Exposure to childhood sexual and physical abuse and subsequent educational achievement

outcomes

Abstract

Objective: This paper examined the relationship between exposure to sexual and physical abuse (CSA and CPA) in childhood and later educational achievement outcomes in late adolescence and early adulthood in a birth cohort of over 1000 children studied to age 25.

Method: Retrospective data on CSA and CPA were gathered at ages 18 and 21 and used to form a best estimate of exposure to CSA and CPA. The relationship between CSA, CPA, and self-reported educational outcomes to 25 years was examined using logistic regression models that took into account social background, parental factors, and individual factors.

Results: Increasing exposure to CSA and CPA was significantly associated with failing to achieve secondary school qualifications (CSA: B = .53, SE = .13, p < .0001; CPA: B = .62, SE = .12, p < .0001), gaining a Higher School Certificate (CSA: B = -.48, SE = .13, p < .001; CPA: B = -.78, SE = .14, p < .001), attending university (CSA: B = -.29, SE = .13, p < .05; CPA: B = -.45, SE = .13, p < .001), and gaining a university degree (CSA: B = -.54, SE = .18, p < .005; CPA: B = -.64, SE = .17, p < .001). Adjustment for confounding social, parental, and individual factors explained most of these associations. After control for confounding factors, omnibus tests of the associations between CSA and outcomes and CPA and outcomes failed to reach statistical significance (CSA: Wald χ^2 (4) = 7.72, p = .10; CPA: Wald χ^2 (4) = 8.26, p = .08).

Conclusions: The effects of exposure to CSA and CPA on later educational achievement outcomes are largely explained by the social, family, and individual context within which exposure to abuse takes place.

Over the last three decades there has been a growing amount of research into the prevalence, correlates, causes, and consequences of child maltreatment. One aspect of this research has focused on the extent to which exposure to maltreatment in childhood has both short- and long-term consequences for personal adjustment (Cicchetti & Toth, 2005; Fundudis, Kaplan, & Dickinson, 2003; Mullen, King, & Tonge, 2000). One outcome that has been examined is poorer school performance and educational achievement (for reviews see Daignault & Hebert, 2004; Holmes, Offen, & Waller, 1997; Kendall-Tackett, Williams, & Finkelhor, 1993; Veltman & Browne, 2001)

Studies of the relationship between exposure to childhood sexual abuse (CSA) and educational outcomes have demonstrated consistent effects of CSA exposure across a range of educational outcomes, including test and school performance and levels of achievement. For example, Chandy and colleagues (Chandy, Blum, & Resnick, 1996, , 1997) found that both male and female adolescents who had been exposed to CSA demonstrated poorer school performance. Similarly, Lisak and Luster (1994) reported that adult males who had been exposed to CSA as children reported significantly greater difficulties in educational pursuits at all levels than non-abused men. Further, Einbender and Friedrich (1989) found that pre-adolescent and adolescent girls who had been exposed to CSA demonstrated lower levels of cognitive ability and poorer grades in school than a matched control group of non-abused girls. The evidence also suggests that these effects may persist after the maltreatment takes place; for example, Frothingham and colleagues (Frothingham et al., 2000) found that children exposed to CSA had significantly more educational problems than children in a matched comparison group during an 8 year period following the diagnosis of sexual abuse exposure in early childhood.

An important issue in the study of the effects of child maltreatment is the fact that children who are exposed to sexual abuse are often exposed to physical abuse as well (Dong et al., 2004; MacMillan et al., 1997). Parallel to the findings on CSA, studies investigating the association between exposure to childhood physical abuse (CPA) and educational outcomes have demonstrated effects of CPA exposure across a similar range of outcomes as in CSA exposure. For example,

Perez and Widom (1994), found that children who had been physically abused had lower IQ and reading ability scores as adults, and had completed fewer years of schooling than individuals in the matched control group. Similarly, Eckenrode and colleagues (Eckenrode, Laird, & Doris, 1993) found that maltreated children (including children who were physically abused) performed more poorly than children in a matched control group on school grades and standardized tests, and were more likely to repeat a year of schooling. Also, Wodarski and colleagues (Wodarski, Kurtz, Gaudin, & Howing, 1990) reported that abused children had a greater incidence of problems with school than children in a matched control group.

