Disentangling the mental health impact of childhood abuse and neglect

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Abstract

It is unclear whether maltreatment types exert common or specific effects on mental health. In the current study, we aimed to systematically characterize the unique, shared and cumulative effects of maltreatment types on psychiatric symptoms, using data drawn from a community sample of high-risk youth ($n = 204$, M = 18.85). Analyses controlled for a range of potentially confounding variables, including socio-demographic variables, neighbourhood deprivation and levels of community violence exposure. Outcome measures included multi-informant reports of internalizing difficulties, as well as data on externalizing problems and trauma-related symptoms. We found that (i) consistent with previous studies, maltreatment types were highly interrelated and frequently co-occurred; (ii) symptom severity linearly increased with the number of maltreatment types experienced (more so for self-report vs informant ratings); and (iii) while most forms of maltreatment were significantly associated with mental health outcomes when examined individually, few unique effects were observed when modelling maltreatment types simultaneously, pointing to an important role of shared variance in driving maltreatment effects on mental health. Emotional abuse emerged as the main independent predictor of psychiatric symptomatology – over and above other maltreatment types – and this effect was comparable for males and females (i.e. no significant interaction with sex). Findings contribute to a better understanding of heterogeneity in individual responses to maltreatment.

Introduction

In recent decades, the deleterious effects of maltreatment on child development and wellbeing have been well documented (Cicchetti & Toth, 2005; McCrory, De Brito, & Viding, 2012). Nevertheless, understanding the causes of heterogeneity in individuals' responses to maltreatment continues to represent an important challenge for researchers and practitioners alike (Afifi & Macmillan, 2011). One factor that may contribute to such individual heterogeneity is the type of maltreatment experienced; that is, whether distinct forms of abuse and neglect are associated with increased risk for specific mental health problems. To date, however, the empirical literature has been largely inconsistent. While a number of studies have reported generic, non-specific associations between types of maltreatment and individual outcomes, including anxiety, depression, suicide risk, rule-breaking and substance use (e.g. Green et al., 2010; Norman, Byambaa, De, Butchart, Scott & Vos, 2012; Torchalla, Strehlau, Li, Schuetz, & Krausz, 2012; Vachon, Krueger, Rogosch, & Cicchetti, 2015), others have provided evidence for differential effects, with the most consistent evidence relating to the impact of physical abuse on externalizing difficulties. Specifically, a number of studies based on child and adult populations have reported a unique association between history of physical abuse and multiple outcomes related to externalizing difficulties, including conduct problems, impulsivity, anger, aggression, disruptive and delinquent behaviours as well as number of violent offences committed (Cohen, Brown & Smailes, 2001; Litrownik et al., 2005; Petrenko, Friend, Garrido, Taussig, & Culhane, 2012; van der Put, Lanctot, de Ruiter, & van Vugt, 2015). Still another set of studies has suggested that the *number* of maltreatment types experienced – rather than the specific *type* itself – may be a more informative predictor of mental health outcomes, whereby exposure to a higher number of maltreatment types linearly predicts greater symptom severity (i.e. cumulative effects; Arata, Langhinrichsen-Rohling, Bowers, & O'Brien, 2007; Finkelhor, Ormrod, & Turner, 2007; Finkelhor, Ormrod, & Turner, 2009; Lauterbach & Armour, 2016). As such, it remains unclear whether maltreatment effects are driven by what is common to all maltreatment types (i.e. shared variance) versus what is specific to a particular maltreatment type (i.e. unique variance). Further research is needed to disambiguate these influences, as the presence of differential effects may carry important implications for risk assessment, treatment formulation and the development of more targeted prevention strategies.

Much of what is known regarding maltreatment effects has come from studies that have focused on specific forms of abuse or neglect in isolation. However, it is increasingly evident that maltreatment types are significantly correlated, so that experience of one form of

maltreatment increases the likelihood of another one also being experienced (Arata at al., 2007; Higgins & McCabe, 2003; Herrenkhol & Herrenkhol, 2009). Furthermore, available data on prevalence estimates suggests that children often experience multiple forms of maltreatment while growing up (Dong et al., 2004; Finkelhor et al., 2007; Saunders, 2003; Turner, Finkelhor, & Ormrod, 2010). Consequently, a failure to consider all maltreatment types is likely to be problematic and result in an overestimation of effects attributed to individual forms of maltreatment, as it assumes that these forms occur independently from one another (Fallon et al., 2010; Higgins & McCabe, 2001; Herrenkhol & Herrenkohl, 2009). To this end, a growing number of studies have begun to examine multiple forms of maltreatment concurrently (e.g. Lau et al., 2005; Petrenko, et al., 2012; Torchalla et al., 2012; Lewis, McElroy, Harlaar, & Runyan; 2016; Lauterbach & Armour, 2016; Villodas et al., 2012). While some consistent findings have emerged, particularly with regards to the unique effect of physical abuse on externalizing difficulties (Cohen, Brown & Smailes, 2001; Litrownik et al., 2005; Petrenko et al., 2012; van der Put et al., 2015), evidence of other unique effects has been more equivocal. For example, an independent effect of sexual abuse on internalizing and externalizing problems has been observed in some studies (e.g. Lewis, McElroy, Harlaar, & Runyan; 2016), but not others (e.g. Vachon et al., 2015). In addition to sampling and measurement differences, mixed findings in the literature may stem from considerable variations across studies in factors such as (i) the number of maltreatment types assessed, (ii) the analytical strategy employed, and (iii) the type of covariates included (Higgins & McCabe, 2001; Petrenko et al., 2012; Arata et al., 2007).

Firstly, studies examining multiple forms of maltreatment concurrently have often varied in the number of maltreatment types assessed. While physical and sexual abuse have featured predominantly within these studies, the inclusion of other maltreatment types has been more inconsistent, particularly with regards to emotional abuse. In some cases, emotional abuse has been excluded on the basis that it may be inherent to all other forms of maltreatment and may not represent a unitary construct (e.g. Petrenko et al., 2012). In other cases, emotional abuse has been examined separately and has been found to be a significant independent contributor to mental health difficulties (e.g. Arata et al., 2007). It is important to clarify the nature and scope of effects associated with emotional abuse, particularly as it has been shown to be as a highly prevalent yet often overlooked form of maltreatment (Rees, 2009).

Second, studies have tended to adopt a categorical approach when assessing the relationship between maltreatment types and mental health outcomes. Often individuals are assigned to discrete categories that index different combinations of maltreatment types and groups are then compared in order to test for differential effects. However, the disadvantage of this approach is that it relies extensively on subjective decisions about what methodology to use in order to derive groups (e.g. person-centred latent class analysis, Witt, Munzer, Ganser, Fegert, Goldbeck & Plener, 2016; hierarchical classification, Lau et al., 2005; severity-based classification; Arata et al., 2007), and how many combinations of maltreatment types to include, both issues that may contribute to differences in findings across studies. Furthermore, the use of discrete categories precludes the possibility of establishing whether maltreatment effects are driven by unique or shared variance between maltreatment types. In contrast, regression approaches can be used to isolate the effects of individual maltreatment types, over and above all other forms of maltreatment. To date, however, few studies have made use of this approach to identify differential effects while including all maltreatment types concurrently (e.g. Arata et al., 2007; Torchalla, et al., 2012).

