Exposure to childhood sexual and physical abuse and adjustment in early adulthood☆

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ABSTRACT

Objective: This research examined linkages between exposure to childhood sexual abuse (CSA) and childhood physical punishment/abuse (CPA) and mental health issues in early adulthood.
Method: The investigation analyzed data from a birth cohort of over 1,000 New Zealand young adults studied to the age of 25.
Results: Exposure to CSA and CPA was associated with increased risks of later mental disorders including depression, anxiety disorder, conduct/anti-social personality disorder, substance dependence, suicidal ideation, and suicide attempts at ages 16–25. Control for social, family, and individual factors reduced the associations between CPA and mental health outcomes to the point of statistical non-significance. However, there was a consistent finding for CSA to remain associated with increased risks of later mental health problems. After adjustment, those exposed to CSA including attempted or completed sexual penetration had rates of disorder that were 2.4 times higher than those not exposed to CSA. Those exposed to harsh or abusive physical punishment had rates of disorder that were 1.5 times higher than those exposed to no or occasional physical punishment. It was estimated that exposure to CSA accounted for approximately 13% of the mental health problems experienced by the cohort. Findings showed that exposure to CPA had only weak effects on later mental health. It was estimated that exposure to CPA accounted for approximately 5% of the mental health problems experienced by the cohort.
Conclusions: Exposure to CSA was associated with consistent increases in risks of later mental health problems. Exposure to CPA had weaker and less consistent effects on later mental health. These findings suggest that much of the association between CPA and later mental health reflects the general family context in which CPA occurs, whereas this is less the case for CSA.

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Introduction

Over the last three decades there has been a large amount of research and theory into the prevalence, correlates, causes, and consequences of both physical and sexual abuse in childhood. One aspect of this research has focused on the extent to which exposure to child maltreatment has long-term consequences for individual mental health and personal adjustment

(for reviews see Chalk, Gibbons, & Scarupa, 2002; Cicchetti & Toth, 2005; Fergusson & Mullen, 1999; Finkelhor, 1990; Holmes & Slap, 1998; Johnson, 2004; Kaplan, Pelcovitz, & Labruna, 1999; Mullen, King, & Tonge, 2000; National Clearinghouse on Child Abuse & Neglect Infomation, 2005; Putnam, 2003; Wissow, 1995). The key findings of this research may be summarized in the following manner.

There has been a growing number of papers that have reviewed the linkages between exposure to childhood sexual abuse (CSA) and subsequent mental health and psychosocial functioning (for reviews see: Fergusson & Mullen, 1999; Finkelhor, 1990; Finkelhor & Hashima, 2001; Holmes & Slap, 1998; Kendall-Tackett, Williams, & Finkelhor, 1993; Putnam, 2003). In all cases, the reviews have concluded that exposure to CSA in childhood is associated with increased rates of mental disorder and adjustment problems including: depression, anxiety, anti-social behaviors, substance use, suicidality, and other psychiatric problems.

For example, in a study of a New Zealand birth cohort, Fergusson et al. (Fergusson, Horwood, & Lynskey, 1996) found that increasing levels of exposure to child CSA (assessed using retrospective reports at age 18) were associated with increased rates of depression, anxiety disorder, conduct disorder, substance use, and suicidal behaviors. These associations persisted after statistical control for a wide range of potentially confounding covariates including gender, measures of family social background, measures of family stability, measures of parenting and parent-child relationships, and measures of parental adjustment. The authors concluded that CSA, and in particular exposure to more severe CSA, was associated with an increased risk of psychiatric disorder at age 18, even following adjustment for potentially confounding factors.

Further, other studies have reported higher rates of sexual adjustment and related problems in those exposed to CSA (for reviews see: DiLillo, 2001; Leonard & Follette, 2002; Loeb et al., 2002; Rumstein-McKean & Hunsley, 2001). For example, Wyatt and colleagues (Wyatt, Guthrie, & Notgrass, 1992) found that in a community sample of women, those who had been sexually abused as children were more likely to report relationships of shorter duration and a higher number of sexual partners. Also, Kinzl and colleagues (Kinzl, Traweger, & Biebl, 1995), using a community sample of women aged 18–30, found that women who had been sexually abused on more than one occasion during childhood were significantly more likely to report sexual dysfunction as adults. The weight of the evidence from these findings clearly suggests that exposure to CSA in childhood is related to increased risks of a wide range of later problems of adjustment that span mental health, suicidality and sexual adjustment issues.

In contrast to the research into CSA, research into the long-term consequences of childhood physical abuse (CPA) for later adjustment has been less consistent. The majority of studies in this area have suggested that exposure to CPA is associated with increased risks of later mental health and adjustment problems (for reviews see: Kaplan et al., 1999; Malinosky-Rummell & Hansen, 1993; Stevenson, 1999; Trickett & McBride-Chang, 1995). For example, a longitudinal community study of 375 young adults conducted by Silverman and colleagues (Silverman, Reinherz, & Giaconia, 1996) found that adolescent males who were physically abused were more likely to report suicidal thoughts at age 15 and were at higher risk of depression, PTSD, anti-social behavior, and substance abuse at age 21. Physically abused females were at higher risk of depression, anxiety, anti-social behavior, somatic complaints, and suicidal ideation at age 15, and were at higher risk of depression, PTSD, anti-social behavior, and substance abuse at age 21. Furthermore, females who had been physically abused in childhood were more likely to have made at least one suicide attempt by age 21.

