

Published in final edited form as:

Child Abuse Negl. 2013 May ; 37(5): 292–302. doi:10.1016/j.chiabu.2012.11.008.

Child maltreatment and adolescent mental health problems in a large birth cohort

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Abstract

Objective—To examine whether notified child maltreatment is associated with adverse psychological outcomes in adolescence, and whether differing patterns of psychological outcome are seen depending on the type of maltreatment.

Methods—The participants were 7223 mother and child pairs enrolled in a population-based birth cohort study in Brisbane, Australia. Exposure to suspected child maltreatment was measured by linkage with state child protection agency data. The primary outcomes were the internalizing and externalizing scales of the Youth Self Report (YSR) at approximately 14 years of age.

Results—The YSR was completed by 5172 subjects (71.6%), with increased attrition of cases of notified maltreatment. After adjustment for potential confounders, notified maltreatment was significantly associated with both internalizing behavior and externalizing behavior at 14. When evaluated as non-exclusive categories of maltreatment, physical abuse, neglect, and emotional abuse were each significantly associated with both internalizing and externalizing behavior after adjustment. When evaluated using an expanded hierarchical scheme that included combinations of multi-type maltreatment, the following groups had significantly higher internalizing behavior after adjustment: emotional abuse (with or without neglect), and multi-type maltreatment including

physical (but not sexual) abuse with neglect and/or emotional abuse. The following groups were associated with externalizing behavior after adjustment: emotional abuse (with or without neglect), and multi-type maltreatment including physical abuse (with neglect and/or emotional abuse), or sexual abuse (with neglect and/or emotional abuse, and/or physical abuse).

Conclusions—This study suggests that child neglect and emotional abuse have serious adverse effects on adolescent mental health and warrant the attention given to other forms of child maltreatment. Additionally, it confirms that young people who are notified for more than one type of maltreatment are at particular risk of adolescent mental health problems.

Introduction

Child maltreatment is an important worldwide public health issue, and has repeatedly been linked to adverse mental and physical health consequences. Estimation of its prevalence is hindered by the absence of widely agreed thresholds at which actions or omissions towards children constitute maltreatment. Physical abuse provides a good example of this: many consider all corporal punishment to be abusive, while others have a higher threshold such as the inflicting of visible physical injury. Hussey et al (2006) found that in a large sample of adolescents in the US, 28.4% reported at least one childhood episode of being “slapped, hit, or kicked” by a caregiver.

When studying child maltreatment from a population perspective it is sometimes possible to utilize government departmental records of reported or substantiated maltreatment. On this measure, child neglect is the type of maltreatment that comes to the attention of child protection authorities most frequently, accounting for more than half of substantiated cases of maltreatment in the United States, and with a lifetime prevalence in western countries being approximately 6% (Theodore, Runyan, & Chang, 2007; US Department of Health and Human Services, 2000).

The common understanding of child neglect is the failure to provide a child with the basic necessities of his or her life such as food, clothing, shelter, and basic monitoring to protect him or her from harm. This is often described as physical neglect (Polonko, 2006). Emotional neglect implies a failure of the parents or caregivers to provide a child with the emotional and psychological nurturing that is required for normal development. Parents who are emotionally neglectful were described by Egeland et al. (1983) as “psychologically distant”. Additionally, Polonko (2006) lists a number of other subsets of neglect, including prenatal neglect, financial neglect, and community, societal, or “collective” neglect. To date, research demonstrates significant associations between child neglect and adverse long-term outcomes in the domains of cognitive and academic performance, emotional and psychological health, and physical health (Connell-Carrick & Scannapieco, 2006; Manly, Kim, Rogosch, & Cicchetti, 2001; Mills et al., 2011).

Despite this, neglect has previously been under-researched relative to physical and sexual abuse. Child physical abuse and sexual abuse have been extensively studied as risk factors for adverse long-term outcomes. Studies have linked physical abuse with problems in adolescence and early adulthood including delinquent and aggressive behaviour, violent offending, anxiety, depression, suicidality, post traumatic stress disorder (PTSD), and alcohol misuse (Fergusson & Lynskey, 1997; Grogan-Kaylor, Ruffolo, Ortega, & Clarke, 2008; Lansford et al., 2002; Manly et al., 2001; Springer, Sheridan, Kuo, & Carnes, 2007).

Retrospective surveys across a broad range of countries have consistently identified child sexual abuse as a major public health issue. In Australia, it has been estimated that among the adult population, approximately 15% of boys and 30% of girls experienced at least one exposure to an unwanted sexual act before the age of 16 (Dunne, Purdie, Cook, Boyle, &

Najman, 2003). Psychological problems such as PTSD, suicidality, deliberate self-harm, and alcohol misuse have been reported in subjects who experienced child sexual abuse (Cutajar et al., 2010; Fergusson, Horwood, & Lynskey, 1996; Gilbert et al., 2009; Tebbutt, Swanston, Oates, & O'Toole, 1997).

More recently, emotional maltreatment, also known as psychological abuse or maltreatment, has received increasing attention by researchers (Hamarman & Bernet, 2000; Trickett, Mennen, Kim, & Sang, 2009). Practically, emotional maltreatment consists of behaviors towards children such as rejection, isolation, terrorization, ignorance, corruption, verbal assault, and overpressuring behavior (Hamarman & Bernet, 2000). Thus, it can include acts of both commission and omission, with the latter often referred to as emotional neglect. The early indications are that emotional maltreatment is associated with abnormalities in development and psychological wellbeing (O'Dougherty Wright, Crawford, & Del Castillo, 2009; Shaffer, Yates, & Egeland, 2009).

