table 3). To adjust the associations between CSA, mental health, psychological wellbeing, sexual risk-taking behaviors, physical health and socioeconomic outcomes to age 30 shown in Table 1, the regression model in Equation 1 was extended to include the confounding factors. The model fitted was:

$$F(Y_i) = B_0 + B_1X + \sum B_jZ_j + \mu \text{ Equation 2.}$$

where Z_j were the confounding covariates identified in Table 2. In the final fitted models the covariates were not treated as dichotomous but analyzed in their original metric (see Methods).

The findings of this analysis are summarized in Table 3 which reports: a) the unadjusted model parameter B , the standard error and the associated level of significance for the effect of CSA on each outcome; b) the covariate adjusted model parameter, standard error and the associated level of significance; and c) measures of effect for the adjusted model. These measures of effect included: Cohen's d (Cohen, 1988) for all outcomes; and estimates of the attributable risk (AR) (Fletcher & Fletcher, 2005) for dichotomous outcomes. Cohen's d is the estimated standardized comparison of no exposure to CSA versus exposure to any CSA. The AR measures the estimated reduction in the rate of the outcome Y_i under the assumption that all CSA was eliminated from the population.

Tests of gender interaction. To examine the extent to which study findings varied with gender, the model in Equation 2 was extended to include a multiplicative gender by CSA interaction term.

Multiple significance testing. The analysis reports multiple tests of significance, raising the possibility of a Type-1 statistical error. To take this into account, results of the final adjusted models were compared against a Bonferroni corrected p -value.

Sample size and sample bias

The analyses were based on samples that ranged from $n=941$ to $n=984$, with these samples representing 74.4% to 77.8% of the original cohort of 1,265 children. Comparison of the analysis samples with remaining cohort members on socio-demographic factors assessed at birth, showed significant ($p<0.05$) tendencies for the analysis sample to under-represent

children from socially disadvantaged families characterized by low maternal education, low socioeconomic status and single parenthood.

To examine whether selection bias due to the processes of sample attrition influenced the findings, the data were reanalyzed using the data-weighting method described by Carlin, Wolfe, Coffey, and Patton (1999). These analyses produced essentially identical conclusions to the reported analyses, suggesting that the findings were unlikely to have been influenced by selection bias.

All data were analyzed using SAS for Windows version 9.2.

Results

Childhood sexual abuse and mental health, psychological wellbeing, sexual risk-taking, physical health and socioeconomic outcomes to age 30.

Table 1 shows relations between CSA (reported at 18 and 21 years, classified into four groups describing the extent of reported childhood exposure to sexual abuse) and a number of outcome domains. These domains span: mental health from 18–30 years, psychological wellbeing at 30 years, sexual risk-taking behaviors to age 30, physical health at 30 years and socioeconomic outcomes to age 30.

The table shows the percentages of each CSA group who were classified as experiencing: major depression, anxiety disorder, suicidal ideation, suicide attempt, alcohol dependence and illicit substance dependence during the period from 18–30 years. To summarize the trends in these outcomes, two further outcomes are reported: a) the percentage in each group with at least one mental health problem; and b) a diversity score showing the mean number of mental health problems reported in each CSA exposure group. The table also reports mean scores for each CSA group on measures of: psychological wellbeing at 30 years (number of PTSD symptoms, self-esteem, life satisfaction and partner relationship

quality); sexual risk-taking behaviors (age of onset of sexual activity, number of sexual partners 18–30 years, number of unplanned pregnancies to age 30 years); and a measure of physical health at 30 years (number of doctor/hospital contacts). Finally, the table shows each CSA group by socioeconomic outcomes (percentage of each group who left school without qualifications, percentage of each group who were welfare dependent at any point between age 25 and 30 and mean gross personal income at age 30). With the exception of suicide attempt, all comparisons were tested for linear trend (see Methods). The table shows:

1. For mental health problems 18–30, all associations between CSA and mental health outcomes were statistically significant ($p < 0.005$). These trends are reflected in the rates of any mental health problem which shows that 95.2% of those exposed to severe sexual abuse reported at least one of the outcomes by the age of 30, compared to only 56.9% of those not sexually abused ($p < 0.001$). The diversity score shows that those exposed to severe CSA had nearly 2.5 times the number of problems compared to those not exposed to CSA.