However, these conclusions have not been supported in all studies. For example, in a prospective study comparing physically abused children to a matched control group of children, Widom and colleagues found associations between exposure to CPA and alcoholism in women, but not men (Widom & White, 1997); no association between CPA and later illicit drug abuse (Widom, Weiler, & Cottler, 1999); and no association between exposure to CPA and later promiscuity and teenage pregnancy (Widom & Kuhns, 1996). Widom and colleagues (Widom, Raphael, & DuMont, 2004; Widom et al., 1999) concluded that the apparent associations between CPA and later adjustment in studies using retrospective reports may reflect a reporting bias in which those with adjustment problems may be more prone to recall or disclose exposure to physical abuse.

In an analysis of a birth cohort of New Zealand born children, Fergusson and Lynskey (Fergusson & Lynskey, 1997) examined the linkages between exposure to (retrospectively recalled) CPA and later mental health outcomes. This study found that although exposure to CPA was associated with increased risks of adverse mental health outcomes including depression and anxiety disorders at age 18, these associations became statistically non-significant after adjustment for confounding factors. Fergusson and Lynskey concluded that the apparent elevated risk for later mental health problems in physically abused young adults was a product of the social context in which the abusive treatment occurred.

Methodological problems in research into the long-term effects of child maltreatment

While research into the long-term consequences of child maltreatment has clarified considerably the linkages between childhood experience and later outcomes, this research is subject to a number of recurrent methodological problems that limit the extent to which clear conclusions may be drawn about the causal effects of child maltreatment on long-term development (Fergusson, Horwood, & Woodward, 2000). One major limitation is that a number of studies of the long-term effects of CSA and CPA have examined these in the context of specialized populations including individuals self-referred for counseling, clinic attendees, psychiatric patients, and prisoners. The extent to which findings from such specialized samples generalizes to the population remains unclear.

A second issue is that a large number of studies of CSA and CPA have not controlled for a variety of background and contextual factors that may be correlated with CSA and CPA and may be a cause of later adjustment difficulties. It could be

argued, therefore, that the apparent relationships between CPA and CSA and later adverse outcomes are the product of the family, social, and personal background factors present in the child's environment, rather than a direct result of CPA and CSA.

A third, and profound limitation of the existing literature on child maltreatment is the fact that, as highlighted above, many studies of CSA and CPA have used a cross-sectional design, relying upon retrospective recall of CSA and CPA and other childhood and family-related factors that may be related to the development of adjustment problems in later life. It could be argued that individuals who are prone to a psychiatric disorder may be more likely to report or recall CSA or CPA. This issue raises the possibility of observing false relationships between CSA, CPA, and later adjustment as a function of participants' ability or willingness to recall and report such events. However, it is clear that in the case of child maltreatment, prospective measurement is not possible due to ethical difficulties (Fergusson & Mullen, 1999).

In general, there are two methods for eliminating recall bias in retrospective reports. The first is the use of known cases, in which only those with confirmed cases of abuse are studied. While this method eliminates recall bias, the use of this method introduces sample selection bias (see above). The second method for eliminating recall bias is the multiple indicator approach, in which individuals are questioned about episodes of abuse at more than one point in time. This method avoids sample selection bias as it proves possible to use a general population sample in such an approach. The availability of repeated measures also makes it possible, subject to certain simplifying assumptions, to develop statistical models to examine the extent and nature of errors in abuse reports and to develop abuse classifications that take into account errors of measurement in the observed report data (Fergusson et al., 2000).

The present study

Against the above background, this paper reports the results of a 25-year longitudinal study of the effects of childhood sexual abuse and childhood physical abuse on long-term mental health outcomes including depression, anxiety disorders, anti-social behaviors, and suicidal ideation and behavior. This study contains a number of features that address many of the major threats to validity outlined above. In particular, the study is based upon a representative birth cohort in which:

1. The assessment of exposure to child maltreatment has been based on repeated retrospective reports made at ages 18 and 21. This use of a test/retest design makes it possible to assess the reliability and stability of reports and to construct robust measures that take into account errors of reporting.
2. The assessment of outcomes has been based on standardized (DSM-IV) diagnostic criteria, increasing the extent to which these outcome data may be compared to those of other studies.
3. An extensive array of background and contextual factors that may be confounded with CSA and CPA were measured prospectively throughout the course of the 25-year study, increasing both the breadth and accuracy of measurement of social background of participants.

Method

The data reported in this investigation were gathered as part of the Christchurch Health and Development Study, a longitudinal study of an unselected birth cohort of 1,265 children born in the Christchurch (New Zealand) birth region during a 4-month period in mid-1977. This cohort has been studied at birth, 4 months, 1 year, at annual intervals to age 16 years, and at ages 18, 21, and 25 years. The study has collected a wide range of data on the health, development, and adjustment of the cohort throughout this period. A detailed description of the study and an overview of study findings can be found in Fergusson, Horwood, Shannon, and Lawton (1989) and Fergusson and Horwood (2001). The Christchurch Health and Development Study has been approved by the Canterbury (New Zealand) Regional Ethics Committee, and all participants have given their informed consent to participate in all aspects of the study. The following measures were used in these analyses.