Third, existing studies have varied in the number and type of covariates included. While many studies have not examined potential confounds in the association between maltreatment and mental health outcomes (see Higgins & McCabe, 2001, for a review), some have controlled for differences in demographic characteristics, such as participant age and sex (e.g. Taussig et al., 2002; Sullivan et al., 2006). Very few studies have adjusted for socio-economic disadvantage, even though maltreatment is known to cluster in geographical areas characterized by increased poverty, also a predictor of poorer mental health outcomes (Evans & Cassells, 2014). In addition, no study to our knowledge has examined the effects of maltreatment types while controlling for other forms of adversity, such as community violence exposure (CVE; Petrenko et al., 2012). CVE may be a particularly important confound as it has been shown to co-occur with maltreatment (Cecil et al., 2014), and also increase risk of negative mental health outcomes (Margolin & Gordis, 2000).

To address these research gaps, we aimed to systematically characterize the unique, shared and cumulative effects of maltreatment types on a broad range of mental health domains within a community sample of high-risk youth (age 16-24). Outcomes examined included multi-informant reports of internalizing problems as well as ratings of externalizing difficulties and trauma-related symptomatology. By controlling for demographic characteristics, neighbourhood deprivation and current levels of community violence exposure we excluded the contribution of these possible confounds in all analyses. Based on

previous studies, we predicted that maltreatment types would be significantly interrelated and that youth who experienced multiple forms of maltreatment while growing up would show more severe psychiatric symptoms. In addition, we predicted that few differential effects would be evident when all maltreatment types were examined concurrently, but that physical abuse would be independently associated with externalizing difficulties. No a priori hypotheses were made for other differential effects, as the evidence so far has been largely inconsistent regarding unique vs shared associations between other maltreatment types and psychopathological outcomes.

Methods

Participants

The present sample comprised of 204 inner-city youth aged 16 to 24 years ($M = 18.85$). Multiple recruitment channels were used in order to include individuals with varying exposure to childhood maltreatment. Of the total sample, 48% ($n = 98$) were recruited from a children's mental health charity, who provided comprehensive services to vulnerable inner-city youth (typically via self-referral), the majority of whom were exposed to developmental adversity, such as poverty, childhood maltreatment and violence exposure. The other 52% ($n = 106$) were recruited via London-based secondary schools ($n = 78$) and internet websites ($n = 28$). Of the total sample, 53% were girls ($n = 108$). The sample was ethnically diverse, with 44% Caucasian, 41% Black, 10% Mixed, and 5% Asian participants.

Procedure

All procedures were approved by the University College London (UCL) Research Ethics Committee (ID No: 2462/001). Charity staff introduced young people to the research; interested participants then met with one of the research team who provided additional information about the study. As a result, all of the youth who met with the researchers had shown interest in the study and agreed to participate. After the testing session, a key worker from the charity who knew each participant well completed a short questionnaire booklet. Participants from schools received information about the research during a brief presentation and students interested in the research were provided with additional information. Out of the participants who initially consented to take part in the study, 89.6% attended the agreed time slots and completed the testing session. After the testing session, a teacher who knew each participant well completed the questionnaire booklet. Participants recruited via websites (Gumtree, Experimatch, UCL Psychology subject pool) were provided information about the

study online, and interested individuals were asked to fill in a brief screening form, so that it could be ensured that only participants with similar socio-demographic characteristics to youth recruited in other sites (i.e. charity and schools) were included in the study (i.e. age, sex, ethnicity and level of neighbourhood deprivation). Eligible participants were asked to select a time slot for the testing session. Participants who described themselves as students were additionally asked to provide details of a teacher who knew them well, so that the questionnaire booklet could be completed. All participants in the present study provided informed consent prior to participation. Because participants were aged 16 years and above, parental consent was not required. Testing took place in a quiet room within the charity, the young person's school or at UCL depending on recruitment source. Participants from the charity and from websites were compensated for their time individually; however students recruited from school settings received group compensation for school equipment or a final year party in line with head-teacher preferences. Of all informant ratings, 54% were provided by key workers and 46% were provided by teachers. Informant reports were not available for participants recruited from internet websites, due to (i) participant not being currently in education (N = 23, 82.2%); (ii) unwillingness to provide teacher information (N = 3, 10.7%); (ii) teacher non-response (N = 2, 7.1%). Further information about recruitment strategy is available elsewhere (Cecil et al., 2014). Details of how recruitment sites compare in relation to the study variables are presented in Supplementary Table 1.

Measures

Childhood maltreatment. Childhood maltreatment was assessed using the Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998). The CTQ is a 28-item self-report measure screening for experiences of maltreatment "while growing up". The CTQ comprises of 5 subscales measuring emotional abuse (e.g. "people in my family said hurtful or insulting things to me"), physical abuse (e.g. "I got hit or beaten so hardly that it was noticed by someone like a teacher, neighbour or doctor"), sexual abuse (e.g. "someone tried to make me do sexual things or watch sexual things"), emotional neglect (e.g. "my family was a source of strength and support", reversed) and physical neglect ("my parents were too drunk or high to take care of the family"). Items are rated on a 5-point Likert scale measuring frequency of occurrence, where 0 = 'never true', 1 = 'rarely true', 2= 'sometimes true', 3 = 'often true' and 4 = 'very often true'. The scales show high internal consistency in our sample (α = .70 – .97). Depending on the specific analysis performed (see Statistical Analysis section), CTQ subscales were examined either as continuous variables (i.e. full scoring range of 0-25 for

each type of maltreatment) or as categorical variables, based on severity thresholds specified in the CTQ manual (i.e. None, Low, Moderate and Severe; Bernstein & Fink, 1998). By including 'I currently feel unsafe at home' as an additional yes/no item we were able to ascertain that none of the participants included in the study currently felt vulnerable to violence in the domestic environment (e.g. by family or partner), although this does not preclude the possibility that abuse or neglect may have occurred outside of the home.

Psychiatric symptoms. Psychiatric symptoms were assessed making use of both informant- and self-report measures. Teachers or key workers completed four subscales from the DSM-IV based Adolescent Symptom Inventory (ASI; Gadow & Sprafkin, 2002) to assess symptoms of generalised anxiety disorder (GAD), major depressive disorder (MDD), oppositional defiant disorder (ODD) and conduct disorder (CD). Each scale contained between 7 and 9 items ($\alpha = .89 - .94$). Two composite measures were created from the ASI subscales. First, an Internalizing Problems scale was created by averaging responses across the GAD and MDD subscales. Second, scores from the ODD and CD subscales were averaged to form the Externalizing Problems scale (Loney, Butler, Lima, Counts, & Eckel, 2006).

Participants completed the Trauma Symptom Checklist for Children – Alternate version (TSCC-A; Briere, 1996) to measure internalizing problems and trauma symptoms. The TSCC-A is a 44-item self-report inventory that includes 5 clinical scales (anxiety, depression, post-traumatic stress, anger and dissociation) and 2 validity scales (under-response and hyper-response). In contrast to the original TSCC (54 items), the TSCC-A is shorter and does not include items indexing sexual concerns. Cronbach's alpha for the scales varied from .84 to .87 in our sample. Construct, convergent and discriminant validity have been well-established using child and adolescent samples (Briere, 1996; Sadowski & Friedrich, 2000). Overall, symptom under-response ($\overline{x} = 1.98$; $SD = 1.94$) was more common than hyper-response ($\overline{x} = 0.35$; $SD = 0.73$). A composite measure of Internalizing Problems was derived by averaging the scores from the anxiety and depression subscales, so that results could be compared to informant reports (Cecil et al., 2014). Post-traumatic stress, anger and dissociation were kept separate and represented trauma-related symptoms.