2. For measures of psychological wellbeing at 30, increasing exposure to CSA was associated with: an increasing number of PTSD symptoms ($p < 0.001$), declining self-esteem ($p < 0.001$), declining life satisfaction ($p < 0.001$) and declining partner relationship quality ($p = 0.017$).

3. For sexual risk taking behaviors up to age 30, increasing exposure to CSA was associated with: an earlier age of onset of sexual activity ($p < 0.001$), a greater number of sexual partners ($p < 0.001$) and more unplanned pregnancies ($p < 0.001$).

4. For physical health at 30, increasing exposure to CSA was associated with more doctor/hospital contacts ($p < 0.001$).

5. For socioeconomic outcomes up to age 30, increasing exposure to CSA was associated with: leaving school without qualifications ($p < 0.001$), welfare dependence ($p < 0.001$) and lower gross personal income ($p < 0.001$).

Insert Table 1 about here

Identification of confounders

Table 2 shows the associations between exposure to CSA and a series of socio-demographic, family functioning and child factors assessed prior to the age of 16. This table is based upon a sample of 984 respondents assessed at age 30, who had complete data on the measurement of CSA. The table shows:

1. Socio-demographic background. Increasing severity of CSA was significantly associated with socioeconomic disadvantage as measured by: younger maternal age, lower maternal education, poorer family living standards and lower family income ($p < 0.001$).

2. Family functioning. Increasing exposure to CSA was associated with: parental history of alcohol problems, criminality, illicit drug use, interparental violence and changes of parents ($p < 0.01$).

3. Child factors. In addition, those exposed to CSA were more likely to: be female, have lower IQ and more frequently experience regular or severe physical punishment/maltreatment ($p < 0.05$).

Insert Table 2 about here

Adjustment for confounding

To take account of the potentially confounding factors described in Table 2, regression models including those variables as covariates were fitted to the data (see Methods). These models were based upon a sample of 941 respondents (mental health problems, 18–30 years) and 974 respondents (psychological wellbeing at 30 years, sexual risk-taking up to 30 years, physical health at 30 years and socioeconomic outcomes at 30

years) with full data on all variables. Table 3 summarizes the results of these regression analyses. The table shows: the adjusted regression parameter B , the associated standard error and test of significance for the effect of CSA on each outcome. In addition, two measures of size of effect are reported: a) Cohen's d ; and b) the attributable risk AR (this is reported for dichotomous outcomes only). The table also identifies the covariates that were statistically significant in each regression. For comparative purposes, the table also reports the unadjusted regression parameters, standard errors and tests of significance. The table shows:

1. Mental health problems 18–30. In all cases the association between CSA and mental health problems remained statistically significant following adjustment ($p < 0.005$). Values of Cohen's d varied from .24 to .53, whereas values of the AR ranged from 5.7% to 16.6%.

2. Psychological wellbeing at age 30. In all cases associations between CSA and psychological wellbeing at age 30 remained statistically significant following adjustment ($p < 0.05$), with the exception of the partner relationship quality score ($p = 0.061$). Values of Cohen's d ranged from .16 to .23.

3. Adult developmental outcomes to age 30. The analysis examined a series of non-psychiatric life course outcomes up to age 30 including: sexual risk-taking behaviors, physical health and socioeconomic outcomes. Table 3 also shows that following covariate adjustment, exposure to CSA was associated with: an earlier age of onset of sexual activity ($p < 0.001$), greater numbers of sexual partners ($p < 0.001$), greater numbers of doctor/hospital contacts for physical health problems ($p < 0.001$) and higher rates of welfare dependence ($p = 0.002$). Effect sizes for the significant outcomes ranged from .14 to .31.

The findings reported in Table 3 show that CSA had small to moderate pervasive effects on risks of: psychiatric disorder, decreased psychological wellbeing, sexual risk-taking, physical health problems and welfare dependence.

Statistically significant ($p < 0.05$) covariate factors in the regression models included: family living standards, parental history of alcohol problems, parental history of criminality, parental history of illicit drug use, interparental violence, gender, child IQ, childhood physical punishment/maltreatment, number of changes of parents and maternal age at child's birth. To take account of the multiple significance testing reported in Table 3, the Bonferroni correction was used ($p = 0.003$). Using this significance level, all associations shown as significant remained significant except for the number of PTSD symptoms, self-esteem and life-satisfaction scores at age 30.

Insert Table 3 about here

Tests of gender interaction

The statistical models described in Table 3 were extended to include tests of gender by severity of CSA interaction (see Methods). No statistically significant interactions were found, suggesting that the effects of CSA on adult developmental outcomes for males and females were similar.