The assessment of childhood exposure to sexual abuse (CSA) and physical punishment/abuse (CPA)

Retrospective reports of exposure to childhood sexual abuse and physical abuse prior to age 16 were obtained from cohort members at ages 18 and 21 years. Sexual abuse was assessed using the following methods. At each assessment, participants were asked whether, before the age of 16, 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 spanned: (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 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). Using the check and narrative data gathered at each age (18, 21), participants were classified into one of four exposure groups reflecting the extent/severity of CSA reports. These groups were: (a) no sexual abuse (85.9% of the sample); (b) non-contact sexual abuse only (2.7% of the sample); (c) contact sexual abuse not involving attempted or completed sexual penetration (5.1% of the sample); (d) attempted or completed

sexual penetration including vaginal, oral and anal intercourse (6.3% of the sample). In the present analysis, respondents were classified as belonging to the group corresponding to the most severe form of abuse reported at either age 18 or 21.

The assessment of childhood physical abuse (CPA) was based on cohort members' reports of parental use of physical punishment. At 18 and 21 years, respondents were asked to report on the extent to which their parents used physical punishment during their childhood (prior to age 16 years). Reports were made on a five-point scale ranging from "parent never used physical punishment" to "parent treated me in a harsh and abusive way" (Fergusson & Lynskey, 1997). Separate ratings were made for mother figures and father figures (if available). Ratings for both parents were then combined into a single rating at each age by classifying the participants into one of four groups based on the greatest level of exposure to physical punishment reported for either parent. These groups were: (a) parents never used physical punishment (6.4% of the sample); (b) parents seldom used physical punishment (11.2% of the sample); (c) at least one parent regularly used physical punishment (78.0% of the sample); (d) at least one parent used frequent or severe punishment or treated the participant in a harsh/abusive manner (4.5% of the sample). In common with information on CSA, in the present analysis, participants were classified into the group corresponding to the most severe level of punishment/abuse reported at either age 18 or 21 years. In addition, in the present analysis, groups 1 (parents never used physical punishment) and 2 (parents seldom used physical punishment) have been combined, as preliminary analyses showed that members of these groups had very similar outcomes in terms of the mental health measures reported in this study.

The availability of repeated measures data on CSA and CPA provided an opportunity to examine the stability of abuse reporting and the effects of current mental state on reporting errors. This analysis has been reported in a previous paper (Fergusson et al., 2000) which produced the following conclusions:

 (i) Reports of CSA and CPA showed considerable instability with kappa values between assessments made at 18 and 21 ranging from .45 to .47.
 (ii) While reports showed considerable instability and change between 18 and 21 years, there was no evidence to suggest that these reports were influenced by current mental state measures.
(iii) Latent class analyses showed that combining the reports gathered at ages 18 and 21 using an "Or" algorithm in which the participant was assigned to the most severe outcome reported at 18 or 21 led to a correct rate of assignment to the latent classes greater than 98%.

In summary, these findings suggested that combining reports of physical and sexual abuse in the ways described above led to accurate classification of reported exposure to CSA and CPA in which any errors of reporting were unrelated to current mental state.

Mental health outcome measures

At ages 18, 21 and 25 years cohort members were questioned about mental health issues since the previous assessment using questionnaires based on the Composite International Diagnostic Interview (CIDI, World Health Organization, 1993), supplemented by additional measures. Using these data the following measures were constructed reflecting the young person's experience of mental health problems over the intervals 16–18, 18–21 and 21–25 years.

Major depression and anxiety disorder (ages 16–18, 18–21, and 21–25)

These disorders were assessed using CIDI items and DSM-IV (American Psychiatric Association, 1994) diagnostic criteria for major depression and a range of anxiety disorders (including generalized anxiety disorder, panic disorder, agoraphobia, social phobia, and specific phobia). For the purposes of the present analysis, sample members who met DSM diagnostic criteria for a major depressive episode at any time during an assessment period were classified as having major depression during that assessment period (22.5% of the sample at age 16–18, 23.5% of the sample at age 18–21, and 21.7% of the sample at age 21–25). Similarly, sample members who met DSM diagnostic criteria for one or more anxiety disorders during the specified periods were classified as having an anxiety disorder (17.1% of the sample at age 16–18, 12.9% of the sample at age 18–21, and 18.2% of the sample at age 21–25). These estimates are comparable to those of a similar birth cohort used in the Dunedin Multidisciplinary Health and Development Study (Fergusson, Poulton, Horwood, Milne, & Swain-Campbell, 2004; Jaffee et al., 2002).

Conduct/anti-social personality disorder (ages 16–18, 18–21, and 21–25)

Conduct disorder symptoms were assessed using the Self Report Delinquency Inventory (SRDI: Elliott & Huizinga, 1989). From age 21 onwards anti-social personality disorder was assessed using custom-written survey items reflecting the DSM-IV criteria for anti-social personality disorder. Sample members who met diagnostic criteria for conduct disorder or anti-social personality disorder during an assessment period were classified as having the disorder during that period (4.8% of the sample at age 16–18, 3.5% of the sample at age 18–21, and 3.0% of the sample at age 21–25).

Substance dependence (ages 16–18, 18–21, and 21–25)

This was assessed by items from the CIDI to assess DSM-IV symptom criteria for dependence upon alcohol, cannabis, or other illicit drugs. Separate questioning was conducted for each substance. Individuals who met the relevant DSM-IV

diagnostic criteria for dependence on alcohol, cannabis, or another illicit drug in the assessment period were classified as substance dependent for that assessment period (8.6% of the sample at age 16–18, 11.0% of the sample at age 18–21, and 11.6% of the sample at age 21–25).