The theoretical frameworks for understanding the developmental psychopathology associated with child maltreatment include social learning theory and other sociological models, attachment theory and other psychodynamic models, and ecological-transactional models (Sidebotham & Heron, 2006). A holistic ecological and developmental psychopathology approach draws together interrelations among the complex biological, psychological and social systems throughout the continuum of child development (Manly et al., 2001). The field of developmental neurobiology is identifying a set of neural pathways that appear to mediate the effect of adverse early childhood experiences on mental health problems in later life (Anda et al., 2006).

There have been a number of methodological weaknesses in many previous studies on the consequences of child maltreatment. The first common issue relates to definition and measurement of the maltreatment (Widom, Raphael, & DuMont, 2004). Developing a system to measure maltreatment that is at once prospective, highly sensitive, and ethical has generally eluded researchers. The most common method of measuring abuse and neglect is by retrospective self-report. This method has the advantage of being inexpensive and convenient. However, retrospective recall of childhood abuse may be inaccurate, and appears to be systematically influenced by the mental health of the adult respondent. That is, well-adjusted adults tend to under-report adverse childhood experiences, while those with psychological problems do not (Hardt & Rutter, 2004). It has also been shown that subjects' self-report of childhood abuse does not remain stable throughout their adulthood. There can be surprising discrepancies between the recall of siblings who were exposed to the same maltreatment, and failure to remember even agency-substantiated childhood abuse (Hardt & Rutter, 2004).

Another approach is to rely on contemporaneous parental disclosure of maltreatment during a longitudinal study. This approach was taken by Lansford et al (2002) and Keiley et al (2001). If this method is adopted, a major difficulty that can be encountered is establishing the threshold for reporting admitted cases of maltreatment to the relevant authorities, and the validity of the parents' self-report if they are aware that the investigators have the obligation to report.

Longitudinal, population-based cohort studies can potentially overcome these weaknesses. For example, the Avon Longitudinal Study of Parents and Children is one of a small number of prospective longitudinal studies to use contemporaneous independent reports of maltreatment (Sidebotham & Heron, 2006). However, this and other population-based birth cohort studies have not prospectively and objectively defined the exposure to different types of child maltreatment (e.g. physical abuse, sexual abuse, emotional abuse, and neglect). The

use of child maltreatment data obtained from the local statutory authority confers the potential benefit of a contemporaneous, impartial, third party assessment of maltreatment.

The disadvantage of prospective recording of child maltreatment using government agency data is the risk of underestimating the incidence of maltreatment due to under-recognition and under-reporting (McGee, Wolfe, Yuen, Wilson, & Carnochan, 1995). Furthermore, even when longitudinal population-based studies have examined the issue of child maltreatment, many have measured the exposure retrospectively, through recall (Boyle et al., 1987; Collishaw et al., 2007; Fergusson & Lynskey, 1997).

The second major issue in research into the consequences of child maltreatment is the failure of many studies to adjust for the adverse environmental conditions in which abuse and neglect often take place. Hence, identified associations may have been due, at least in part, to confounding factors such as parental poverty and lack of education (Horwitz, Widom, McLauchlin, & White, 2001; Maniglio, 2009).

The outcomes of different types of child maltreatment are considered to have some broad similarities. For example, physical and sexual abuse can both result in post-traumatic psychological problems (Briere & Elliott, 2003). However, there have been suggestions of some particularly strong associations between certain maltreatment types and outcomes – for example, studies to date have suggested that physical abuse may have the strongest association with subsequent externalizing behaviors such as delinquency and aggression (Grogan-Kaylor et al., 2008; Manly et al., 2001). Even more than the other types of maltreatment, neglect is considered to have a particularly strong association with adverse cognitive and academic outcomes (Mills et al., 2011).

The value of comparing and contrasting the outcomes of different maltreatment types is controversial. For example, it may appear superficially that physical and sexual abuse tend to be episodic, traumatic events whereas emotional abuse and neglect may be more chronic and pervasive (Egeland et al., 1983). However, it is well recognized that multiple maltreatment types often occur within the same family, a phenomenon that has been referred to as multi-type maltreatment (Arata, Langhinrichsen-Rohling, Bowers, & O'Brien, 2007) or polyvictimization (Finkelhor et al., 2009). Furthermore, distinguishing types of maltreatment by their episodic or traumatic nature is problematic. For example child neglect, which might otherwise be presumed to be chronic rather than episodic, has been recognized to be associated with PTSD. An example of how child neglect or emotional abuse could be episodic is in the case of maltreating parents who are intermittently affected by substances (Gilbert et al., 2009).

A small but growing body of literature has sought to construct hierarchical schemata to classify types of maltreatment, including observed patterns of multi-type maltreatment. In an expanded hierarchical classification, such as that proposed by Lau et al (2005), subjects who experience a single maltreatment type are classified into the relevant group (e.g. physical abuse, sexual abuse), whereas those who experience multi-type maltreatment are grouped according to clusters representing commonly co-occurring maltreatment types, e.g. physical abuse accompanied by emotional abuse or neglect. Examples of such studies are those by Hahm and colleagues (2010), Lau and colleagues (2005), and Trickett and co-authors (2011; 2009). The potential benefits of hierarchical schemata are that they permit comparison of the outcomes of different types of maltreatment, while also taking into account the propensity for multi-type maltreatment within maltreating families.