In general, existing studies of CSA and CPA exposure and educational outcomes suffer from three limitations, including: (a) the use of selected samples and specialized populations, including clinical samples (Chandy et al., 1996, 1997; Eckenrode et al., 1993; Einbender & Friedrich, 1989; Frothingham et al., 2000; Perez & Widom, 1994; Wodarski et al., 1990); (b) the use of cross-sectional designs in which measures of exposure to abuse and educational outcomes were obtained retrospectively (Chandy et al., 1996, 1997; Eckenrode et al., 1993; Einbender & Friedrich, 1989; Lisak & Luster, 1994; Wodarski et al., 1990); and (c) a lack of control for a wide range of measures of social, family, and individual factors that may be correlated with exposure to abuse and also contribute to later adverse educational outcomes (Eckenrode et al., 1993; Einbender & Friedrich, 1989; Lisak & Luster, 1994; Wodarski et al., 1990). The best research design to examine these issues is a longitudinal design in which prospectively assessed measures of child maltreatment are related to subsequent achievement, taking into account social, family, and related factors. However, because of ethical difficulties, this design is often not possible. An alternative to this approach is the "semi-prospective design" in which outcomes and covariates are assessed longitudinally, whereas exposure to abuse is assessed retrospectively (Fergusson & Mullen, 1999).

In this study we report the results of a semi-prospective study of the linkages between exposure to child maltreatment and subsequent educational achievement taking into account social, family, and childhood factors. The aims of this research were:

1. To examine the relationship between retrospective reports of exposure to CSA and CPA prior to age 16 on subsequent educational outcomes over the period from 16-25 years.

2. To control linkages between abuse exposure and educational outcomes for a series of confounding factors. These factors included socio-economic, family, and individual factors that were related to abuse exposure.

Method

The data were gathered as part of the Christchurch Health and Development Study (CHDS), a longitudinal study of a birth cohort of 1,265 children born in the Christchurch (New Zealand) urban region in mid-1977. The cohort has been studied at birth, 4 months, 1 year and at annual intervals to age 16 years, and again at ages 18, 21, and 25 (Fergusson & Horwood, 2001; Fergusson, Horwood, Shannon, & Lawton, 1989). The study has collected information from a variety of sources including: parental interviews, teacher reports, self-reports, psychometric assessments, medical, and other record data. The cohort was recruited via contacting all mothers giving birth in all Christchurch maternity hospitals during a four-month period in mid-1977. A total of 1310 children were born in Christchurch during this period, of whom the mothers of 1265 (97%) agreed to participate in the study. The study is not representative of the New Zealand population as a whole, but rather represents a cross-section of the population of the Christchurch urban region in 1977.

All phases of data collection were subject to signed consent from research participants. Prior to age 14 all information was collected on the basis of signed parental consent only; from age 14 onwards, signed consent was also obtained from the cohort members. All phases of data collection were subject to ethical approval from the Canterbury Ethics Committee. Data were collected via face-to-face interviews conducted by trained interviewers in single sessions lasting 1-3 hours.

The present analysis used the following measures:

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 by asking whether, before the age of 16, anyone had ever attempted to involve them in any of a series of 15 unwanted sexual activities, including: (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; (c) episodes involving attempted or completed vaginal, oral or anal intercourse. (Fergusson, Horwood, & Lynskey, 1996; Fergusson, Lynskey, & Horwood, 1996). Using these data, participants were classified into one of four exposure groups reflecting the extent/severity of CSA reports: (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); and (d) attempted or completed sexual penetration including vaginal, oral and anal intercourse (6.3% of the sample). This classification was based upon the most severe form of CSA reported at either age 18 or 21. In the present analysis, groups 1 (no sexual abuse) and 2 (non-contact sexual abuse only) have been combined, as preliminary analyses showed that members of these groups had very similar outcomes in terms of the educational achievement measures reported in this study.