Suicidal ideation and suicide attempts (ages 16–18, 18–21, and 21–25)
    Suicidal ideation was assessed by asking sample members whether they had ever thought about killing themselves or had attempted suicide during the assessment period and the frequency of such thoughts or attempts. Those individuals who reported having any suicidal thoughts or who reported having attempted suicide at least once in the assessment interval were classified as having suicidal ideation (14.7% of the sample at age 16–18, 14.2% of the sample at age 18–21, and 12.4% of the sample at age 21–25) or having attempted suicide (3.6% of the sample at age 16–18, 3.7% of the sample at age 18–21, and 2.1% of the sample at age 21–25).

Overall number of disorders (ages 16–18, 18–21, and 21–25)
    The overall number of disorders was calculated by summing the responses for each of the six categories of mental health disorder for each participant at each assessment period, resulting in scores that ranged from 0 (reported no mental health disorders) to 6 (reported each of six mental health disorders). Of the sample, 61.1% reported no mental health disorders at age 16–18, 61.9% reported no mental health disorders at age 18–21, and 61.1% reported no mental health disorders at age 21–25.

Confounding factors

    To assess the extent to which associations between CSA and CPA and later mental health outcomes at ages 18, 21, and 25 could be explained by the effects of confounding factors, a range of measures was chosen from the database of the study for inclusion in the analysis. These measures were selected on the basis of having been found to be correlated with CSA and CPA in the present investigation and in previous investigations of this cohort. The covariate factors chosen for inclusion in the analyses were as follows.

Measures of family socio-economic background

Maternal age
    This was assessed at the time of the survey child's birth.

Maternal and paternal education
    This was assessed at the time of the survey child's birth using a three-point scale which reflected the highest level of educational achievement attained. This scale was: 1 = parent lacked formal educational qualifications (had not graduated from high school); 2 = parent had secondary level educational qualifications (had graduated from high school); 3 = parent had tertiary level qualifications (had obtained a university degree or equivalent qualification).

Family living standards (0–10 years)
    At each assessment up to age 10 years, a global assessment of the material living standards of the family was obtained by means of an interviewer rating. Ratings were made on a five-point scale that ranged from 1 = very good to 5 = very poor. These ratings were summed over the 10-year period and divided by 10 to give a measure of typical family living standards during this period. For the purposes of the present study, the scale scores were reverse coded, such that a high score implied a higher standard of living.

Family socioeconomic status
    This was assessed at the time of the survey child's birth using the Elley–Irving (Elley & Irving, 1976) scale of socio-economic status for New Zealand. This scale classifies SES into six levels on the basis of paternal occupation, ranging from 1 = professional occupations to 6 = unskilled occupations. For the purposes of the present study, the scale scores were reverse coded, such that higher scores implied higher SES.

Family functioning and parental behavior

Parental attachment (age 15)
    This was assessed using the parental attachment scale developed by Armsden and Greenberg (1987) and administered when sample members were aged 15. The full parental attachment scale was used in this analysis and was found to have good reliability (α = .87).

Changes of parents
    At each assessment from birth to 15 years, comprehensive information was gathered on changes in the child's family situation since the previous assessment. Using this information an overall measure of family instability was constructed on

the basis of a count of the number of changes of parents experienced by the child up to age 15. Changes of parents included all changes resulting from parental separation/divorce, reconciliation, remarriage, death of a parent, fostering, and other changes of custodial parents.

Parental alcoholism/alcohol problems, criminal offending, and illicit drug use

When sample members were aged 11, their parents were questioned about parental use of illicit drugs. At the 15-year assessment parents were further questioned concerning their history of alcoholism or alcohol problems and criminal offending. On the basis of this questioning 11.9% of the sample were classified as having a parental history of alcoholism/alcohol problems, 12.4% of the sample as having a parental history of criminal offending, and 24.9% as having a parental history of illicit drug use.

Maternal and paternal care and affection, maternal and paternal control and over-protection (parental bonding measures)

At age 16, sample members were questioned about their relationship with both their mother and father using the care and over-protection subscales of the Parental Bonding Instrument (PBI: Parker, Tupling, & Brown, 1979). The PBI is a 25-item retrospective measure of an adolescent's perception of his or her mother's and father's parenting attitudes and behavior towards them during childhood. The care scale measures the extent to which a parent was perceived to be supportive, affectionate, and nurturing, while the over-protection scale measures the extent to which a parent was perceived to be controlling and unwilling to allow the child autonomy. The alpha coefficients for the maternal and paternal care and over-protection scales were high, ranging from .85 to .91.

Individual factors

IQ

This was assessed at ages 8 and 9 using the Revised Wechsler Intelligence Scale for Children (WISC-R: Wechsler, 1974). Total scores were computed on the basis of results on four verbal and four performance subscales. The split half reliabilities of these scores were .93 at age 8 and .95 at age 9. For the purposes of these analyses the observed WISC-R total IQ scores at age 8 and 9 were combined by averaging over the two administrations.

Gender

Recorded at birth.

Statistical analyses

The unadjusted associations between CSA, CPA and the repeated measures of mental health outcomes (Tables 1 and 2) were tested for statistical significance by fitting generalized estimating equation (GEE) models (Liang & Zeger, 1986; Zeger & Liang, 1986) to the data for each outcome. The GEE approach pools the repeated measures on each outcome at ages 16–18, 18–21 and 21–25 years to produce an estimate of the population averaged effect of exposure to child maltreatment (CSA or CPA) on each outcome. This estimate typically has greater precision than estimates derived from fitting separate models for each observation period. For dichotomous outcomes (measures of mental disorder and suicidal behavior) a logistic regression model was fitted of the form:

$$\text{logit}(Y_{it}) = B_0 + B_1 X_i + E_{it}$$

where $\text{logit}(Y_{it})$ was the log odds of the outcome Y for the ith participant in the tth time period ($t = 16$–18, 18–21, 21–25), X_i was the measure of the extent of exposure to CSA or CPA for the ith individual, and E_{it} was the error or disturbance term for the model. The disturbance terms Eit were assumed to be correlated over time. For the count of the total number of disorders a negative binomial regression model was fitted of the form:

$$\log(Y_{it}) = B_0 + B_1 X_i + E_{it}$$

where $\log(Y_{it})$ was the logarithm of the rate of disorder for the ith individual in the tth time interval, and X_i, E_{it} were defined as previously. In these models the coefficient B_1 represents the effect of abuse exposure (CSA or CPA) on the outcome pooled over the three observation periods. In each case the test of significance of the association was given by a Wald chi-squared test of the hypothesis that $B_1 = 0$.