Covariates (control variables). Data on age, sex, and ethnicity were collected from all participants. Cognitive ability was assessed using the two-subtest version of the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). None of the participants in the

sample scored below 70 or above 125 on the WASI. Neighbourhood deprivation was measured using the census-derived Index of Multiple Deprivation (IMD, 2011). Specifically, Area-level data was acquired using self-reported participant postcode information. Postcodes were matched to administrative Lower Super Output Areas (LSOAs) that represent area-weighted geographical units for which population census data are available. From each LSOA a continuous IMD score was obtained. The IMD is an aggregate measure of multiple indicators of deprivation, spanning: (i) income; (ii) employment; (iii) health and disability; (iv) education skills and training;(v) barriers to housing and services; (vi) crime; and (vii) living environment (Noble, Wright, Smith, & Dibben, 2006). Scores in our sample ranged from 3.20 (least deprived) to 62.31 (most deprived), with a mean score of 28.41, suggesting that on average, participants resided in impoverished neighbourhoods compared to the national average (i.e. within 4th most deprived quantile; IMD, 2011). Exposure to community violence over the past year was assessed using the validated, self-report Children's Report of Exposure to Violence (CREV; Cooley, Turner, & Beidel, 1995). Items from the CREV were rated on a 5-point Likert scale ranging from 'no, never' to 'every day', and were grouped into three subscales ($\alpha = .79 - .89$): hearing about (e.g. *"In the last year, how many times have you been told a stranger was shot or stabbed?"*), witnessing (e.g. *"In the last year, how many times have you seen a stranger being shot or stabbed?"*), and directly experiencing (i.e. being a victim of; e.g. *"In the last year, how many times have you been shot or stabbed?"*) community violence. Subscale scores were then combined to create a total CVE score. For the above covariates, higher values indicate female gender, non-white ethnicity, older age, higher cognitive ability, greater neighbourhood deprivation and more severe CVE, respectively.

Statistical Analysis

In line with recommendations by Herrenkhol and Herrenkhol (2009), we first carried out a number of descriptive statistics, in order to facilitate comparability with other studies. Specifically, we used correlation matrices to examine associations between maltreatment types (measured as continuous variables) and the study covariates (i.e. socio-demographic characteristics and CVE), as well as interrelationships between maltreatment types. We then calculated prevalence rates of exposure based on severity thresholds specified by the CTQ manual (i.e. None, Low, Moderate and Severe) in order to examine (i) frequency rates for each maltreatment type individually, regardless of whether it co-occurred with other maltreatment types; and (ii) the proportion of maltreated youth who experienced multi-type

maltreatment (i.e. two or more forms of maltreatment). Here, maltreated youth were defined as youth who had experienced at least one form of maltreatment at or above the Low maltreatment severity threshold specified by the CTQ manual (Arata et al., 2005). To calculate prevalence rates of multi-type maltreatment, we created a count variable indexing, for each participant, the number of maltreatment types experienced at or above the *Low* CTQ cut-off threshold (range: 0-5).

Second, we investigated the *cumulative* effects of maltreatment, by examining the relationship between number of maltreatment types experienced (i.e. using the count variable described above) and symptom severity. A linear step-wise regression was run for each mental health outcome, including all covariates in the first block (age, sex, IQ, ethnicity, IMD, CVE), and number of maltreatment types experienced (0-5) in the second block.

Third, we aimed to disentangle the *unique* vs *shared* effects of individual maltreatment types. This analysis consisted of two different sets of multivariate regressions, both of which controlled for all covariates. In the first set of regressions, each maltreatment type (measured as a continuous variable to model the full range of exposure) was included separately as an independent predictor, to examine its effect above and beyond socio-demographic covariates and CVE (*individual models*). In the second set of regressions, all maltreatment types were entered simultaneously as predictor variables to assess whether any maltreatment type was uniquely associated with the outcomes, above and beyond the effect of covariates as well as all other maltreatment types (*simultaneous models*). Contrasting individual and simultaneous models allowed to partition unique from shared effects of maltreatment types on mental health outcomes. Statistical significance was established by examining the 95% confidence intervals of the unstandardized estimates and associated *p* values, while standardized estimates were used as a measure of effect size (Altman, Machin, Bryant & Gardner, 2013). Analyses were performed on SPSS package v. 21 (2012).

Results

Step 1: Descriptive statistics

Associations between maltreatment types and study variables. As shown in **Table 1**, maltreatment types were not significantly associated with participant sex or level of neighbourhood deprivation (IMD), which may in part reflect the fact that, on average, participants resided in impoverished neighbourhoods, compared to the national average (IMD, 2011). Multiple forms of maltreatment were associated with participant age and ethnicity. Of note, physical abuse was associated with lower IQ. Importantly, maltreatment

types were significantly associated with higher levels of community violence exposure (CVE) during the past year. Associations with CVE were weak for sexual abuse, but moderate across all other forms of maltreatment ($r = .30 – .37$). Maltreatment types were positively associated with psychiatric symptoms across informant- and self-report rated outcomes.

******************************* **Table 1** *********************************

Interrelationships between maltreatment types. All maltreatment types were significantly correlated with one another ($p < .001$), as shown in **Table 2**. Correlation coefficients ranged from .29 to .70. Sexual abuse was most weakly associated with other maltreatment types. The strongest correlations were found between emotional abuse and emotional neglect, as well as between emotional neglect and physical neglect.

******************************* **Table 2**********************************

Prevalence rates. **Table 3** displays the frequency of each type of maltreatment based on the thresholds specified by the CTQ manual. Emotional abuse and emotional neglect were the most common types, with approximately half of participants reporting at least low levels of maltreatment in these domains (i.e. 'Low' threshold or higher). Physical abuse and physical neglect were reported by over one third of participants. Sexual abuse was the least common form of maltreatment and was reported by approximately 15% of participants. Of those youth who had experienced maltreatment, most were classified within the 'Low' maltreatment range, followed by the 'Moderate' range. 'Severe' maltreatment occurred in between 7.8% and 13.7% of participants depending on the maltreatment type examined.