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) 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). Ratings for both parents (if available) were 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: (a) parents never used physical punishment (4.5% of the sample); (b) parents seldom used

physical punishment (78.0% of the sample); (c) at least one parent regularly used physical punishment (11.2% of the sample); (d) at least one parent used frequent or severe punishment or treated the participant in a harsh/abusive manner (6.4% of the sample). In common with 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 educational achievement 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, Horwood, & Woodward, 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)   Whilst 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%.

Educational attainment (16-25 years)

The outcome measures in the present study were based on assessments of cohort members' attainment of New Zealand high school and tertiary educational qualifications as assessed at ages 18, 21, and 25. All measures were assessed via self-report.

No secondary school qualifications: Sample members who had never attained any secondary school qualifications by age 21, either while they were at high school or subsequently as adult students, were classified as having no secondary school qualifications (18.1% of the sample).

Higher School Certificate: In New Zealand in Year 13 (7th Form), students could complete a qualification known as Higher School Certificate: this qualification was awarded to students who completed 5 years of secondary school education from Year 9 and who completed at least three subjects above Year 12 (6th Form) level. At ages 18 and 21, sample members were questioned about the attainment of Higher School Certificate: 42.3% of the sample had attained this qualification.

Attended University: At ages 21 and 25, sample members were questioned as to whether they had ever enrolled at University, either full-time or part-time: 39.9% of the sample reported ever attending University by age 25.

University degree or equivalent: At age 25, sample members were questioned as to whether they had ever attained a Bachelor's level or higher degree from a university or equivalent tertiary institution: 26.1% of the sample reported having attained a degree.

Confounding factors

A series of covariate factors was chosen to assess the associations between CSA and CPA and later educational achievement outcomes could be explained by the effects of confounding factors. These measures were selected on the basis of: a) a review of the literature identifying factors that previously have been found to be associated with CSA and CPA; and b) factors that were found to be correlated with CSA and CPA in the present investigation and in previous investigations of this cohort.

Measures of family socio-economic background

Maternal age: This was assessed at the time of the survey child's birth via mother's self-report and verified at each parent assessment thereafter.

Maternal and paternal education: This was assessed via parental report 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 socioeconomic status: This was assessed via parental report at the time of the survey child's birth, using the Elley-Irving (1976) scale of socio-economic status for New Zealand. This scale classifies SES into 6 levels on the basis of paternal occupation, ranging from 1 = professional occupations to 6 = unskilled occupations. In a small number of cases (<2%) either the father was unemployed or the family was a single parent family for which the occupation of the natural father was unknown. For the purposes of the present analysis these families were classified into SES level 6 based on the fact that all of these families had very low incomes.

Family functioning and parental adjustment

Changes of parents: A measure reflecting the total number of parental changes occurring up to age 15 as a result of separation/divorce, reconciliation, fostering, remarriage, or death was assessed via parental report.

Parental alcoholism/alcohol problems, criminal offending, and illicit drug use: Parental illicit drug use was assessed via parental report at age 11 (24.9% of the sample were thus classified), and at age 15 offending (12.4% of the sample) and alcohol abuse/dependence (11.9% of the sample) were assessed, also via parental report.

Interparental violence: The experience of interparental violence during childhood (prior to age 16 years) was assessed via participant self-report at age 18 though a series of eight items derived from the Conflict Tactics Scale (CTS: 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 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 (put other parent down). An overall measure was created by summing the responses for both father- and mother-initiated violence ($\alpha = .88$).

Individual factors

Gender: Recorded at birth.

IQ: Assessed at ages 8 and 9 (and averaged across these ages) using the Revised Wechsler Intelligence Scale for Children (WISC-R: Wechsler, 1974).