The strength of the associations between CSA, CPA and covariate factors (Table 3) was summarized by the Pearson product moment correlation. To adjust the observed associations between exposure to CSA (or CPA) and the outcome measures for the correlated effects of exposure to CPA (or CSA) and other confounding factors (Table 4), the GEE models above were extended to include the set of covariate factors. For dichotomous outcomes the model fitted was of the form:

$$\text{logit}(Y_{it}) = B_0 + B_1 X_{1i} + B_2 X_{2i} + \sum B_j Z_{ij} + E_{it}$$

and for the count of number of disorders the model was of the form: $\log(Y_{it}) = B_0 + B_1 X_{1i} + B_2 X_{2i} + \sum B_j Z_{ij} + E_{it}$ In these models X_{1i}, X_{2i} represent the extent of exposure to CSA and CPA respectively for the ith individual, Z_{ij} were the set of

Table 1
Associations between exposure to childhood sexual abuse (CSA) and rates of mental health problems (ages 16–18, 18–21, 21–25)

Variable (% reporting)	Extent of CSA			
	None	Non-contact	Contact	Attempted/completed penetration
Major depression				
16–18	16.8	42.9	55.8	57.8
18–21	19.6	42.9	41.5	54.0
21–25	18.4	35.7	44.2	40.9
Anxiety disorder				
16–18	13.5	32.1	40.4	40.6
18–21	10.4	28.6	18.9	34.9
21–25	15.6	14.3	28.9	45.5
Conduct/anti-social personality disorder				
16–18	4.1	.0	7.7	14.1
18–21	2.9	3.6	1.9	12.7
21–25	2.6	3.6	1.9	9.1
Substance dependence				
16–18	7.0	7.1	17.3	23.4
18–21	9.7	10.7	15.1	25.4
21–25	11.2	10.7	7.7	19.7
Suicidal ideation				
16–18	11.6	21.4	36.5	37.5
18–21	11.9	14.3	20.8	41.3
21–25	11.2	10.7	15.4	25.8
Suicide attempts				
16–18	2.2	.0	9.6	20.3
18–21	2.5	3.6	1.9	20.6
21–25	1.5	.0	1.9	10.6
Total number of disorders (mean and *SD*)				
16–18	.55 (.94)	1.04 (1.20)	1.67 (1.29)	1.94 (1.80)
18–21	.57 (.98)	1.04 (1.07)	1.00 (1.04)	1.89 (1.55)
21–25	.60 (1.00)	.75 (.93)	1.00 (1.15)	1.52 (1.45)

Variable (% reporting)	Total *N*	Extent of CSA			
		None	Non-contact	Contact	Attempted/completed penetration
Sample size					
16–18	1,025	881	28	52	64
18–21	1,011	867	28	53	63
21–25	1,001	855	28	52	66

Note: The effect of CSA on outcome variables was statistically significant in all cases (LR χ^2), $p < .0001$.

covariate factors for individual i and the remaining terms were as described previously. In these models the coefficient B_1 represents the effect of CSA on the outcome net of the correlated effects of CPA and other covariates; similarly, B_2 represents the effect of CPA on the outcome net of CSA and other covariate factors. Finally, the fitted regression models were extended to incorporate interaction terms to test for CSA × gender and CPA × gender interactions. All models were fitted using Stata 8 (StataCorp, 2003).

The regression parameter estimates reported in Table 4 were used to assess the individual contribution of CSA and CPA to the overall rate of mental disorder in the cohort, through calculation of the population attributable risk (PAR) estimate for both CSA and CPA. The PAR estimates the percentage reduction in the overall rate of mental disorder that would follow elimination of all CSA or all CPA from the population (MacMahon & Pugh, 1970).

Sample size and sample bias

The present analysis is based upon the samples having complete data on CSA and CPA as assessed at ages 18 and 21, and on the outcome measures at each age. These samples ranged in size from 1,001 to 1,025, and represented between 79% and 81% of the initial cohort of 1,265 children. To examine the effects of sample losses on the representativeness of the sample, the obtained samples with complete data at each age were compared with the remaining sample members on a series of socio-demographic measures collected at birth. This analysis suggested that there were statistically significant ($p < .01$) tendencies for the obtained samples to under-represent individuals from socially disadvantaged backgrounds characterized by low parental education, low socio-economic status and single parenthood. To address this issue, the data weighting methods described by Carlin, Wolfe, Coffey, and Patton (1999) were used to examine the possible implications of selection effects arising from the pattern of missing data. These analyses produced essentially the same pattern of results

Table 2
Associations between exposure to childhood physical punishment/abuse (CPA) and rates of mental health problems (ages 16–18, 18–21, 21–25)