 Rates of multi-type maltreatment (of poly-victimization) are also shown in **Table 3**. Out of the full sample, 139 youth (68%) reported experiencing at least one form of maltreatment at or above the Low CTQ maltreatment severity threshold. Of these maltreated youth, 28.1% reported experiencing one form of maltreatment, while the remaining 71.9% reported experiencing multiple types of maltreatment. As such, multi-type maltreatment occurred more frequently than the experience of single forms of maltreatment in isolation. Of note, there were no significant sex differences in either prevalence rates of maltreatment (across types) or rates of poly-victimization ($p > 0.05$)

******************************* **Table 3** *********************************

Step 2: Cumulative effects of maltreatment

Figure 1 shows the association between number of maltreatment types experienced and severity of mental health outcomes across domains. With regards to informant reported outcomes, we found a significant effect of the number of maltreatment types reported on internalizing (*Std.B* = .27; $p < 0.01$) and, to a lesser extent, externalizing difficulties (*Std.B* = .17; $p < 0.05$), whereby exposure to a greater number of maltreatment types associated with more severe symptomatology. Of note, although symptom levels for informant-report internalizing and externalizing difficulties appear to decrease slightly between youth who have been exposed to four vs five types of maltreatment, this difference was not significant ($p > 0.05$). A significant effect was identified across all self-report outcomes – internalizing difficulties (*Std.B* = .39; $p < 0.001$), PTSD (*Std.B* = .40; $p < 0.001$), dissociation (*Std.B* = .30; $p < 0.001$) and a weaker association with anger (*Std.B* = .22; $p < 0.01$). Overall, the relationship between maltreatment type *N* and symptom severity was more pronounced for self-report compared to informant-report measures, particularly in the intermediate range of exposure (i.e. an experience of 3 types of maltreatment).

******************************** **Figure 1************************************

Step 3: Shared vs unique effects of maltreatment types

Individual models. Associations between maltreatment types and psychiatric symptoms are displayed in **Table 4**. Individual models show estimates for each maltreatment type when entered as a sole predictor, without controlling for the presence of other maltreatment types. From this model, it is clear that across outcomes, the majority of maltreatment types were significantly and positively associated with psychiatric symptom severity based on informant- and self- report, above and beyond the effect of socio-demographic covariates and CVE. Sexual abuse was least consistently associated with psychiatric symptoms, while emotional abuse and physical abuse were significantly associated with all outcomes explored. It is note-worthy that, across both informant- and self-report ratings, findings were consistent in the relative contribution of different maltreatment types to internalizing difficulties.

Simultaneous models. By entering all maltreatment types as predictors concurrently, simultaneous models explore the unique associations between each form of maltreatment and psychiatric symptoms, above and beyond the contribution of socio-demographic variables, CVE and shared variance between maltreatment types (see **Table 4**). Based on these models, we found that emotional abuse emerged as the only independent contributor to psychiatric

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symptoms, for all outcomes except externalizing difficulties. Effect sizes were moderate for anger levels, and large for internalizing difficulties, PTSD and dissociation. Against our expectation, we did not observe a unique association between physical abuse and externalizing difficulties. To investigate this lack of association further, we tested whether this finding was due to the fact that, unlike previous studies, we adjusted for CVE in our analysis. Indeed, physical abuse was found to independently predict externalizing difficulties when CVE was not controlled for (*Std.B* = .29, $p < .01$).

******************************** **Table 4** ********************************

Follow-up analyses

In light of the above findings, we carried out a number of follow-up analyses to further delineate the influence of maltreatment types on psychiatric symptomatology.

Incremental contribution of emotional abuse. First, we examined the specific, incremental contribution of emotional abuse to variance explained in mental health outcomes. For this, we re-ran multiple regression analyses that included covariates and other maltreatment types in the first block, and emotional abuse as a sole independent predictor in the second block. We found that for all outcomes, except externalizing difficulties, emotional abuse significantly raised the explanatory power of our models, ranging from a minimum R^2 change of .03 for self-reported anger (F(11, 174) = 5.44, $p < .001$; adjusted R^2 = .22; significant F change = $p < .01$) to a maximum R^2 change of .11 for self-report PTSD symptoms (F(11, 174) = 10.83, $p < .001$; adjusted R^2 = .38; significant F change = $p < .001$).

Sex as a potential moderator. As a second follow-up analysis, we investigated whether the effect of emotional abuse on symptom severity was moderated by sex. This analysis was informed by evidence pointing to sex as (i) an important predictor of psychiatric symptomatology (Costello, Mustillo, Erkanli, Keeler & Angold, 2003), and (ii) as a potential moderator in the association between maltreatment and mental health outcomes (Thompson, Kingree & Desai, 2004). No significant interaction effects were observed in our sample, suggesting that the association between emotional abuse and psychiatric symptoms was comparable for males and females.

CVE as a potential mediator. Given that physical abuse was found to independently predict externalizing difficulties only when CVE was not controlled for, we carried out an additional analysis to examine the potential role of CVE as a mediator in this association. Specifically,

we used maximum likelihood estimation to estimate a path analytic model in Mplus (physical abuse → CVE → externalizing difficulties), controlling for socio-demographic covariates and other maltreatment types. Mediation was tested using bootstrapped model constraint statements (10,000 times). Based on this analysis, we found that the effect of physical abuse on externalizing difficulties was indeed partially mediated by CVE (b= .07, s.e.= 0.03, *p*= .02, bootstrapped 95% CI = .03 – .15). When we extended this analysis to examine the other outcome variables, we found that CVE also partially mediated the effect of physical abuse on trauma symptoms (*anger*: b= .14, s.e.= .05, *p*=.003, bootstrapped 95% CI = .06 – .24; *PTSD*: b= .11, s.e.= .05, *p*= .03, bootstrapped 95% CI = .03 – .22; *dissociation*: b= .15, s.e.= .05, *p*= .004, bootstrapped 95% CI = .06 – .26), but not internalizing difficulties (p>.05 across self- and external-reported symptoms).

Disaggregating forms of externalizing and internalizing psychopathology. As a last step, we investigated whether the same pattern of associations between maltreatment types and outcomes was observed when disaggregating between forms of internalizing (i.e. depression/MDD vs anxiety/GAD) and externalizing psychopathology (i.e. ODD vs CD; see Supplementary Table 2). Overall, findings were highly consistent with results from the main analyses, with emotional abuse emerging as the sole independent predictor of internalizing problems, across externally rated MDD and GAD symptoms (based on the ASI-4 subscales) as well as self-report anxiety and depression symptoms (based on the TSCC subscales). In contrast to our main analyses, however, we found that when separating forms of externalizing difficulties, sexual abuse independently associated with CD (but not ODD) symptoms. Interestingly, this association was found to be twice as large in magnitude for female participants (*r* = .43, *p* < .001) than for males (*r* = .20, *p* > .05).

Discussion

The aim of this study was to systematically characterize the unique, shared and cumulative effects of childhood abuse and neglect on young people's mental health. Strengths include the analysis of quantitative data on a broad range of maltreatment types, (multi-rated) psychiatric outcomes and confounding factors, based on a sample of youth featuring high rates of adversity. Consistent with prior research, we found that maltreatment types were highly interrelated and frequently co-occurred. The number of maltreatment types experienced linearly predicted symptom severity (especially for self-report ratings), which supports a cumulative effect of maltreatment on psychiatric symptomatology. When examined

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separately (individual models), all maltreatment types were significantly associated with mental health outcomes, with effects strongest for emotional abuse and weakest for sexual abuse. When examining maltreatment types concurrently (simultaneous models), we found that: (i) the majority of associations were no longer significant, pointing to an important role of shared variance in driving maltreatment effects on mental health outcomes; (ii) contrary to our prediction, no unique association was found between physical abuse and externalizing difficulties; and (iii) emotional abuse emerged as the sole independent contributor to internalizing difficulties and trauma-related symptomatology – an effect that was similar in males and females (i.e. no significant moderation of sex). Overall, the use of different strategies to model childhood maltreatment provide complementary insights into the way maltreatment types may independently and additively impact mental health, both of which are important for refining our understanding of maltreatment effects as well as informing clinical and research practice. Below, we discuss findings in the context of the extant literature, before outlining key implications and directions for future research.