The outcomes of these studies using expanded hierarchical schemata to classify maltreatment histories have indicated that young people experiencing multi-type maltreatment are more likely to experience psychological dysfunction than singly maltreated

peers (Arata et al., 2007; Lau et al., 2005), and have suggested that multi-type maltreatment that includes sexual abuse may be particularly harmful (Hahm et al., 2010).

This study examines whether young people who are notified as cases of suspected maltreatment have higher rates of psychological problems in adolescence than their non-maltreated peers. Secondly, the study aims to identify whether different types of notified maltreatment (physical abuse, sexual abuse, neglect, or emotional abuse), alone or in combination using an expanded hierarchical scheme, are associated with different patterns of psychological problems.

Methods

Data sources

The Mater-University Study of Pregnancy (MUSP) is a longitudinal birth cohort study. Between 1981 and 1983, 8556 consecutive pregnant women attending the Mater Misericordiae Mothers' Hospital for their first prenatal visit were invited to participate (Keeping et al., 1989). Mothers were excluded if they declined to participate at either the first clinic visit or 3-5 day postnatal follow-up ($n=410$, 4.7%), had a multiple birth ($n=59$, 0.7%), experienced stillbirth or postnatal death of the infant ($n=99$, 1.2%), gave birth at a different hospital ($n=710$, 8.3%), or placed the baby for adoption ($n=55$, 0.6%). Therefore, the final cohort numbered 7223 mother and infant pairs (Najman et al., 2004).

At the first prenatal clinic visit, the women completed a detailed questionnaire covering topics such as demographic background and personal health. The mothers and children were further assessed when the children were aged 3 to 5 days, 6 months, 5 years, and 14 years. The follow-up rate at 5 years and 14 years was very similar (72.8% and 71.6% respectively) (Najman et al., 2004; O'Callaghan, O'Callaghan, Najman, Williams, & Bor, 2007).

The child maltreatment data in this study include notifications of physical, sexual, and emotional abuse, and neglect. This data was obtained from the records of the Queensland state child protection agency (Department of Families, Youth and Community Care - DFYCC), in September 2000. The child maltreatment data was linked anonymously to the MUSP longitudinal data as reported previously (Strathearn, Mamun, Najman, & O'Callaghan, 2009). The exposure to child maltreatment in this study is defined by the occurrence of one or more notifications to DFYCC that reached the threshold for formal investigation for suspected child maltreatment prior to September 2000, at which time the youngest members of the cohort were 16.5 years old. The children who were notified as suspected cases of maltreatment were recorded as to the type or types of suspected maltreatment – one or more of physical abuse, sexual abuse, neglect, and emotional abuse.

Outcome measures

The outcome variables were derived from the results of the Achenbach Youth Self-Report (YSR) questionnaires that were completed by the young people at, or close to, age 14 (Achenbach, 1991b). The outcomes used in this study were the two main summary YSR scales: internalizing behavior and externalizing behavior (Achenbach, 1991a). In the MUSP cohort, both scales had high internal reliability (Cronbach alpha 0.87 for each).

Both scales are widely used in child and adolescent psychological research, and for this study were selected for their complementary components, with most significant adolescent psychological symptoms included in one or the other scale. The internalizing scale comprises the total of the subscales of withdrawal, anxious/depressed, and somatic symptoms. The externalizing scale comprises the total of the aggression and delinquency

subscales. The internalizing scale consisted of 31 items, and the externalizing scale 30. Each item was scored 0, 1, or 2, with the score of 2 indicating the stated behavior was often true.

Potential confounding or modifying variables

Seven important potential confounding variables were used to adjust the observed associations of child maltreatment with internalizing and externalizing behaviors (Table 1). The young person's age (at completion of the YSR), gender and race were used for adjustment because of their associations with YSR outcomes. Additionally, four socioeconomic variables were selected to represent the well-recognized confounding effect of socioeconomic disadvantage on observed associations between child maltreatment and adverse outcomes. In the YSR cohort, maternal age, marital status, maternal educational achievement, and family income (all at first prenatal clinic visit) were selected. Each was strongly associated with both child maltreatment notification and YSR outcomes.

Statistical analysis

The primary analysis assessed whether notification for child maltreatment of any kind was associated with internalizing and externalizing behavior at the 14-year follow-up. Multivariate linear regression was used to adjust the observed association for the 7 variables outlined above. Unstandardized regression co-efficients were reported, which in this context can be thought of as mean differences in internalizing and externalizing scores.

The secondary hypothesis was that differing patterns of psychological outcomes would be seen among subjects who experienced differing types of maltreatment. First, univariate and multivariate linear regression was carried out using non-exclusive categories of reported maltreatment – physical abuse, sexual abuse, neglect, and emotional abuse. As with the primary analysis above, each type of maltreatment was assessed for its association with internalizing and externalizing behavior, and also adjusted for the 7 covariates.

Second, the maltreatment was categorized by an expanded hierarchical scheme – instead of non-exclusive categories, the subjects were categorized into mutually exclusive groups based on a hierarchical scheme similar to that described by Lau et al (2005). The details of the scheme were as follows: first, subjects notified as cases of only one type of maltreatment (physical abuse, sexual abuse, and neglect) were categorized in the relevant group.