Variable (% reporting)	Extent of CPA		
	None/seldom	Regular	Severe/harsh
Major depression			
16–18	19.2	28.5	49.2
18–21	21.4	31.0	38.5
21–25	19.2	27.7	42.4
Anxiety disorder			
16–18	14.6	24.1	37.7
18–21	11.0	15.9	30.8
21–25	16.3	23.2	33.3
Conduct/anti-social personality disorder			
16–18	3.7	12.1	6.6
18–21	2.4	9.7	6.2
21–25	1.6	10.7	7.6
Substance dependence			
16–18	7.1	12.9	21.3
18–21	9.5	17.7	18.5
21–25	9.7	21.4	18.2
Suicidal ideation			
16–18	12.9	17.2	36.1
18–21	12.5	17.7	30.8
21–25	10.6	16.1	28.8
Suicide attempts			
16–18	2.7	4.3	14.8
18–21	2.5	6.2	13.9
21–25	1.2	3.6	10.6
Total number of disorders (mean and *SD*)			
16–18	.60 (1.02)	.99 (1.20)	1.66 (1.65)
18–21	.59 (.97)	.98 (1.32)	1.38 (1.49)
21–25	.59 (.95)	1.03 (1.38)	1.41 (1.51)

Variable (% reporting)	Total *N*	Extent of CPA		
		None/seldom	Regular	Severe/harsh
Sample size				
16–18	1,025	848	116	61
18–21	1,011	833	113	65
21–25	1,001	823	112	66

Note: The effect of CPA on outcome variables was statistically significant in all cases (LR χ^2), $p < .0001$.

to those reported here, suggesting that the conclusions of this study were unlikely to have been influenced by selection bias.

Results

Associations between exposure to childhood sexual abuse (CSA) and childhood physical punishment/abuse (CPA) and later mental health outcomes

Tables 1 and 2 show the associations between CSA (Table 1), CPA (Table 2), and a series of measures of mental health outcomes measured at 18, 21, and 25 years. The Tables show that both CSA and CPA were associated with increasing rates of major depression ($p < .0001$), anxiety disorder ($p < .0001$), conduct/anti-social personality disorder ($p < .0001$), substance dependence ($p < .0001$), suicidal ideation ($p < .0001$), and suicidal behavior ($p < .0001$). The tables also show that exposure to CSA and exposure to CPA were both significantly ($p < .0001$) associated with the overall total number of mental health disorders at ages 18, 21, and 25. For example, those individuals exposed to attempted/completed sexual penetration in childhood reported an average of 1.52 mental health disorders at age 25, whereas those who were not exposed to sexual abuse reported an average of .60 mental health disorders at age 25. Similarly, those individuals exposed to harsh/severe physical punishment in childhood reported an average of 1.41 mental health disorders at age 25, whereas those who were not exposed to harsh/severe physical punishment in childhood reported an average of .59 mental health disorders at age 25.

Table 3
Correlations between socio-economic, family, and individual factors and CSA and CPA

Factor	CSA		CPA	
	r^a	p	r^a	p
a. Socio-economic factors				
Maternal age	−.12	<.0001	−.19	<.0001
Maternal education level	−.12	<.0001	−.12	<.0001
Paternal education level	−.05	>.05	−.11	<.001
Family standard of living (ages 0–10)	−.13	<.0001	−.22	<.0001
Family SES at birth	−.01	>.70	−.16	<.0001
b. Family functioning and parental behavior				
Parental attachment	−.15	<.0001	−.24	<.0001
Changes of parents (by age 15)	.19	<.0001	.24	<.0001
Parental history of alcoholism	.10	<.01	.18	<.0001
Parental history of illicit drug use	.11	<.001	.05	ns
Parental history of criminal offending	.08	<.05	.18	<.0001
Maternal care	−.17	<.0001	−.26	<.0001
Paternal care	−.20	<.0001	−.30	<.0001
Maternal over-protection	.18	<.0001	.16	<.0001
Paternal over-protection	.17	<.0001	.22	<.0001
c. Individual factors				
IQ	−.09	<.01	−.11	<.001
Female gender	.23	<.0001	.00	ns
CSA	–	–	.20	<.0001
CPA	.20	<.0001	–	–

[a] Pearson product-moment correlation.

Socio-economic, family, and individual correlates with exposure to CSA and CPA

Table 3 shows the Pearson product-moment correlations between the extent of exposure to CSA, CPA, and a range of socio-economic, family, and individual factors identified as being potentially related to either CSA or CPA. The table shows that:

1. CSA and CPA were significantly correlated with a number of socio-economic, family, and individual factors. These included maternal age, maternal and paternal education, family standard of living, and family socio-economic status at birth, parental attachment (at age 15), changes of parents (by age 15), parental history of illicit drug use, parental history of criminal offending, maternal and paternal care, and maternal and paternal over-protection, IQ, and gender.
2. The majority of factors were common to both CSA and CPA (e.g., parental attachment and changes of parents), while others were specific to either CSA (e.g., parental illicit drug use, gender) or CPA (e.g., paternal education level, socio-economic status at birth).