Maltreatment types as highly interrelated exposures

First, we found that maltreatment types were highly interrelated, and that the magnitude of associations observed paralleled that reported by a small set of existing studies reviewed by Herrenkhol and Herrenkohl (2009). In line with previous reports, sexual abuse was found to be most weakly associated with other forms of maltreatment (see Higgins & McCabe, 2001, for a review). With regards to prevalence rates, emotional abuse and emotional neglect were the most frequently reported maltreatment types, followed by physical abuse, physical neglect and sexual abuse, which is consistent with research pointing to emotional abuse as a particularly prevalent form of developmental adversity (e.g. Radford et al., 2011). Notably, only one in four of maltreated youth reported experiencing a single form of maltreatment, supporting prior evidence showing that multi-type maltreatment may often be the norm, rather than the exception (Herrenkohl & Herrenkohl, 2009; Finkelhor et al., 2007).

The cumulative effects of maltreatment on mental health

Second, findings showed that the *number* of maltreatment types experienced was a significant predictor of symptom severity, even after accounting for socio-demographic factors, neighbourhood deprivation and exposure to community violence. Specifically, we found that – across mental health domains– the severity of psychiatric symptoms linearly increased with the number of maltreatment types reported. Interestingly, our findings not only support a cumulative effect of maltreatment (e.g. Arata et al., 2007; Finkelhor et al., 2007), but also

indicate that this relationship was more pronounced when examining self-report vs informant-report data. While such difference may reflect inflation due to shared-method variance (i.e. self-reported maltreatment history and symptom severity), the higher sample size for self-report data (i.e. resulting in higher statistical power) and/or the cross-informant discordance often observed in assessments of psychopathology (see Achenbach, Krukowski, Dumenci & Ivanova, 2005), it is also possible that self-report data may be more sensitive in detecting mental health problems in the intermediate range of exposure (e.g. 2-3 types of maltreatment), when difficulties may be present but perhaps not as visible to external raters.

Characterizing the unique vs shared effects of maltreatment types

Third, we found that, while individual forms of maltreatment typically associated with mental health outcomes when examined separately, most of these associations were no longer significant when maltreatment types were modelled together (i.e. simultaneous models), indicating that effects may have been driven by what is common to maltreatment types (i.e. shared variance). These findings clearly demonstrate that failure to account for multiple forms of maltreatment can result in the overestimation of effects attributed to specific maltreatment types. In addition, findings may in part explain why generic, non-specific associations between maltreatment types and outcomes have sometimes been reported in the past, while other times differential and unique associations have been observed. For example, based on our individual models, internalizing difficulties were found to be significantly associated with all maltreatment types, thus supporting a more 'generalist' model of maltreatment effects. In contrast, simultaneous models showed that only one type of maltreatment, emotional abuse, was uniquely predictive of internalizing difficulties, thereby also supporting a 'differential' role for this type of maltreatment in predicting internalizing difficulties. It is important for future studies to consider how the use of different analytical strategies may impact findings when investigating maltreatment effects.

Physical abuse and externalizing difficulties

Contrary to expectations, we found no evidence of a unique association between physical abuse and externalizing difficulties in our simultaneous model. This finding contrasts with a number of studies documenting an independent effect of this maltreatment type on externalizing outcomes, including conduct problems and delinquency (e.g. Litrownik et al., 2005; Petrenko, et al., 2012; Taussig et al., 2002). It is important to note; however, that unlike previous studies, we accounted for current levels of CVE in our analysis. In fact, when CVE was *not* included in our model, a unique effect of physical abuse on externalizing difficulties

was indeed observed. On the one hand, it is possible that CVE mediates the association between physical abuse and externalizing problems. For example, youth who have been physically abused may be more likely to affiliate with delinquent peers, thereby increasing likelihood of exposure to violent events (Cicchetti & Toth, 2005). On the other hand, it is also possible that physically abused youth may be more vulnerable to CVE *because* they have greater externalizing difficulties.

To explore this issue further, we carried out a post-hoc analysis to test whether CVE mediated the association between physical abuse and externalizing difficulties. Results indicated that CVE significantly mediated this relationship, over and above the influence of socio-demographic characteristics and other maltreatment types. Interestingly, however, this mediation effect was not specific to externalizing problems, but also extended to trauma symptoms (i.e. anger, PTSD, dissociation). In contrast, no mediation was identified for internalizing difficulties. This selective pattern of associations is consistent with previous work from our group documenting an effect of CVE on externalizing problems and trauma symptoms, but not internalizing problems (Cecil et al., 2014). It is important to note, however, that because mediational analyses were based on cross-sectional data, we are limited in the conclusions that can be drawn. A clearer understanding of longitudinal associations between physical abuse and CVE is needed so as to refine prevention and intervention targets aimed at reducing externalizing difficulties and trauma symptoms amongst physically abused youth.

We also note that when disaggregating between forms of externalizing psychopathologies, we identified an independent association between sexual abuse and CD (but not ODD) symptoms – an effect that was stronger for females than for males. Although associations between sexual abuse and externalizing problems in girls have previously been reported (e.g. substance use; Smith & Saldana, 2013), existing evidence for the differential effects of sexual abuse on mental health outcomes has generally been weak and inconsistent (see Tromovitch & Rind, 2008; for a review). Albeit intriguing, this result should be interpreted with caution given that prevalence rates for sexual abuse were considerably lower than for other forms of maltreatment. The low prevalence of sexual abuse, combined with its asymmetrical co-occurrence with other forms of maltreatment (i.e. most cases of sexual abuse co-occur with non-sexual abuse, but not vice versa), makes it especially hard to reliably isolate the unique effects of sexual abuse (compared to non-sexual abuse; Vachon et al., 2015). Consequently, more work will be needed to test whether this association is replicated in samples with higher prevalence rates of sexual abuse, and if so, to explore why this

association may be stronger in females and specific to CD (as opposed to ODD) symptomatology.

Emotional abuse as an independent contributor to mental health outcomes

In the present study, emotional abuse emerged as the only maltreatment type to uniquely contribute to internalizing difficulties as well as trauma-related symptomatology (anger, post-traumatic stress and dissociation).

Internalizing difficulties. Although available data is sparse, a small number of other studies have also documented a unique effect of emotional abuse on internalizing difficulties (McGee, Wolfe & Wilson; 1997; Arata et al., 2007). Interestingly, Edwards and colleagues (2003) found that in addition to independently predicting anxiety and depression, emotional abuse also served to heighten the effect of other maltreatment types. Emotional abuse may be a particularly important risk factor for internalizing problems because it negatively impacts the development of the self-system (McGee, Wolfe & Wilson, 1997). For example, prolonged experience of denigration may cause a child to internalize parental criticisms, which may contribute to low self-esteem and negative perceptions of the self (Briere & Runtz, 1990). Moreover, experiencing intense negative affect by parents may impair the child's own capacity to self-regulate, further increasing risk for internalizing difficulties (McGee, Wolfe & Wilson, 1997).