Second, those notified only as cases of suspected emotional, or emotional abuse and neglect, but no notified physical or sexual abuse, were grouped together for two reasons. First, notification for emotional abuse alone was rare, occurring in only one followed-up subject. Second, there was an unavoidable qualitative overlap between the DFYCC constructs of neglect and emotional abuse – the contemporaneous definition of emotional abuse included acts that led to “emotional deprivation”, while the definition of neglect included the failure to provide children with the conditions for “healthy...emotional development” (p.144) (Strathearn, Gray, O'Callaghan, & Wood, 2001). Therefore, the failure to provide a child with affection and psychological nurturing (emotional neglect) could result in categorization as either neglect or emotional abuse.

Subjects notified as cases of suspected sexual abuse, plus any of the other types, were grouped together, and the final group consisted of young people notified as cases of physical abuse plus emotional abuse or neglect, but not sexual abuse. These maltreatment groups were then tested using multivariate linear regression, before and after adjustment, for their association with internalizing and externalizing behavior. Further, to more clearly define the significance of multi-type maltreatment when compared with single maltreatment types, post-estimation pairwise comparisons were used to compare the following groups: physical multi-type maltreatment with physical abuse alone; sexual multi-type maltreatment with

sexual abuse alone; and the emotional/neglect group, of whom all but one was notified for both, with neglect alone.

Two sensitivity analyses were performed, using the non-exclusive categories of reported maltreatment. First, the definition of exposure to maltreatment was narrowed to include only substantiated cases. Second, the analysis was repeated without excluding those who were first reported as suspected cases of maltreatment after the YSR at age 14 was completed.

All data analysis was undertaken using Stata 12 (Stata Corp, College Station, TX). The study was approved by the University of Queensland Behavioral and Social Sciences Ethical Review Committee, and the ethics committee of the Mater Children's Hospital, South Brisbane.

Results

Of the 7223 mother and child pairs in the original cohort, the DFYCC child protection history was available for 7214. Eight pairs were unable to be positively identified from the child protection record. One pair was inadvertently omitted from the child protection search. Of the 5172 (71.6%) participants who completed the YSR at approximately 14 years, a further six were excluded from analysis because they failed to answer 20 or more questions, leading to unreliable problem scores (Figure 1). The median age of subjects at completion of the YSR was 13.9 years (interquartile range 13.7 to 14.2 years).

There were significant differences between the mothers of the subjects who remained in the study at 14 and those who were lost to follow-up (Table 1). Those lost to follow up were more likely to have markers of low socioeconomic status, and the children were more likely to have been notified as suspected cases of maltreatment. Of the total cohort, 789 (10.9%) had been notified at least once to the DFYCC as a case of suspected maltreatment and investigation initiated – of these, 506 subjects (7.0% of cohort) had been subject to a substantiated notification. This included 82 subjects (1.1% of cohort) who had spent some time subject to a child protection order – these were the young people judged to be in need of protection, with the intervention usually involving out-of-home care.

Neglect was the most commonly notified type of maltreatment (500 subjects, 6.9% of cohort), followed by physical abuse (475 subjects, 6.6%), emotional abuse (446 subjects, 6.2%), and sexual abuse (259 subjects, 3.6%). A total of 522 subjects (7.2% of total cohort, or 66.2% of all notified subjects) were notified for 2 or more maltreatment types. Subjects notified as emotional abuse cases were the most likely to have been notified for another maltreatment type (97%), followed by physical abuse (88%), neglect (76%), and sexual abuse (74%).

Of the 5166 who adequately completed the YSR, 425 (8.2%) were notified, of whom 258 (5.0%) had been substantiated as maltreatment cases at least once. Only 19 (0.04%) had been subject to a child protection order. This lower incidence of maltreatment in the followed up group is consistent with the findings demonstrated in Table 1 that the group lost to follow up were more likely to be socioeconomically disadvantaged, and to have been notified as suspected cases of maltreatment.

Of the 425 followed-up subjects who were notified at least once as cases of suspected maltreatment, 68 were notified for the first time after completing the YSR and were therefore excluded from analysis. After this exclusion, the median age of first notification for the subjects available for analysis was 6.3 years (interquartile range 3.1 to 11.1 years). One subject did not have the type of maltreatment documented, and was included in the

analysis of notifications of suspected maltreatment, but excluded from the analysis of maltreatment types.

Of the 357 remaining notified subjects, classification according to the expanded hierarchical scheme was as follows: physical abuse only, 28 (8%); sexual abuse only, 47 (13%); neglect only, 49 (14%); emotional +/- neglect, 25 (7%); sexual multi-type maltreatment, 72 (20%); and physical (not sexual) multi-type maltreatment, 136 (38%). Of the final physical multi-type group, 115 (85%) had been notified additionally for emotional abuse, and 86 (64%) for neglect. Among the 72 subjects in the final sexual multi-type group, 67 (93%) had been notified for emotional abuse or neglect, and 43 (60%) for physical abuse.

The identity of the alleged perpetrator/s was only available for the substantiated cases (229 of the 357 subjects notified before completing the YSR, 64%): the mother alone was listed for 56 (24%); the father alone was listed for 45 (20%); two or more parent figures (biological or step parents) were listed for 70 (31%); the mother's partner/step father alone was listed for 10 (4%); other combinations and non-parents were recorded for 40 (17%); and perpetrator data were missing for 8 (3%).