Statistical analyses

The unadjusted associations between CSA, CPA, covariate factors, and educational achievement outcomes, were tested for significance using the Mantel-Haenszel χ^2 test of linear trend. To take into account the effect of confounding factors, two approaches were used. In both approaches, all covariates were entered into the models. First, each educational outcome was modelled as a linear function of CSA, CPA, and covariate factors using logistic regression methods. Second, to provide omnibus tests of the net effect of CSA and CPA on educational outcomes after adjustment for covariates, a generalized estimating equation (GEE) model (Liang & Zeger, 1986; Zeger & Liang, 1986) was fitted to the data. This fitted model fitted was of the form:

$$\text{Logit}(Y_{it}) = B_{0t} + B_{1t}X_{1i} + B_{2t}X_{2i} + \Sigma B_{jt}Z_{ji} + E_{it}$$

where Y_{it} (t = 1, 2, 3, 4) were the set of four educational outcomes for the i-th participant; X_{1i} and X_{2i} were the measures of the extent of exposure to CSA and CPA respectively for the i-th

individual, Zji were the set of covariate factors for individual i, and Eit was the error or disturbance term for the model. Both the intercepts (B0t) and regression parameters (B1t, B2t, Bjt) were permitted to vary with the educational outcome Yit, and the error terms Eit were permitted to be correlated. From the parameters of the fitted model, omnibus Wald χ^2 tests of the net effects of CSA and CPA on all four outcomes jointly were constructed to test the null hypothesis H0: B1t = 0 (t = 1, 2, 3, 4) and H0: B2t = 0 (t = 1, 2, 3, 4) respectively. Finally, gender x CSA and gender x CPA interaction terms were entered into the models in order to examine possible gender differences in educational outcomes as a function of CSA or CPA exposure.

Statistical power. Consideration of the power of the analysis (Dupont & Plummer, 1990) showed that the study had over 80% power at alpha=.05 to detect odds ratios between abuse exposure and failure to attain educational outcomes in the range from 1.7 to 2.6, depending on the base rate of the outcome examined and the definition of abuse. These estimates suggest that the present analysis had adequate power to detect small to moderate effect sizes.

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 educational outcomes assessed to age 25. These samples ranged from 1001 to 1053 and represented between 79% to 83% of the initial cohort of 1265 children. In addition, there was further sample attrition as a result of missing data on some of the covariates. In particular, data were missing for approximately 20% of the sample on the measure of child cognitive ability (WISC-R) as a result of historical budgetary constraints.

The following approaches were used to address possible selection bias resulting from sample attrition and missing data. First, missing data estimation methods were used to impute ability scores for those children with missing values on the IQ measure (WISC-R). Missing value estimation was conducted using the impute procedure of Stata 8.0 (StataCorp, 2003) under the assumption that the data were missing at random. Second, to address issues of selection bias, the

data weighting methods described by Carlin, Wolfe, Coffey and Patton (1999) were applied using a two-stage process. In the first stage, the obtained samples with complete data in each analysis were compared with the remaining sample members on a series of socio-demographic measures collected at birth. This analysis suggested that there were small but 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. In the second stage, the sample was stratified on the basis of these characteristics to estimate the probability of inclusion in the sample for each analysis, and were reanalyzed with the data for each individual weighted by the inverse of the probability of sample inclusion. These analyses produced essentially the same pattern of results 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 child maltreatment and later educational achievement outcomes

Tables 1 and 2 show the associations between the extent of exposure to CSA (Table 1), the extent of exposure to CPA (Table 2), and subsequent educational achievement. For each comparison the Tables report tests of linear association using the Mantel-Haenszel χ^2 test for linear trend. The Tables show that in all cases increasing exposure to CSA and CPA was associated with significant ($p < .05$) tendencies for decreasing educational achievement at secondary school and university.