Anger. We are aware of only one study to date that has explored the effects of multiple maltreatment types on this outcome. Huglund and colleagues (1995) found that adults who had experienced emotional abuse were more likely to engage in both forms of overt and covert anger as well as displaying greater levels of hostility. Potential mechanisms underlying this association, however, were not considered. It is possible that difficulties in emotional arousal and affect regulation that increase risk for depression and anxiety amongst emotionally maltreated individuals may also contribute to difficulties in managing feelings of anger. However, more research will be needed to elucidate the processes underlying the association between emotional abuse and anger.

Post-traumatic stress. Given that a diagnosis of PTSD requires the presence of acute and potentially life-threatening stressors, it would seem counter-intuitive that emotional abuse would uniquely predict PTSD symptoms. Although most of the extant literature has focussed on the impact of physical and sexual abuse, a small number of studies that have assessed emotional abuse have reported similar findings to ours. Spertus and colleagues (2003) found that emotional abuse independently predicted PTSD symptomatology, over and

above the effects of other forms of maltreatment. Furthermore, a study by Sullivan and colleagues (2006), found that emotional abuse was the only maltreatment type to be uniquely associated with severity of PTSD symptom clusters (arousal, avoidance and numbing) as well as overall levels of posttraumatic stress. Reasons for such an association are unclear. On the one hand, it is possible that emotional abuse, particularly when it involves the use of coercive and threatening behaviours, may lead to a pattern of PTSD symptomatology. For example, threatening behaviour may cause a child to fear retribution, re-victimization or the infliction of harm to others. Alternatively, it is possible that emotional abuse may increase risk for post-traumatic stress via a more indirect route; for example, by increasing risk of lifetime exposure to traumatic events (Spertus et al., 2003). It is important to note, however, that because these studies, like ours, examined PTSD symptomatology, the extent to which findings may hold relevance for a clinical diagnosis of PTSD is unclear.

Dissociation. Dissociation involves the disruption of processes essential for the integration of consciousness, memory, perception and identity (Simeon et al., 2001). As with PTSD research, the literature on dissociation has focussed principally on the impact of physical and sexual abuse. However, emotional abuse has been found to uniquely impact dissociation levels in a number of studies (Sar et al., 2004; Simeon et al., 2001). It is possible that by causing disruptions to the development of the self-system, emotional abuse may lead to a more fragmented sense of self. Alternatively, youth who have experienced more chronic or severe emotional abuse may dissociate as an adaptive coping strategy in response to an emotionally harmful environment (Haferkamp, Bebermeier, Mollering & Neuner, 2015). As with the other outcomes outlined above, future research will be needed to elucidate processes underlying the association between emotional abuse and dissociation.

Why emotional abuse?
Together, findings from our study, as well as others (e.g. Arata et al., 2007; Edwards et al., 2003; Sar et al., 2004; Spertus et al., 2003), point to emotional abuse as a particularly detrimental form of maltreatment and as a robust predictor of mental health difficulties. These findings raise the question as to why emotional abuse in particular would impact individual functioning over and above the effect of other maltreatment types. Beyond the specific reasons outlined above, there is a need to understand more generally what makes emotional abuse 'distinctive' compared to other maltreatment types. One line of argument would hold that in addition to being characterized by low levels of parental warmth (Nicholas & Bieber, 1996), the experience of emotional abuse may also serve to decrease the

availability of emotional scaffolding and social support necessary for coping with co-occurring forms of maltreatment. Targeted negativity and invalidation is also likely to lead to dysregulation of biological systems underlying emotional control (Neacsiu, Bohus & Linehan, 2014) as well as insecure attachment, which is correlated with internalising (and externalising) problems (Groh, Roisman, van Ijzendoorn, Bakermans-Kranenburg & Fearon, 2012). In fact, it has been previously reported that physically abused individuals who rated caregivers as being more emotionally supportive were less likely to develop internalizing difficulties in adulthood compared to individuals who report experiencing low parental warmth (Wind & Silvern, 1994). An alternative line of argument could contend that the reason emotional abuse is so strongly associated with mental health outcomes is because it indexes something that is secondary to all maltreatment types (Hart, Binggeli & Brassard, 1997). For example, physical abuse, sexual abuse and neglect are all likely to instil in the child a belief that they are worthless or unloved, both of which meet definitional criteria for emotional abuse (UK Department for Education, 2010). If this is the case, then it is unsurprising that effects attributed to different forms of maltreatment would fail to reach significance once the variance they share with emotional abuse is controlled for.

The measure of emotional abuse used in the present study limits our ability to tease out what is driving the observed effects. While the CTQ is a widely used and well-validated measure of childhood maltreatment, it enquires only about one aspect of emotional abuse – namely targeted hostility/negativity (or spurning in US terminology) and the general term 'emotional abuse'. However, the totality of emotional abuse also encompasses exploiting (i.e. failing to distinguish the psychological boundary between the child and parent; using the child for the fulfilment of the parent's emotional needs), terrorising/exposing the child to frightening experiences as well as mis-socialising/corrupting the child includes. Furthermore, of the five items included, two describe behaviourally specific acts (calling names, saying hurtful things), two describe feelings that may not only index emotional abuse but may also be secondary to other maltreatment types (feeling hated, thinking that parents wished they were never born), and the last item measures subjective appraisals of the abuse ('I believe I was emotionally abused'). As such, it is unclear whether effects observed may result from items that are specific to emotional abuse or from those that may be secondary to all forms of maltreatment. Furthermore, it is not possible to discern whether the effects of emotional abuse may be driven by objective behaviours as opposed to more subjective appraisals of the abuse. Further research incorporating in-depth assessments of emotional abuse will be needed to clarify the processes by which this maltreatment type uniquely affects mental health.

Limitations

The present findings should be interpreted in light of a number of limitations. First, although rates of maltreatment in our sample were high, analyses were based on a modestly sized group of inner-city youth, which precluded the possibility of addressing more nuanced research questions (e.g. sex differences), and may have resulted in limited power to detect significant associations. Self-selection and convenience sampling are also limitations, as the recruitment strategy used in the present study (a) precludes us from determining to what degree the participants were representative of youth from the settings from which they were sampled, and (b) inherently differed in levels of childhood maltreatment and psychiatric symptomatology across sites (with youth recruited from charity being at highest risk). Second, our measure of maltreatment (CTQ) was based on self-reports, which are particularly susceptible to retrospective biases, even though the use of retrospective versus prospective reports of maltreatment has been shown to produce comparable associations with psychopathological outcomes (Scott, McLaughlin, Smith, & Ellis, 2012). Furthermore, the CTQ does not record information about current trauma exposure and important additional maltreatment characteristics, including timing, duration and child-perpetrator relationship. In future, it will be important to replicate findings using larger samples, ideally featuring externally-validated maltreatment histories that will make it possible to investigate how these influences may moderate the effect of maltreatment types on mental health outcomes (White et al., 2015). It is also important to note that the CTQ only captures one of several components of emotional abuse (i.e. targeted hostility/spurning), so that the independent effects observed in the present study will need to be further investigated using more comprehensive assessments of maltreatment exposure. Third, due to low literacy levels and the fact that the age range of the sample straddled adolescence and young adulthood, we selected outcome measures that were originally designed for younger age groups in order ensure adequate comprehension. Thus, it will be important in future to replicate findings using psychiatric assessments validated on youth and young adult populations. Fourth, the fact that maltreatment, CVE and a proportion of outcomes were reported by youth themselves raises the possibility of shared method variance. It is note-worthy, however, that results across reporters were highly consistent regarding the relative contribution of different maltreatment types to internalizing difficulties, both within individual and simultaneous models. Fifth, we were not able to include genetic data in the present analyses. Given that genetic variability has been found to interact with maltreatment exposure to predict long-term outcomes (e.g. Bellani, Nobile, Bianchi, Van Os & Brambilla, 2012), future studies should

seek to incorporate this information in order to better understand heterogeneity in young people's responses to childhood abuse and neglect. Finally, while our data supports a causal role of emotional abuse on mental health difficulties it is not possible to establish directionality of findings due to the cross-sectional nature of the study.