Internalizing

The mean internalizing raw score for the whole cohort was 13.55 (SD 7.73), which is comparable with published international norms (Achenbach & Rescorla, 2007). Both before and after adjustment for sociodemographic covariates, notified maltreatment was significantly associated with internalizing behavior at 14 years of age (adjusted regression coefficient 1.70, 95% CI 0.83 to 2.56) (Table 2). Similarly, physical abuse, neglect, and emotional abuse were all associated with internalizing behavior both before and after adjustment (Table 2). The adjusted unstandardized regression coefficient for notified emotional abuse was 2.81 (95% CI 1.64 to 3.97); for physical abuse, 1.76 (95% CI 0.63 to 2.90); and for neglect, 1.88 (95% CI 0.74 to 3.02). Reported sexual abuse, as a non-exclusive category, was associated with internalizing behavior before adjustment, before not after adjustment (Table 2).

When analyzed according to the expanded hierarchical categorization (Table 3), the groups with significant increases in internalizing behavior after adjustment were the emotional/neglect group (adjusted regression coefficient 4.24, 95% CI 1.27 to 7.21) and the physical plus emotional/neglect group (coefficient 1.85, 95% CI 0.46 to 3.24). Despite higher point estimates, these were not significantly higher than the corresponding single-type maltreatment groups on post-estimation pairwise testing (Table 3).

Externalizing

The mean externalizing raw score for the cohort was 12.92 (SD 7.40). Notified maltreatment was associated with externalizing behavior before and after adjustment (adjusted regression coefficient 2.16, 95% CI 1.33 to 2.99) (Table 4). Physical abuse (coefficient 2.29, 95% CI 1.20 to 3.38), neglect (coefficient 2.90, 95% CI 1.81 to 4.00), and emotional abuse (coefficient 3.41, 95% CI 2.29 to 4.53) were all associated with externalizing behavior after adjustment for sociodemographic variables. Sexual abuse was associated with externalizing behavior before, but not after, adjustment (Table 4).

When analyzed according to the expanded hierarchical scheme (Table 5), the emotional/neglect group (adjusted regression coefficient 6.24, 95% CI 3.39 to 9.09), physical plus emotional/neglect group (coefficient 2.51, 95% CI 1.17 to 3.84), and sexual multi-type group (coefficient 2.41, 95% CI 0.63 to 4.20) had higher levels of externalizing behavior after adjustment for sociodemographic variables. The sexual multi-type group had significantly higher externalizing behavior scores than the corresponding single-type

maltreatment group on pairwise testing, as did the comparison of the emotional/neglect group with neglect alone (Table 5).

Sensitivity analyses

The analysis of non-exclusive maltreatment groups was also conducted using only substantiated cases of maltreatment to define the exposure. The results are shown in Table 2 and Table 4 for internalizing and externalizing, respectively. In relation to internalizing behavior, after adjusting for the sociodemographic covariates, substantiated neglect was associated with increased internalizing behavior (adjusted regression coefficient 3.88, 95% CI 2.30 to 5.46), as were emotional abuse (coefficient 3.38, 95% CI 1.88 to 4.87), and physical abuse (coefficient 2.25, 95% CI 0.76 to 3.74).

Regarding externalizing behavior, physical abuse (adjusted regression coefficient 2.90, 95% CI 1.47 to 4.33), neglect (coefficient 3.17, 95% CI 1.65, 4.69), and emotional abuse (coefficient 2.88, 95% CI 1.44 to 4.31) were all associated with increased externalizing behavior after adjustment for sociodemographic factors.

A final sensitivity analysis was performed by including the subjects who were first notified for suspected exposure to maltreatment after completing the YSR. This added 68 subjects to the analysis. The results were not substantially different than when these subjects had been excluded (data not shown).

Discussion

This study has found that in a large, population-based cohort, adolescents who were notified for suspected exposure to child maltreatment had higher rates of internalizing and externalizing behavior when compared with their non-maltreated peers. These findings are broadly consistent with those of an extensive literature on child maltreatment, across studies of differing methodologies and populations (Fergusson & Lynskey, 1997; Horwitz et al., 2001; Lansford et al., 2002). A major associated finding was the strong association of multi-type maltreatment, particularly including neglect and emotional abuse, with adverse outcomes. This has not previously been documented in a prospective population-based birth cohort.

It was found that notification as a suspected case of child maltreatment was associated with an increase in internalizing behavior of approximately one fifth of a standard deviation, and in externalizing behavior of approximately one quarter of a standard deviation, after adjusting for a range of relevant sociodemographic factors. In addition to suffering experienced by the maltreated adolescents themselves, this is important because of the cost of antisocial behavior to society, which has been estimated at 10 times the cost incurred by non-antisocial young people by 28 years of age (Scott, Knapp, Henderson, & Maughan, 2001).

A distinctive feature of this population-based study is that it was able to prospectively examine the associations between different maltreatment types, as recorded by the external government agency, and adverse adolescent psychological outcomes. Therefore, it was not subject to the recall bias that can affect research based on retrospective recall of child maltreatment (Widom et al., 2004). After adjusting for sociodemographic factors, emotional abuse, neglect, and physical abuse were significantly associated with increased internalizing behavior. Physical abuse, neglect, and emotional abuse were also strongly associated with externalizing behavior.

It is well documented that each type of maltreatment rarely occurs in isolation. Emotional abuse, in particular, is often accompanied by other forms of maltreatment such as physical abuse (Trickett et al., 2009). This study's data also permitted categorization of the notified subjects into an expanded hierarchical scheme that allowed further analysis of the outcomes of multi-type maltreatment in this cohort. This study confirmed the importance of multi-type maltreatment as an antecedent of adolescent mental health problems. Specifically, both internalizing and externalizing behavior were significantly elevated in the groups notified for emotional abuse and neglect, with or without physical abuse.