Table 4
Associations between exposure to CSA and CPA and mental health problems at ages 16–18, 18–21, 21–25, before and after adjustment for covariates

Measure	Unadjusted B (SE), p	Adjusted B (SE), p	Significant covariates
a. CSA			
Major depression	.57 (.05), <.0001	.44 (.07), <.0001	1, 5, 6, 7, 8, 9
Anxiety disorder	.50 (.06), <.0001	.33 (.07), <.0001	6, 8, 9
Conduct/anti-social personality disorder	.41 (.10), <.0001	.66 (.17), <.0001	6, 9
Substance dependence	.31 (.07), <.0001	.44 (.10), <.0001	6, 9
Suicidal ideation	.47 (.06), <.0001	.34 (.08), <.0001	4, 6, 7
Suicide attempt	.74 (.09), <.0001	.49 (.14), <.0001	1, 4, 6
Overall number of disorders	.36 (.02), <.0001	.29 (.05), <.0001	1, 3, 6
b. CPA			
Major depression	.55 (.08), <.0001	.44 (.11), <.0001	2, 5, 6, 7, 8, 9
Anxiety disorder	.56 (.09), <.0001	.20 (.13), >.10	2, 6, 8, 9
Conduct/anti-social personality disorder	.71 (.16), <.0001	.22 (.25), >.80	2, 6, 9
Substance dependence	.53 (.11), <.0001	−.02 (.16), >.90	2, 6, 9
Suicidal ideation	.60 (.09), <.0001	.19 (.13), >.10	2, 4, 6, 7
Suicide attempt	.96 (.15), <.0001	.48 (.23), <.05	2, 4, 6
Overall number of disorders	.48 (.04), <.0001	.19 (.08), <.05	2, 3, 6

Covariates: 1. childhood physical punishment; 2. childhood sexual abuse; 3. paternal education; 4. family standard of living (0–10 years); 5. changes of parents (by age 15); 6. parental attachment (age 15); 7. parental history of illicit drug use; 8. IQ; 9. gender.

3. There was a consistent tendency for the covariate factors to be more strongly related to CPA than CSA, which is particularly evident for measures of family functioning and CPA.
4. Exposure to CSA and CPA were significantly correlated ($r = .20$, $p < .0001$).

Associations between exposure to CSA and CPA and mental health problems at ages 18, 21, and 25, after adjustment for covariates

The preceding analyses raise the possibility that the increased risks of poorer mental health outcomes at ages 18, 21, and 25 for those exposed to either CSA or CPA may be explained by the childhood and family factors listed above. To address this issue, a further set of analyses was conducted that adjusted the associations between exposure to CSA and CPA and mental health outcomes at ages 18, 21, and 25 for the factors listed above. To control for the potential confounding of CSA and CPA, exposure to CPA was added as a covariate to models of association between CSA and mental health outcomes, and exposure to CSA was added as a covariate to models of association between CPA and mental health outcomes.

The results of these analyses are reported in Table 4, which shows the unadjusted and adjusted regression coefficients for CSA and CPA and each mental health outcome measure, and the range of statistically significant covariates for each outcome. The table demonstrates:

1. *CSA and mental health outcomes*: Adjustment for confounding factors reduced the associations between exposure to CSA and later mental health outcomes at ages 16–18, 18–21, and 21–25. However, the associations between CSA and all mental health outcomes remained statistically significant ($p < .0001$) even after controlling for confounding factors. Significant ($p < .05$) covariate factors included childhood physical punishment, paternal education, family standard of living (ages 0–10), changes of parents, parental history of illicit drug use, parental attachment (age 15), IQ, and gender. The model parameters imply that, after adjustment, those exposed to sexual abuse involving attempted/completed sexual penetration had overall rates of mental disorder that were 2.4 times higher (95% CI: 1.8–3.2) than those who were not exposed to sexual abuse.
2. *CPA and mental health outcomes*: Statistical control for confounding covariates reduced the associations between exposure to CPA and mental health measures at ages 18, 21, and 25 in all cases. For most measures (anxiety disorders, conduct/anti-social personality disorder, substance dependence, and suicidal ideation) this control reduced the associations to the point of statistical non-significance. However, significant associations remained between CPA and depression ($p < .0001$), suicide attempts ($p < .05$), and the overall rate of mental disorder ($p < .05$). These results suggest that the associations between CPA and mental health were largely but not wholly explained by common confounding factors. These factors included childhood sexual abuse, paternal education, family standard of living (ages 0–10), changes of parents, parental attachment (age 15), and child IQ. The model parameters imply that, after adjustment, those exposed to harsh or severe levels of physical punishment had overall rates of mental disorder that were 1.5 times higher (95% CI: 1.1–2.0) than those who were not exposed or were seldom exposed to physical punishment.

Estimates of the population attributable risk (PAR) of CSA and CPA after controlling for covariates

The results in Table 4 show that exposure to both CSA and CPA was related to overall rates of mental disorders. To assess the contribution of these factors to overall rates of mental disorder, the PAR was calculated. The PAR estimates the percentage reduction in the overall rate of mental disorder that would follow elimination of all CSA or all CPA from the population (MacMahon & Pugh, 1970). The PAR for CSA was 13.1% (95% CI: 7.6%–19.6%), suggesting that exposure to CSA could account for 13.1% of all mental disorders in the cohort. The PAR for CPA was 5.1% (95% CI: .7%–10.5%), suggesting that the elimination of CPA would reduce the rate of mental disorder in the cohort by 5.1%.

Supplementary analyses

The effects of gender

To examine whether associations between CSA/CPA and later educational outcomes varied with gender, the models described in Table 4 were extended to include gender × exposure to CSA and gender × exposure to CPA interaction terms. In no case was a significant interaction found, suggesting that the associations between exposure to CSA and later mental health outcomes were similar for males and females.