Implications and future directions

Despite these limitations, the findings from the present study have the scope to inform research and clinical practice in three key ways. First, the large degree of overlap between maltreatment types means that it is critical for empirical studies to assess all maltreatment types concurrently so as to account for the shared variance between them. In a clinical context, practitioners should be particularly aware that multi-type maltreatment is more common than the experience of single forms of maltreatment, and relates to more severe psychiatric symptoms. Consideration of these factors may be especially relevant for risk assessment, the identification of more comprehensive maltreatment profiles, and the development of strategies designed to reduce risk for re-victimization amongst maltreated individuals.

Second, the findings underscore the need to measure current levels of community violence exposure when investigating the later effects of childhood maltreatment. This is particularly relevant for studies measuring maltreatment based on retrospective reports in older youth, as these same youths may be particularly vulnerable to experiencing CVE. Future studies would also benefit from including additional factors associated with both maltreatment and community violence (e.g. peer victimization) in order to gain a more ecologically-valid and transactional understanding of the impact of developmental adversity on mental health. Longitudinal research will also be needed to clarify bidirectional associations between physical abuse and CVE in the development of externalizing difficulties and trauma symptomatology.

Third, the present findings point to emotional abuse as a particularly detrimental form of maltreatment that necessitates greater attention in research, policy and clinical practice. From a research standpoint, it will be important to identify what mechanisms mediate the effect of emotional abuse on mental health functioning. In terms of risk assessment, clinicians should be aware of the key role of emotional abuse in the manifestation of a broad range of negative outcomes. The implementation of intervention strategies designed to foster parental warmth, parenting skills and positive parent-child interactions may be particularly effective in counteracting the consequences of emotional abuse and preventing future

experience of victimization (Iwaniec et al., 2007). Given that emotional abuse may impact individual functioning primarily by disrupting the developing self-system, tailored programmes that help to build children's self-esteem and self-image may be important in reducing risk for mental health problems, particularly internalizing difficulties (Doyle, 2003; Briere & Runtz, 1990).

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Table 1. Study variables descriptives and correlations with maltreatment types

Variables	Mean (SD) or %	Emotional Abuse	Physical Abuse	Sexual Abuse	Emotional Neglect	Physical neglect	Total Maltreatment
				Maltreatment Types			
Socio-Demographic Variables							
Ethnicity [a]							
White	44.1%	-.12	-.19**	-.07	-.24***	-.19**	-.16**
Black	40.7%	.12	.26***	.10	.23***	.23***	.25***
Mixed	9.8%	-.04	-.08	-.01	-.07	-.06	-.07
Asian	5.4%	.07	-.05	-.05	.10	.02	.03
Sex (Female)	53%	.03	.03	.08	.02	.00	.04
Age	18.85 (2.27)	.24**	.13	.14*	.25***	.21***	.25***
IQ	101.30 (11.85)	.04	-.16*	-.04	-.02	-.09	-.06
IMD	28.41 (11.08)	.08	.05	.13	.12	.10	.12
Current violence exposure							
CVE	17.54 (13.08)	.33***	.34***	.19**	.30***	.37***	.39***
Psychiatric Symptoms							
Informant report							
Internalizing Problems	3.65 (3.88)	.45***	.41***	.22**	.35***	.39***	.47***
Externalizing Problems	2.34 (3.60)	.32***	.43***	.26***	.26***	.30***	.40***
Self-report							
Internalizing Problems	6.48 (4.49)	.51***	.30***	.23***	.39***	.36***	.47***
Anger	7.15 (5.64)	.34***	.31***	.10	.27***	.25***	.34***
PTSD	9.58 (6.52)	.54***	.38***	.28***	.40***	.39***	.51***
Dissociation	9.12 (6.02)	.46***	.30***	.17*	.34***	.29***	.41***

N.B. Bivariate correlations significant at: *p <.05, **p < .01, ***p < .001. IMD, Index of multiple deprivation; CVE, Community violence exposure. [a] Ethnicity: White (yes = 1; no = 0); Black (yes = 1; no = 0); Mixed (yes = 1; no = 0); Asian (yes = 1; no = 0).

Table 2. Intercorrelations between maltreatment types

Maltreatment subtype	M (SD)	1	2	3	4
1. Emotional abuse	9.66 (4.72)	–			
2. Physical abuse	7.72 (4.42)	.61	–		
3. Sexual abuse	6.04 (3.38)	.38	.29	–	
4. Emotional neglect	10.42 (4.70)	.70	.52	.34	–
5. Physical neglect	7.28 (3.21)	.65	.59	.35	.70

N.B. all correlations, $p < .001$.

Table 3. Prevalence rates of exposure

Maltreatment type[a]	CTQ threshold			
	None	Low	Moderate	Severe
	% (N)	% (N)	% (N)	% (N)
Emotional abuse	52.0 (106)	24.5 (50)	9.8 (20)	13.7 (28)
Physical abuse	65.7 (134)	13.7 (28)	8.8 (18)	11.8 (24)
Sexual abuse	84.8 (173)	4.9 (10)	4.9 (10)	5.4 (11)
Emotional neglect	50.5 (103)	29.4 (60)	11.3 (23)	8.8 (18)
Physical neglect	68.6 (140)	12.3 (25)	11.3 (23)	7.8 (16)
Number of types[b]				Maltreated youth
1				28.1 (39)
2				23.7 (33)
3				17.3 (24)
4				20.1 (28)
5				10.8 (15)

[a] Proportion of youth who are classified as having experienced None, Low, Moderate or Severe maltreatment based on CTQ thresholds. N = 204.

[b] Proportion of maltreated youth who have experienced 1 to 5 forms of maltreatment at or above Low maltreatment threshold. N = 139.