With regard to multi-type maltreatment including sexual abuse, of whom 93% had been notified for emotional abuse and/or neglect, the additional maltreatment types were associated with an elevation of externalizing behavior significantly higher than sexual abuse alone. Some studies using hierarchical classification schemata have concluded that multi-type maltreatment including sexual abuse is perhaps the most harmful pattern of all (Hahm et al., 2010; Lau et al., 2005; Pears, Kim, & Fisher, 2008). The subjects in two of these studies (Lau et al., 2005; Pears et al., 2008) were children known to the child protective services, with resultant higher rates of multi-type maltreatment overall. Hahm et al. (2010) was a study of self-reported child maltreatment in adolescent female participants in a longitudinal study.

The finding of this present study, using a large population-based birth cohort, that emotional abuse and neglect appear to be more consistently correlated with adverse psychological outcomes in adolescence than sexual abuse, is more closely aligned with other studies that used a non-protective services sample, such as Arata et al. (2007) (urban high school sample) and Loos & Alexander (1997) (college undergraduates).

Much research into early childhood experiences emphasizes traumatic childhood experiences such as physical or sexual abuse, with relatively less emphasis on emotional abuse and neglect (Dube et al., 2005; Lansford et al., 2002). However, one recent review suggested that maternal neglect – particularly emotional neglect – might result in altered development of brain reward and oxytocin systems in the offspring, which may lead to impaired parental care giving in the subsequent generation (Strathearn, 2011). The current results suggest that neglect and emotional abuse needs to be given at least as much attention as physical and sexual abuse as potential sources of long-term psychological dysfunction.

Existing literature that provides strong support for the prominence of neglect and emotional abuse as causes of later mental health problems includes that by Egeland and colleagues, who in 1983 reported a group of parents among an at-risk cohort whose disengaged behavior towards their children was described as “psychologically unavailable” (Egeland, 1997; Egeland et al., 1983; Shaffer et al., 2009). The associations of this subtle emotional maltreatment were poor infant and toddler attachment, behavioral problems and academic difficulties in early schooling, and mental health problems in adolescence (Egeland, 1997; Egeland et al., 1983; Erickson & Egeland, 1996).

An unanticipated result of this study was the relative lack of association between sexual abuse and adverse psychological outcome in adolescence. The exception to this was the group that was reported for both sexual abuse and one or more additional maltreatment types, mostly neglect and/or emotional abuse, as discussed above. A number of factors can be postulated for the relatively weak correlation between sexual abuse and adverse psychological outcomes in this study.

First, it may be at least partly due to chance or bias – the incidence of agency-reported sexual abuse in the cohort was lower than that of the other maltreatment types, and only 3.6% of the total cohort. Given that self-reported rate of child sexual abuse is much higher

than this, recently estimated at 12.7% worldwide (Stoltenborgh, van Ijzendoorn, Euser, & Bakermans-Kranenburg, 2011), the possibility remains that the small cohort of notified sexual abuse cases in this study are not representative of sexually abused young people in general, either by chance or another unknown factor related to the process of being notified to the government agency. Thus, a proportion of participants classified as not exposed to sexual abuse may be false negatives. Second, no data was available that detailed interventions the children received after notification – one may speculate that children notified for sexual abuse may have received effective interventions, but we are unable to test this hypothesis, and it could apply equally to interventions for other maltreatment types.

Finally, the possibility remains that while sexual abuse is widely accepted to be highly relevant as a cause of psychopathology at a clinical level, on a population level its effects are only minimally evident (Rind, Tromovitch, & Bauserman, 1998), and where associated psychopathology is present, consideration needs to be given to the co-occurrence and impact of other maltreatment types.

This study raises the possibility that emotional abuse and neglect is responsible for a significant proportion of child maltreatment-related psychopathology in adolescents, including in those young people who primarily come to the attention of the authorities due to suspected physical or sexual abuse. It adds weight to the contention by other researchers that the variability of the observed outcomes of childhood physical and sexual abuse across different studies is likely to be due to confounding by not only socioeconomic factors, but other family dysfunction including co-existing neglect and emotional abuse (Crouch, Milner, & Thomsen, 2001; Griffin & Maryann, 2010).

There are a number of limitations of the present study that require acknowledgement. First, the child protection agency data almost certainly underestimates the proportion of young people in the cohort who experienced each type of maltreatment, and also the rate of multi-type maltreatment. For example, an even higher proportion of young people in the physical or sexual abuse group may have also experienced neglect, and *vice versa* (Mennen, Kim, Sang, & Trickett, 2010). However, such misclassification would result in an underestimation of any association between maltreatment and psychological outcome. This applies to comparisons between maltreated and non-maltreated subjects, and also between singly and multiply maltreated subjects.

It is clear that the subjects who had been notified for suspected exposure to maltreatment had a higher attrition rate in this study than their non-notified peers (Table 1). Therefore, the possibility of attrition bias exists. However, the birth cohort design allows us to observe the associations between the baseline sociodemographic variables and our outcome variables. These suggest that attrition in this cohort is much more likely to result in underestimation of the association between child maltreatment and adverse psychological outcome, rather than overestimation.

Conclusions

This study suggests that the experience of neglect or emotional abuse is at least as important a determinant of adolescent mental health as physical or sexual abuse. Further prospective, longitudinal research with even larger cohorts is required to more precisely define the complex interactions between different types and severity of child maltreatment, long-term psychological outcomes, and the genetic and social milieu in which they occur. Other complex issues arise from this study, including the capacity of child protection services to identify and intervene in cases of emotional abuse and neglect, given the high workload of

physical and sexual abuse cases. This study gives further impetus for ongoing research in this field.