INSERT TABLES 1 AND 2 HERE

Associations between CSA, CPA, and socio-economic, family functioning, and individual factors

The results in Tables 1 and 2 suggest a possible causal association in which increasing exposure to child maltreatment led to declining educational achievement. An alternative explanation for these

findings is that that the poorer achievement of those exposed to CSA or CPA could be explained by other social, family or individual characteristics that were correlated with exposure to child maltreatment and also related to later educational achievement. To examine this issue, Tables 3 and 4 show the associations 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. Table 3 shows that increasing exposure to CSA was significantly (p < .05) associated with: lower maternal age, lower maternal educational qualifications, higher rates of family change, and increased rates of interparental violence. In addition, those exposed to CSA tended more often to be female and had lower IQ, and increased exposure to CPA. Table 4 shows that increasing exposure to CPA was associated with a similar set of factors. However, there were some differences; in particular, exposure to CPA was not related to gender, but was associated with paternal education and family socio-economic status.

INSERT TABLES 3 AND 4 HERE

Associations between childhood abuse and educational outcomes after adjustment for covariates

To adjust the observed associations between exposure to CSA (or CPA) for the correlated effects of exposure to CPA (or CSA) and the other covariates listed in Tables 3 and 4, a series of regression models were fitted to the data. In these analyses, each educational outcome was modelled as a function of exposure to CSA, CPA and the covariate factors using multiple logistic regression models (see Methods). The results of these analyses are summarized in Table 5 which shows the estimated regression coefficients B and their standard errors (SE), between CSA and each outcome and between CPA and each outcome, after adjustment for the covariates. For comparative purposes the Table also shows the corresponding regression coefficients prior to covariate adjustment. The Table also reports the covariates that were found to be statistically significant in the fitted model for each educational outcome. The Table shows:

1. In all cases, adjustment for covariate factors reduced the associations between CSA and educational qualifications. In three out of the four analyses, CSA was not a significant predictor (p > .05) of educational outcomes.

2. In all cases, adjustment for covariates reduced the association between CPA and educational outcomes. In three out of the four analyses, the association became statistically non-significant (p > .05) following control of covariates.

INSERT TABLE 5 HERE

The overall impression conveyed by Table 5 is that much of the association between child maltreatment and educational outcomes was explained by confounding factors. Nonetheless, there were hints of residual association which included: (a) even after adjustment, the coefficients were non-zero and (b) in two cases significant (p < .05) associations were found. To test for residual associations, a multivariate GEE model was fitted to the data for CSA and CPA (see Methods). This model permitted an omnibus test of the associations between child maltreatment and educational achievement after control for covariates. In both cases the test failed to reach statistical significance (CSA: Wald χ^2 (4) = 7.72, p = .10; CPA: Wald χ^2 (4) = 8.26, p = .08), suggesting that the residual associations in Table 5 did not deviate significantly from what would be expected under the null hypothesis of no association.

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 5 were extended to include gender x exposure to CSA and gender x exposure to CPA interaction terms. The analyses revealed only a single statistically significant (p < .05) interaction effect, that of gender x exposure to CPA for the "no secondary school qualifications" outcome. This interaction appeared to reflect the fact that the

effect of CPA on the likelihood of gaining no secondary school qualifications was higher for girls than boys (girls B = .64, SE = .25, p < .01; boys B = -.27, SE = .26, p > .30). Because of the comparatively large number of tests conducted, this finding may have been due to chance as a result of multiple tests of significance. To address this issue, a Bonferroni (Grove & Andreasen, 1982) adjusted p-value (p < .006) was employed to correct for multiple (8) tests of significance. In this instance, the gender x CPA interaction for the "no secondary school qualifications" outcome was not statistically significant (p > .006) using the Bonferroni correction.

Discussion

The present study attempted to address a range of limitations in the existing research on exposure to childhood sexual and physical abuse and later educational outcomes. These analyses led to the following general conclusions.