Discussion

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: a) increased risks of mental health problems in adulthood (ages 18–30); b) a greater number of PTSD symptoms, lower self-esteem and lower life satisfaction at 30; c) higher rates of sexual risk-taking behaviors to age 30; d) higher rates of doctor/hospital contact for physical illness at 30; and e) higher rates of welfare dependence (ages 25–30). Effect sizes assessed using

Cohen's *d* and attributable risk (AR) showed that the effects of CSA on later outcomes were small to moderate. Values of Cohen's *d* ranged from .14 to .53 with a median value of .31, whereas the values of the AR ranged from 5.7% to 16.6% with a median value of 10.3%. Tests of gender interaction suggested that the effects of CSA were similar for males and females.

Compared with previous research into the multiple outcomes of CSA such as that by Trickett et al. (2011), this study has a number of advantages. These include: a) retrospective assessments of CSA that were based on repeated measures obtained at ages 18 and 21, with the measures tested for reporting error and recall bias using structural equation modeling (Fergusson, et al., 2011); b) prospective collection of a wide range of psychiatric and non-psychiatric outcomes assessed up to the age of 30; and c) the collection of a wide range of prospectively assessed confounding factors including socio-demographic background, family functioning, and child factors. This combination of factors makes it possible to assess the contributions of CSA to a wide range of adult developmental outcomes assessed over an extended period, net of various sources of confounding.

While this study has a number of strengths (see above), it also has a number of limitations. These limitations center around the fact that the findings are based on a specific birth cohort, studied in a specific historical context, using self-report interview data. The extent to which these findings apply to other cohorts assessed using other methods are not fully known. Another potential limitation is that the number of cohort members who had sought treatment for the effects of CSA is unknown. It is possible that had this been taken into account, it may have moderated the observed associations between exposure to CSA and adult developmental outcomes.

The findings are broadly consistent with the conclusions of recent systematic reviews and meta-analyses of the effects of CSA on adult developmental outcomes (Hillberg, et al.,

2011; Irish, et al., 2010; Maniglio, 2009, 2010; Paolucci, et al., 2001; Putnam, 2003). What the present study adds to this body of knowledge is an illustration of the impacts of CSA on adult development in a well-studied birth cohort. Adverse effects of CSA are not limited to psychiatric outcomes but also include decreased psychological, sexual, physical and socioeconomic wellbeing. The results of this 30-year longitudinal study serve to summarize and synthesize a large amount of the evidence on the adverse effects of CSA, by examining the consequences of CSA for multiple outcomes in a birth cohort. The essential message from this research is that:

1. Increasing exposure to CSA was associated with increasing risks of adverse outcomes from age 18–30.
2. Even after extensive covariate adjustment, CSA is linked to adverse adult developmental outcomes that span: mental disorders, psychological wellbeing, sexual risk-taking, physical health and socioeconomic wellbeing.
3. While the individual effect sizes for CSA typically range from small to moderate, it is also clear that accumulative adverse effects on adult developmental outcomes are substantial.

There are strong grounds for investing in programs, policies and interventions which minimize the exposure of children to this source of childhood adversity (Gilbert, et al., 2009; MacMillan, et al., 2009). This study has important implications for practitioners as it shows that CSA has diverse and complex sequelae that extend over a protracted period of time. These findings should be taken into account when planning the long-term support and therapy of children exposed to CSA (Horner, 2010).

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Table 1

Associations between the extent of childhood sexual abuse (<16 years) mental health, psychological wellbeing, sexual risk-taking behaviors, physical health and socioeconomic outcomes to age 30