Discussion

There has been an extensive literature that has suggested that exposure to childhood sexual abuse or physical abuse is a risk factor for long-term psychiatric disorder (Fergusson & Mullen, 1999; Finkelhor, 1990; Finkelhor & Hashima, 2001; Holmes & Slap, 1998; Kaplan et al., 1999; Kendall-Tackett et al., 1993; Malinosky-Rummell & Hansen, 1993; Putnam, 2003). In general, the evidence on the role of CSA has tended to be somewhat stronger and more consistent than for CPA. These trends are clearly evident in the findings from the present study.

Consistent with previous studies of this cohort (Fergusson, Horwood, et al., 1996; Fergusson, Lynskey, et al., 1996) and previous research (Fergusson & Mullen, 1999; Finkelhor, 1990; Holmes & Slap, 1998; Putnam, 2003), exposure to childhood sexual abuse was consistently related to increased risks of mental health problems in adolescence and young adulthood. These associations persisted after extensive adjustment for confounding covariates. The general trends in the analysis were reflected in the overall rate of disorders. The analysis suggested that, even following adjustment for confounding covariates, children exposed to sexual abuse involving attempted or completed sexual penetration had rates of disorder that were 2.4 times higher than those of children not exposed to CSA. Estimates of the PAR suggested that the elimination of CSA within the CHDS cohort would have reduced overall rates of disorder by 13.1%.

In contrast to the findings for CSA, the effects of exposure to physical punishment and abuse (CPA) were both weaker and less consistent. After covariate adjustment, exposure to CPA was not significantly associated with a number of later outcomes including: anxiety disorders; substance dependence; conduct/anti-social personality disorders; and suicidal ideation. However, there were significant associations between exposure to CPA and depression ($p < .0001$), suicide attempts ($p < .05$), and the overall rate of mental disorders ($p < .05$). The fitted model PAR showed that elimination of all physical punishment and abuse would have only a small effect on overall rates of disorder and would reduce these by 5.1%. The principal reasons for exposure to CPA having a smaller impact on mental health outcomes than that of CSA were twofold. First, there was a significant correlation ($r = .20$) between CSA and CPA suggesting that, in part, the elevated risks of later mental health problems amongst children exposed to CPA may have been due to the effects of correlated or co-morbid CSA. Second, physical punishment was related to a wide range of disadvantageous socio-economic, family, and individual factors, suggesting that in part the elevated risks of later mental health disorders found amongst those exposed to CPA were due to the social and family context within which CPA occurred.

The present study also addressed the issue of correlation and co-morbidity between CSA and CPA by fitting regression models in which measures of both physical and sexual abuse were included as predictors. These analyses found that after covariate adjustment, CSA remained a predictor of all mental health outcomes, whereas CPA did not. These findings suggest that exposure to CSA confounded the relationship between CPA and mental health, whereas CPA did not confound the relationship between CSA and mental health.

The finding of this study suggesting that the long-term effects of CSA tend to be larger than the long-term effects of CPA is consistent with previous findings and theorizing that CSA may contribute to more long-term problems than CPA (Boney-McCoy & Finkelhor, 1996; Putnam & Trickett, 1993). While it is unclear why CSA is a stronger predictor of mental health outcomes, Boney-McCoy and Finkelhor (1996) speculated that CSA may have greater impact on mental health outcomes due to the revictimization of sexual abuse victims.

These findings have a number of implications for understanding the linkages between physical punishment/abuse and longer-term development. In particular, while many commentators have discussed the role of physical punishment and child maltreatment on the development of later disorders (Kaplan et al., 1999; Malinosky-Rummell & Hansen, 1993; Stevenson, 1999; Trickett & McBride-Chang, 1995), the findings of this study suggest that much of this association may reflect the social and family context within which abuse and punishment occurs. These findings highlight the need for programs addressing childhood physical punishment and abuse to take into account the wider family and social context within which harsh or abusive physical punishment occurs.

The present study had a number of methodological strengths when compared to existing research in this area. However, there are a number of caveats that should be borne in mind when appraising these results. In particular, the study findings are subject to the following limitations:

1. Sampling: The study is based on a specific cohort from a specific society that has been studied over a specific time period. The extent to which the findings from this study generalize to other cohorts in other societies or at other times is unclear.
2. Sample loss: As mentioned in Method section, there was evidence of small non-random sample loss in these analyses. While methods for detecting bias suggested that the results of the study were not biased, it is possible that some bias has been introduced into the study via non-random sample loss.
3. Measurement: The study findings are subject to two types of limitations with regard to the measurement of CSA and CPA. First, as noted above, these assessments are based on retrospective reports and may be subject to reporting bias. Second, the findings apply to the range of exposures examined in this study, and it is possible for example, that harmful effects may have been evident for physical abuse had we studied a larger sample of young people exposed to severe physical abuse.
4. Confounding: A final threat to study validity comes from uncontrolled sources of confounding that may be correlated with both exposure to child maltreatment and later mental health.

Despite these caveats the present study suggests two major conclusions about the linkages between reported exposure to child maltreatment and mental health in adolescence and young adulthood. First, exposure to childhood sexual abuse is related to clear increases in risks of later mental health problems including depression, anxiety disorders, conduct/anti-social personality disorder, substance use disorders and suicidality. Estimates suggest that exposure to CSA accounts for 13.1% of these disorders. Second, while exposure to physical punishment and abuse is correlated with later mental health, these associations are largely explained by the social, family and childhood context within which such exposure occurs. However, exposure to physical punishment/abuse is associated with a small but detectable increase in the overall rate of mental

disorders. Estimates suggest the exposure to CPA accounts for 5.1% of the overall rate of mental disorder in adolescence and young adulthood.

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