First, there were pervasive bivariate associations between exposure to CSA and CPA and a range of educational outcomes spanning high school and university achievement. For all outcomes there were clear and linear trends for increasing severity of both CSA and CPA exposure to be associated with decreasing educational achievement.

Second, it was clear that there were a number of covariate factors that were related to both CSA and CPA that could potentially confound the relationship between exposure to abuse and later educational achievement. Analyses revealed significant associations between a range of socio-economic, family functioning, parental adjustment, and individual factors, and CSA and CPA. It could be suggested, therefore, that any apparent association between child maltreatment and later educational achievement outcomes reflects the psychosocial context in which the child develops, rather than the direct effects of CSA exposure and CPA exposure on longer-term educational achievement. This hypothesis was supported by a series of analyses in which logistic regression models were fitted to the data for CSA and CPA exposure and educational achievement outcomes. The results of these analyses showed that the associations between exposure to child maltreatment

and later educational achievement became non-significant for six out of eight of the comparisons studied. Further multivariate tests using GEE modelling methods showed that overall there was no significant association between child maltreatment and later educational achievement. These results suggest that most, if not all, of the apparent associations between child maltreatment and educational outcomes were explained by social, family, and contextual factors associated with child maltreatment rather than the direct effects of abuse *per se*.

The finding of bivariate associations between exposure to maltreatment in childhood and later educational underachievement in the present study is generally consistent with the existing literature on child maltreatment and educational outcomes (e.g. Chandy et al., 1996; Chandy et al., 1997; Eckenrode et al., 1993; Einbender & Friedrich, 1989; Frothingham et al., 2000; Lisak & Luster, 1994; Perez & Widom, 1994; Wodarski et al., 1990). The present study, however, suggests that the associations between child maltreatment and diminished educational outcomes can be explained by the influence of factors associated with exposure to child maltreatment. While these findings suggest that exposure to child maltreatment is not a direct cause of later educational underachievement, it is clear that exposure to CSA and CPA in childhood is a risk marker for poorer educational outcomes.

Additionally, there have been suggestions in the literature that the effects of exposure to child maltreatment vary with gender (e.g. Garnefski & Diekstra, 1997; Holmes et al., 1997; Little & Hamby, 1999; Meyerson, Long, Miranda, & Marx, 2002; Thompson, Kingree, & Desai, 2004). These findings suggest that CSA may have greater effects on males, whereas CPA may have greater effects on females. These interactions between gender, child maltreatment, and outcomes were not found in the present study, and tests of interaction suggested that exposure to child maltreatment had similar effects on the educational achievement of males and females. The only exception to this trend was a finding that CPA had greater effects on school qualifications in females. However, this finding could well be due to chance given the multiple tests of significance that were conducted.

However, in appraising these conclusions, the following limitations of the study should be considered:

1. Measurement: The analysis is based on retrospective reports of child maltreatment gathered at ages 18 and 21, raising issues about the effects of retrospective reporting on study validity. This issue has been examined in a previous study of the validity of child maltreatment reports in this cohort (Fergusson et al., 2000). This analysis led to three major conclusions. First, there were high rates of false negative reporting for child maltreatment reports. Second, the use of repeated measures of observation led to acceptable levels of reporting accuracy (a greater than 98% rate of correct assignment to latent class). Third, there was no evidence to suggest that the underreporting of abuse was related to mental health factors. This analysis provides considerable reassurance that estimation of the associations between child maltreatment and educational outcomes was not adversely affected by the use of retrospective reports.

2. Sample: The study is based on a specific birth cohort in a specific societal context. The findings thus reflect the nature and extent of the abuse to which cohort members were exposed. It is possible that in other cohort and social contexts the associations between child maltreatment and educational achievement may differ.

Notwithstanding these limitations, the results of this 25-year study confirm the view that children exposed to child maltreatment are at increased risk of educational under-achievement over their life course. However, this under-achievement largely reflects the social, family, and related contexts within which acts of child maltreatment occur, rather than the direct effects of child maltreatment *per se* on educational achievement. These findings may imply that interventions designed to improve the social and family-related factors that contribute to the incidence of CSA and CPA may also have the benefit of increasing educational achievement for children in at-risk families.