Outcome	Extent of sexual abuse				<i>p</i>
	None	Non-contact	Contact	Sexual penetration	
Mental health problems (18–30 years)	(<i>n</i> = 809)	(<i>n</i> = 28)	(<i>n</i> = 51)	(<i>n</i> = 62)	
% Major depression	38.3	60.7	68.6	77.4	<0.001 ^a
% Anxiety disorder	32.4	46.4	51.0	74.2	<0.001 ^a
% Suicidal ideation	20.8	32.1	37.3	54.8	<0.001 ^a
% Suicide attempt	3.8	3.6	3.9	27.4	<0.001 ^{a,d}
% Alcohol dependence	9.9	21.4	17.7	19.4	0.004 ^a
% Illicit substance dependence	13.0	17.9	11.8	32.3	<0.001 ^a
% Any mental health problem	56.9	75.0	80.4	95.2	<0.001 ^a
Mean (SD) diversity score	1.2 (1.3)	1.8 (1.5)	1.9 (1.4)	2.9 (1.5)	<0.001 ^b
Psychological wellbeing (30 years)	(<i>n</i> = 840)	(<i>n</i> = 28)	(<i>n</i> = 52)	(<i>n</i> = 64)	
Mean (SD) number of PTSD symptoms score	1.5 (3.0)	3.6 (3.4)	2.6 (3.6)	3.7 (4.1)	<0.001 ^b
Mean (SD) self-esteem score	33.0 (4.5)	32.5 (5.0)	32.0 (4.8)	30.7 (5.1)	<0.001 ^c
Mean (SD) life satisfaction score	39.8 (4.7)	39.9 (4.0)	38.9 (4.9)	37.7 (5.2)	<0.001 ^c
Mean (SD) partner relationship quality score ^e	27.5 (7.4)	26.7 (8.6)	27.5 (7.5)	24.6 (9.6)	0.017 ^c

Sexual risk-taking behaviors	(<i>n</i> = 809)	(<i>n</i> = 28)	(<i>n</i> = 51)	(<i>n</i> = 62)	
Mean (SD) age of onset of sexual activity	17.3 (2.3)	17.5 (2.5)	16.5 (1.9)	15.2 (2.8)	<0.001 ^c
Mean (SD) number of sexual partners (18–30 years)	13.8 (16.7)	10.8 (15.1)	14.5 (18.9)	23.3 (33.6)	<0.001 ^b
Mean (SD) number of unplanned pregnancies (to 30 years)	0.6 (1.1)	0.7 (1.2)	1.0 (1.5)	1.3 (1.4)	<0.001 ^b
Physical health (30 years)	(<i>n</i> = 840)	(<i>n</i> = 28)	(<i>n</i> = 52)	(<i>n</i> = 64)	
Mean (SD) number of doctor/hospital contacts ^f	2.3 (3.3)	2.3 (2.8)	2.6 (3.3)	3.8 (3.6)	<0.001 ^b
Socioeconomic outcomes	(<i>n</i> = 840)	(<i>n</i> = 28)	(<i>n</i> = 52)	(<i>n</i> = 64)	
% Left school without qualifications	15.2	10.7	23.1	37.5	<0.001 ^a
% Welfare dependence (ever 25–30 years)	13.3	21.4	26.9	37.5	<0.001 ^a
Mean (SD) gross income (NZD ,000) (30 years) ^g	50.0 (30.0)	39.6 (27.6)	38.9 (23.9)	37.8 (30.2)	<0.001 ^c

Note. ^a Logistic regression; ^b Poisson regression; ^c Least squares regression; ^d In the suicide attempt regression model, childhood sexual abuse was dichotomized into none, non-contact and contact sexual abuse versus sexual penetration due to non-linearity of the association; ^e Analysis restricted to respondents in any romantic partnership over the previous 12 months (*n*= 873); ^f Number of doctor/hospital contacts for physical health problems in the past 12 months; ^g Gross personal income (NZD,000) reported for the previous 12 months.

Table 2

Associations between extent of childhood sexual abuse (<16 years) and confounding factors

Measure	Extent of sexual abuse				<i>p</i>
	None (<i>n</i> =840)	Non-contact (<i>n</i> =28)	Contact (<i>n</i> =52)	Sexual penetration (<i>n</i> =64)	
Socio-demographic background					
% Mother aged <25 years at birth of child	45.2	46.4	55.8	73.4	<0.001
% Mother lacked formal educational qualifications at birth	46.9	42.9	63.5	67.2	<0.001
% In lowest quartile of averaged family living standards (0–10 years)	20.4	17.9	28.9	45.3	<0.001
% In lowest quartile of averaged family income (0–10 years)	21.5	28.6	32.0	37.5	<0.001
Family functioning					
% Parental history of alcohol problem (15 years)	10.8	4.2	21.3	24.1	<0.001
% Parental history of criminality (15 years)	11.9	4.2	21.3	22.4	0.008
% Parental history of illicit drug use (11 years)	23.1	34.6	28.6	40.7	<0.005
% Interparental violence (<16 years)	42.3	57.1	60.0	62.9	<0.001
% Any change of parents (0–16 years)	35.1	28.6	42.3	60.9	<0.001
Child factors					
% Female	46.4	89.3	76.9	81.3	<0.001
% In lowest quartile of child IQ (8–9 years)	24.4	21.4	25.0	40.6	0.017
% Regular/more severe physical punishment (<16 years)	15.7	28.6	26.9	34.4	<0.001