Acknowledgments

The authors thank the MUSP team, participants, Mater Misericordiae Hospital, and the University of Queensland (Schools of Social Science, Population Health, and Medicine). The study was primarily funded by the National Health and Medical Research Council (NHMRC). Rosa Alati is funded by a NHMRC Career Development Award (CDA) Level 2 (ID Number: APP1012485). Lane Strathearn was supported by Award Number R01DA026437 from the National Institute on Drug Abuse, and Award Number R01HD065819 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development. The content is solely the responsibility of the authors and does not necessarily represent the views of the U.S. National Institutes of Health, the Australian National Health and Medical Research Council, or other supporting agencies.

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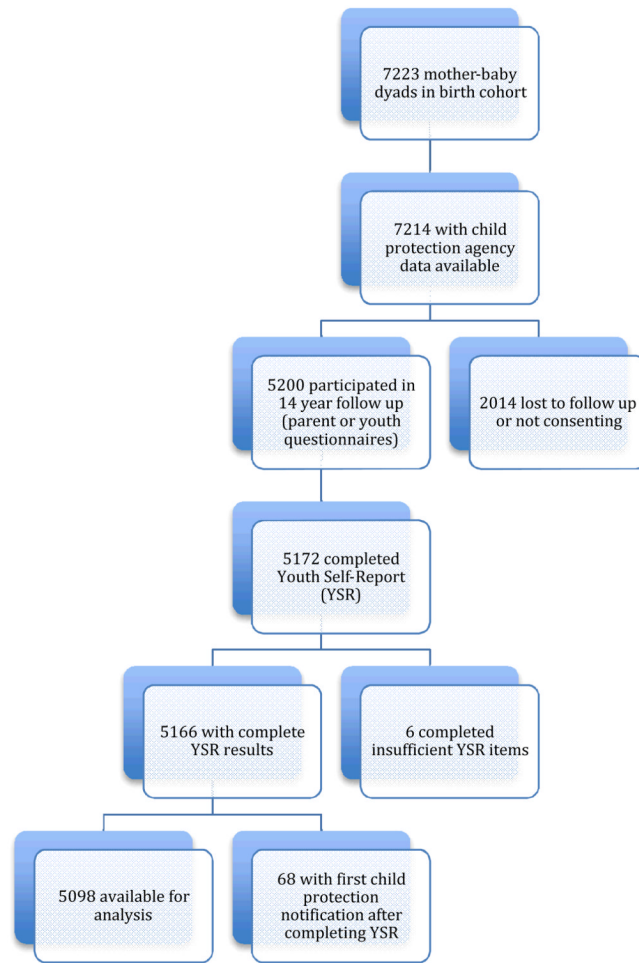


Figure 1.
Flow of subjects through MUSP study.

Table 1

Characteristics of cohort, by completion of YSR at 14 year follow-up.

Characteristic	N (of 7214)	Completed YSR (%)	χ^2, p	Maltreatment notification (%)	χ^2, p
<i>Maltreatment notification</i>					
No notifications	6425	73.9	134.8, <0.001	0	N/A
Any notification	789	54.1		100.0	
<i>Type of notified maltreatment (exclusive categories)</i>					
Physical abuse only	59	62.7		100.0	
Sexual abuse only	67	74.6		100.0	
Neglect only	121	53.7	159.5, <0.001	100.0	N/A
Emotional +/- neglect	64	46.9		100.0	
Sexual + 1 or more other	192	43.8		100.0	
Physical + neglect or emotional	281	56.9		100.0	
<i>Gender</i>					
Male	3755	71.3	0.54, 0.461	10.1	5.4, 0.02
Female	3459	72.1		11.8	
<i>Race</i>					
White	6250	73.4		10.7	
Aboriginal-Islander	444	53.4		17.6	
Asian	307	61.9	97.5, <0.001	7.8	24.1, <0.001
Other/not specified	213	74.2		9.4	
<i>Maternal age in pregnancy</i>					
13-19	1178	61.1		20.0	
20-34	5718	73.7	77.6, <0.001	9.4	123.8, <0.001
35+	318	74.2		5.7	
<i>Marital status in pregnancy</i>					
Married	5380	76.3		8.0	
Single	735	59.6	223.6, <0.001	21.1	201.9, <0.001

Characteristic	N (of 7214)	Completed YSR (%)	Maltreatment notification (%)
Living together	843	57.5	18.0
Separated-divorced-widowed	193	53.9	23.8
<i>Family income (annual) prior to birth</i>			
<=\$10399	2304	64.1	126.9, <0.001
>\$10400	4436	77.0	16.1
			106.8, <0.001
<i>Maternal education status in pregnancy</i>			
Incomplete high school	1304	66.4	19.1
Completed high school	4601	72.2	27.7, <0.001
Post high school	1256	75.6	10.0
			132.8, <0.001
			5.4

Table 2

Regression coefficients for internalizing behavior (YSR at 14 years), according to maltreatment notification and substantiation (non-exclusive categories).