References

Carlin, J. B., Wolfe, R., Coffey, C., & Patton, G. C. (1999). Tutorial in biostatistics. Analysis of binary outcomes in longitudinal studies using weighted estimating equations and discrete-time survival methods: Prevalence and incidence of smoking in an adolescent cohort. *Statistics in Medicine, 18*, 2655-2679.

Chandy, J. M., Blum, R. W., & Resnick, M. D. (1996). Female adolescents with a history of sexual abuse: Risk outcome and protective factors. *Journal of Interpersonal Violence, 11*(4), 503-518.

Chandy, J. M., Blum, R. W., & Resnick, M. D. (1997). Sexually abused male adolescents: How vulnerable are they? *Journal of Child Sexual Abuse, 6*(2), 1-16.

Cicchetti, D., & Toth, S. L. (2005). Child maltreatment. *Annual Review of Clinical Psychology, 1*(1), 409-438.

Daignault, I. V., & Hebert, M. (2004). The school adapatation of sexually abused children. *Canadian Psychology, 45(4),* 293-307.

Dong, M., Anda, R. F., Felitti, V. J., Dube, S. R., Williamson, D. F., Thompson, T. J., Loo, C. M., & Giles, W. H. (2004). The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse & Neglect, 28*(7), 771-784.

Dupont, W. D., & Plummer, W. D. (1990). Power and sample size calculations: A review and computer program. *Controlled Clinical Trials, 11*, 116-128.

Eckenrode, J., Laird, M., & Doris, J. (1993). School performance and disciplinary problems among abused and neglected children. *Developmental Psychology, 29*(1), 53-62.

Einbender, A. J., & Friedrich, W. N. (1989). Psychological functioning and behavior of sexually abused girls. *Journal of Consulting and Clinical Psychology, 57*(1), 155-157.

Elley, W. B., & Irving, J. C. (1976). Revised socio-economic index for New Zealand. *New Zealand Journal of Educational Studies, 11*(1), 25-36.

Fergusson, D. M., & Horwood, L. J. (2001). The Christchurch Health and Development Study: Review of findings on child and adolescent mental health. *Australian and New Zealand Journal of Psychiatry, 35*(3), 287-296.

Fergusson, D. M., Horwood, L. J., & Lynskey, M. T. (1996). Childhood sexual abuse and psychiatric disorder in young adulthood: II. Psychiatric outcomes of childhood sexual abuse. *Journal of the American Academy of Child & Adolescent Psychiatry, 35*(10), 1365-1374.

Fergusson, D. M., Horwood, L. J., Shannon, F. T., & Lawton, J. M. (1989). The Christchurch Child Development Study: A review of epidemiological findings. *Paediatric & Perinatal Epidemiology, 3*(3), 278-301.

Fergusson, D. M., Horwood, L. J., & Woodward, L. J. (2000). The stability of child abuse reports: A longitudinal study of young adults. *Psychological Medicine, 30*, 529-544.

Fergusson, D. M., & Lynskey, M. T. (1997). Physical punishment/maltreatment during childhood and adjustment in young adulthood. *Child Abuse & Neglect, 21*(7), 617-630.

Fergusson, D. M., Lynskey, M. T., & Horwood, L. J. (1996). Childhood sexual abuse and psychiatric disorder in young adulthood: I. Prevalence of sexual abuse and factors associated with sexual abuse. *Journal of the American Academy of Child & Adolescent Psychiatry, 35*(10), 1355-1364.

Fergusson, D. M., & Mullen, P. E. (1999). *Childhood sexual abuse - An evidence based perspective*. Thousand Oaks: Sage, CA.