Table 3

Associations between extent of childhood sexual abuse (<16 years), and mental health, psychological wellbeing, sexual risk-taking behaviors, physical health and socioeconomic outcomes to age 30: (a) unadjusted and (b) adjusted for covariates

Outcome	(a) Unadjusted		(b) Adjusted for covariates		Size of effect ^b		Significant covariates ^c
	<i>B (SE)</i>	<i>p</i>	<i>B (SE)</i>	<i>p</i>	Cohen's <i>d</i>	AR(%)	
Mental health problems (18–30 years)							
Major depression	0.600 (0.089)	<0.001	0.426 (0.094)	<0.001	.44	7.5	1,2,3
Anxiety disorder	0.537 (0.082)	<0.001	0.364 (0.089)	<0.001	.33	6.5	1,2
Suicidal ideation	0.489 (0.079)	<0.001	0.395 (0.089)	<0.001	.40	10.5	2,3
Suicide attempt ^a	2.250 (0.334)	<0.001	1.863 (0.403)	<0.001	.24	14.8	2,4
Alcohol dependence	0.290 (0.100)	0.004	0.374 (0.118)	0.002	.40	16.6	1,2,5
Illicit drug dependence	0.310 (0.092)	<0.001	0.425 (0.113)	<0.001	.37	13.3	1,2,3,5
Any mental health problem	0.750 (0.124)	<0.001	0.618 (0.129)	<0.001	.48	5.7	3,6
Diversity score	0.286 (0.025)	<0.001	0.209 (0.029)	<0.001	.53	–	2,3
Psychological wellbeing (30 years)							
Number of PTSD symptoms score	0.294 (0.045)	<0.001	0.120 (0.051)	0.017	.23	–	1,2,3,7
Self-esteem score	-0.693 (0.171)	<0.001	-0.371 (0.181)	0.041	.16	–	5,7
Life satisfaction score	-0.606 (0.178)	<0.001	-0.510 (0.189)	0.007	.23	–	1,8
Partner relationship quality score	-0.720 (0.303)	0.017	-0.608 (0.324)	0.061	.20	–	2,9

Sexual risk-taking behaviors

Age of onset of sexual activity	-0.644 (0.090)	<0.001	-0.381 (0.091)	<0.001	.29	–	3,8,9
Number of sexual partners (18–30 years)	0.140 (0.033)	<0.001	0.175 (0.035)	<0.001	.31	–	1,2,5,6,7
Number of unplanned pregnancies (to 30 years)	0.250 (0.037)	<0.001	0.043 (0.043)	0.316	.17	–	1,2,3,4,5,9,10

Physical health outcomes (30 years)

Number of doctor/hospital contacts	0.141 (0.021)	<0.001	0.105 (0.023)	<0.001	.14	–	1,2,6,7,8,9
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Socioeconomic outcomes

Left school without qualifications	0.310 (0.082)	<0.001	0.184 (0.116)	0.112	.11	3.4	1,4,7,8,9
Welfare dependence (ever 25–30 years)	0.452 (0.084)	<0.001	0.310 (0.099)	0.002	.30	10.0	2,5,7,8,10
Gross income (NZD ,000) (30 years)	-4.605 (1.114)	<0.001	-.730 (1.102)	0.508	.09	–	1,4,7,10

Note. ^a In the suicide attempt regression model, childhood sexual abuse was dichotomized into none, non-contact and contact sexual abuse versus sexual penetration due to non-linearity of association; ^b Cohen's *d* is the estimated standardized comparison of no exposure to CSA versus any exposure to CSA. For dichotomous outcomes the AR measures the estimated reduction in the rates of adverse adult outcomes under the assumption that all CSA was eliminated from the population; ^c Statistically significant covariates ($p < 0.05$): 1=Gender; 2=Childhood physical punishment/maltreatment (<16 years); 3=Parental history of illicit drug use; 4=Family averaged standard of living (0–10 years); 5=Parental history of criminality, 6=Interparental violence (<16 years); 7=Child IQ (8–9 years); 8=Number of changes of parents (0–16 years); 9= Maternal educational attainment; 10=Maternal age at child's birth.