	Unadjusted coefficient (n=5098)(95%CI)		Adjusted coefficient ^I (n=4798)(95% CI)	
No notified maltreatment	0.0	<i>p</i>	0.0	<i>p</i>
Any notified maltreatment	2.08 (1.25, 2.91)	<0.001	1.70 (0.83, 2.56)	<0.001
Physical abuse	1.97 (0.90, 3.05)	<0.001	1.76 (0.63, 2.90)	0.002
Sexual abuse	2.14 (0.73, 3.54)	0.003	1.29 (−0.15, 2.73)	0.079
Neglect	2.13 (1.05, 3.22)	<0.001	1.88 (0.74, 3.02)	0.001
Emotional abuse	3.06 (1.94, 4.19)	<0.001	2.81 (1.64, 3.97)	<0.001
No substantiated notification	0.0		0.0	
Any substantiated notification	2.45 (1.43, 3.47)	<0.001	2.13 (1.07, 3.19)	<0.001
Physical abuse	2.28 (0.84, 3.71)	0.002	2.25 (0.76, 3.74)	0.003
Sexual abuse	1.66 (−0.15, 3.47)	0.073	0.91 (−0.93, 2.76)	0.333
Neglect	4.00 (2.51, 5.50)	<0.001	3.88 (2.30, 5.46)	<0.001
Emotional abuse	3.73 (2.30, 5.16)	<0.001	3.38 (1.88, 4.87)	<0.001

^I Variables used in adjustment were: gender, age at completion, race, mother's age, marital status, family income, maternal education.

Table 3

Associations between notified maltreatment classification (exclusive categories) and internalizing behavior (YSR) at age 14.

	Number completing YSR	Unadjusted coefficient (n=5098) (95% CI)	Adjusted coefficient ^f (n=4799) (95% CI)	P value
No notification	4746		0.0	N/A
(a) Physical abuse only	28	0.95 (-1.92, 3.81)	0.72 (-2.25, 3.69)	0.635
(b) Sexual abuse only	47	2.27 (0.05, 4.48)	1.08 (-1.14, 3.30)	0.341
(c) Neglect only	49	1.36 (-0.81, 3.53)	1.25 (-1.00, 3.49)	0.275
(d) Emotional +/- neglect	25	4.51 (1.47, 7.54)	4.24 (1.27, 7.21)	0.005
(e) Sexual multi-type (+ emotional/neglect/physical)	72	2.21 (0.41, 4.00)	1.65 (-0.20, 3.51)	0.081
(f) Physical multi-type (+ emotional/neglect)	136	2.01 (0.69, 3.33)	1.85 (0.46, 3.24)	0.009

^f Variables used in adjustment were: gender, age at completion, race, mother's age, marital status, family income, maternal education. Pairwise comparisons of adjusted associations: (a) vs (f): p=0.495; (b) vs (e): p=0.693; (c) vs (d): p=0.112

Table 4

Regression coefficients for externalizing behavior (YSR at 14 years), according to maltreatment notification and substantiation (non-exclusive categories).

	Unadjusted coefficient (n=5098)(95%CI)		Adjusted coefficient ^I (n=4798)(95% CI)	
No notified maltreatment	0.0	<i>p</i>	0.0	<i>p</i>
Any notified maltreatment	2.77 (1.99, 3.56)	<0.001	2.16 (1.33, 2.99)	<0.001
Physical abuse	3.01 (1.99, 4.03)	<0.001	2.29 (1.20, 3.38)	<0.001
Sexual abuse	1.64 (0.31, 2.97)	0.016	1.00 (−0.38, 2.39)	0.155
Neglect	3.67 (2.65, 4.69)	<0.001	2.90 (1.81, 4.00)	<0.001
Emotional abuse	4.04 (2.98, 5.11)	<0.001	3.41 (2.29, 4.53)	<0.001
No substantiated notification	0.0		0.0	
Any substantiated notification	3.03 (2.06, 4.00)	<0.001	2.28 (1.26, 3.30)	<0.001
Physical abuse	3.89 (2.53, 5.25)	<0.001	2.90 (1.47, 4.33)	<0.001
Sexual abuse	1.34 (−0.37, 3.06)	0.125	0.42 (−1.36, 2.19)	0.646
Neglect	3.91 (2.49, 5.33)	<0.001	3.17 (1.65, 4.69)	<0.001
Emotional abuse	3.66 (2.31, 5.02)	<0.001	2.88 (1.44, 4.31)	<0.001

^I Variables used in adjustment were: gender, age at completion, race, mother's age, marital status, family income, maternal education.

Table 5

Associations between notified maltreatment classification (exclusive categories) and externalizing behavior (YSR) at age 14.

	Number completing YSR	Unadjusted coefficient (n=5098) (95% CI)	Adjusted coefficient (n=4799) (95% CI)	P value
No notification	4746	0.0	N/A	N/A
(a) Physical abuse only	28	1.58 (-1.13, 4.28)	1.35 (-1.50, 4.20)	0.352
(b) Sexual abuse only	47	0.00 (-2.10, 2.09)	-0.58 (-2.71, 1.55)	0.595
(c) Neglect only	49	2.28 (0.23, 4.33)	1.96 (-0.19, 4.12)	0.074
(d) Emotional +/- neglect	25	6.96 (4.10, 9.83)	6.24 (3.39, 9.09)	<0.001
(e) Sexual multi-type (+ emotional/neglect/physical)	72	2.97 (1.28, 4.67)	2.41 (0.63, 4.20)	0.008
(f) Physical multi-type (+ emotional/neglect)	136	3.32 (2.07, 4.56)	2.51 (1.17, 3.84)	<0.001

*I*² Variables used in adjustment were: gender, age at completion, race, mother's age, marital status, family income, maternal education. Pairwise comparisons of adjusted associations: (a) vs (f): p=0.471; (b) vs (e): p=0.033; (c) vs (d): p=0.018