Frothingham, T. E., Hobbs, C. J., Wynne, J. M., Yee, L., Goyal, A., & Wadsworth, D. J. (2000). Follow up study eight years after diagnosis of sexual abuse. *Archives of Disease in Childhood, 83*(2), 132-134.

Fundudis, T., Kaplan, C., & Dickinson, H. (2003). A comparison study of characteristics of parents of abused and non-abused children. *Educational and Child Psychology, 20(1),* 90-108.

Garnefski, N., & Diekstra, R. F. W. (1997). Child sexual abuse and emotional and behavioral problems in adolescence: Gender differences. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*(3), 323-329.

Grove, W. M., & Andreasen, N. C. (1982). Simultaneous tests of many hypotheses in exploratory research. *Journal of Nervous & Mental Disease, 170*(1), 3-8.

Holmes, G. R., Offen, L., & Waller, G. (1997). See no evil, hear no evil, speak no evil: Why do relatively few male victims of childhood sexual abuse receive help for abuse-related issues in adulthood? *Clinical Psychology Review, 17*(1), 69-88.

Kendall-Tackett, K. A., Williams, L. M., & Finkelhor, D. (1993). Impact of sexual abuse on children: A review and synthesis of recent empirical studies. *Psychological Bulletin, 113*(1), 164-180.

Liang, K.-Y., & Zeger, S. L. (1986). Longitudinal data analysis using generalized linear models. *Biometrika, 73*, 13-22.

Lisak, D., & Luster, L. (1994). Educational, occupational, and relationship histories of men who were sexually and/or physically abused as children. *Journal of Traumatic Stress, 7*(4), 507-523.

Little, L., & Hamby, S. L. (1999). Gender differences in sexual abuse outcomes and recovery experiences: A survey of therapist-survivors. *Professional Psychology: Research and Practice, 30*(4), 378-385.

MacMillan, H. L., Fleming, J. E., Trocme, N., Boyle, M. H., Wong, M., Racine, Y. A., Beardslee, W. R., & Offord, D. R. (1997). Prevalence of child physical and sexual abuse in the community. Results from the Ontario Health Supplement. *Journal of the American Medical Association, 278*(2), 131-135.

Meyerson, L. A., Long, P. L., Miranda, R., Jr., & Marx, B. P. (2002). The influence of childhood sexual abuse, physical abuse, family environment, and gender on the psychological adjustment of adolescents. *Child Abuse & Neglect, 26*(4), 387-405.

Mullen, P. E., King, N. J., & Tonge, B. J. (2000). Child sexual abuse: An overview. *Behaviour Change, 17*(1), 2-14.

Perez, C. M., & Widom, C. S. (1994). Childhood victimization and long-term intellectual and academic outcomes. *Child Abuse & Neglect, 18*(8), 617-633.

StataCorp. (2003). *Stata statistical software: Release 8.0*. Texas: Stata Corporation, College Station.

Straus, M. (1979). Measuring intrafamily conflict and violence: The Conflict Tactics (CT) Scale. *Journal of Marriage & the Family, 41*, 75-88.

Thompson, M. P., Kingree, J., & Desai, S. (2004). Gender differences in long-term health consequences of physical abuse of children: Data from a nationally representative survey. *American Journal of Public Health, 94*(4), 599-604.

Veltman, M. W., & Browne, K. D. (2001). Three decades of child maltreatment research: Implications for the school years. *Trauma, Violence, & Abuse, 2(3),* 215-239.

Wechsler, D. (1974). *Manual for the Wechsler Intelligence Scale for Children - Revised*. New York: Psychological Corporation.

Wodarski, J. S., Kurtz, P., Gaudin, J. M., & Howing, P. T. (1990). Maltreatment and the school-age child: Major academic, socioemotional, and adaptive outcomes. *Social Work, 35(6),* 506-513.

Zeger, S. L., & Liang, K.-Y. (1986). Longitudinal data analysis for discrete and continuous outcomes. *Biometrics, 42*(1), 121-130.