Table 4. Associations between maltreatment types and psychiatric symptoms

	Regression models							
	Individual				**Simultaneous**			
	B	*(Std B)*	95% CI		*B*	*(Std B)*	95% CI	
Psychiatric symptoms			LL	UL			LL	UL
Informant report								
Internalizing								
Emotional abuse	.27***	(.38)	.16	.38	.29***	(.40)	.12	.46
Physical abuse	.18**	(.23)	.05	.30	.03	(.04)	-.12	.18
Sexual abuse	.14	(.13)	-.03	.32	.04	(.03)	-.14	.21
Emotional neglect	.16**	(.21)	.04	.29	-.10	(-.12)	-.28	.09
Physical neglect	.24**	(.23)	.07	.43	.05	(.05)	-.19	.30
Externalizing								
Emotional abuse	.14*	(.21)	.03	.26	.10	(.15)	-.07	.27
Physical abuse	.15*	(.20)	.03	.27	.11	(.14)	-.04	.26
Sexual abuse	.19*	(.18)	.02	.35	.15	(.14)	-.03	.32
Emotional neglect	.10	(.06)	-.02	.22	-.03	(-.04)	-.22	.16
Physical neglect	.12	(.11)	-.05	.29	-.06	(-.05)	-.30	.19
Self-report								
Internalizing								
Emotional abuse	.47***	(.48)	.34	.60	.51***	(.52)	.31	.71
Physical abuse	.22**	(.20)	.06	.38	-.10	(-.10)	-.28	.08
Sexual abuse	.18	(.14)	-.01	.38	-.00	(-.00)	-.18	.18
Emotional neglect	.31***	(.31)	.17	.45	-.04	(-.04)	-.24	.16
Physical neglect	.44***	(.29)	.22	.65	.10	(.07)	-.18	.38
Anger								
Emotional abuse	.35***	(.29)	.17	.52	.34**	(.28)	.08	.60
Physical abuse	.26**	(.20)	.07	.46	.10	(.08)	-.13	.34
Sexual abuse	.03	(.17)	-.21	.27	-.11	(-.07)	-.35	.13
Emotional neglect	.25**	(.20)	.07	.43	.06	(.05)	-.20	.33
Physical neglect	.24	(.14)	-.04	.51	-.16	(-.09)	-.54	.21

Table 4 *Continued*

Psychiatric symptoms	Regression models							
	Individual				Simultaneous			
	B	*(Std B)*	95% CI		*B*	*(Std B)*	95% CI	
			LL	UL			LL	UL
Self-report								
PTSD								
Emotional abuse	.69***	(.49)	.51	.87	.76***	(.54)	.49	1.03
Physical abuse	.37***	(.24)	.15	.59	-.06	(-.04)	-.31	.19
Sexual abuse	.33*	(.17)	.06	.60	.08	(.04)	-.17	.33
Emotional neglect	.42***	(.29)	.22	.62	-.11	(-.08)	-.38	.17
Physical neglect	.59***	(.27)	.29	.90	.06	(.03)	-.33	.44
Dissociation								
Emotional abuse	.52***	(.41)	.35	.70	.67***	(.52)	.41	.93
Physical abuse	.24*	(.17)	.03	.45	-.05	(.04)	-.29	.18
Sexual abuse	.10	(.13)	-.15	.35	-.09	(-.05)	-.34	.15
Emotional neglect	.27**	(.22)	.10	.47	-.06	(-.05)	-.33	.21
Physical neglect	.30*	(.15)	.01	.59	-.16	(-.08)	-.54	.22

N.B. All models control for sex, ethnicity, age, IQ, neighbourhood deprivation and community violence exposure over the past year. *p <.05, **p < .01, ***p < .001.

Figure 1. Association between number of maltreatment types experienced and symptom severity across mental health domains.
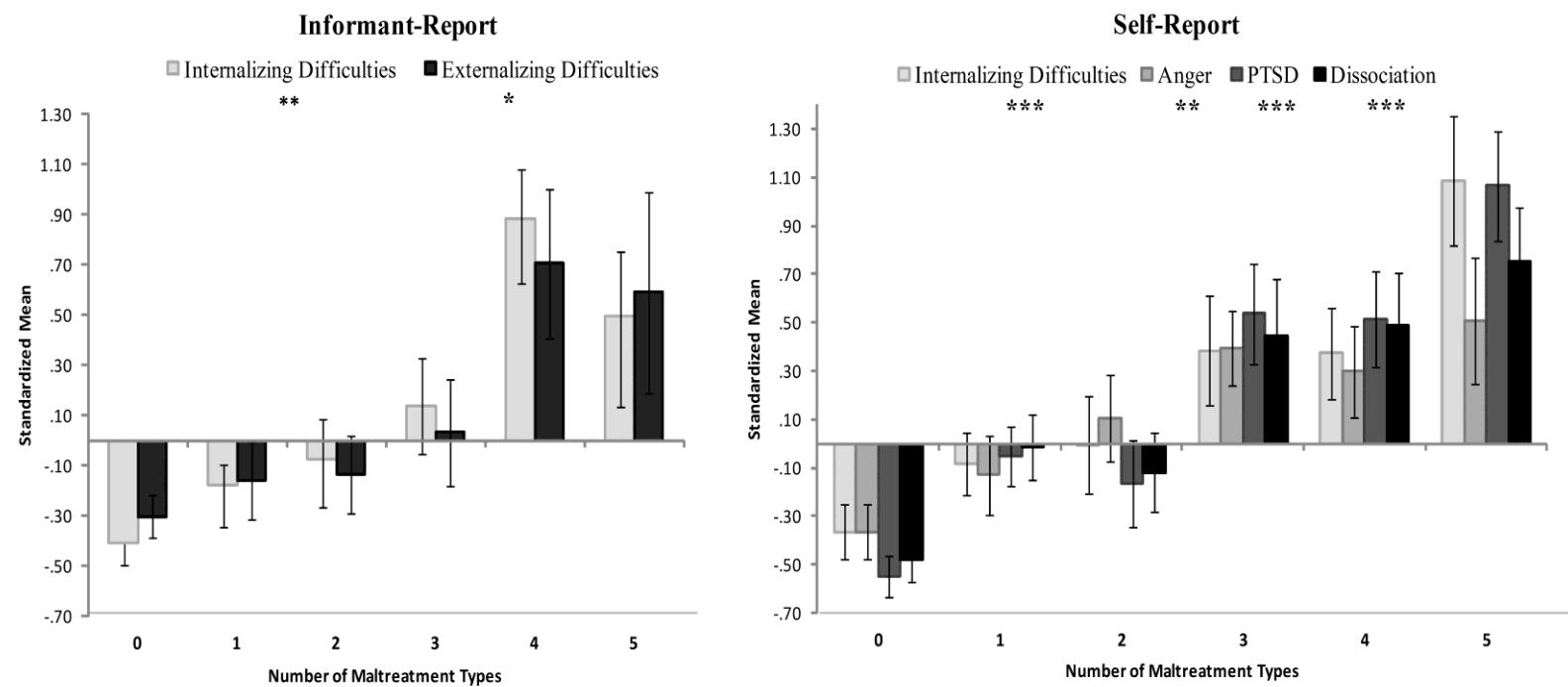
N.B. Asterisks refer to the main effect of number of maltreatment types on psychiatric outcomes, controlling for sex, ethnicity, age, IQ, neighbourhood deprivation (IMD) and community violence exposure (CVE). *$p < .05$, **$p < .01$, ***$p < .001$.

Supplementary Table 1. Descriptive statistics and group differences across the study variables by recruitment site

	Recruitment Source			Omnibus test[a]	Pairwise contrasts[b]
	Charity *(C)* $n = 98$ Mean (SD) or %	Schools *(S)* $n = 78$ Mean (SD) or %	Internet *(I)* $n = 28$ Mean (SD) or %		
Covariates					
Sex (female)	54.1%	52.6%	50.0%	$X^2 (2) = 0.15, \ p = 0.96$	-
Age	19.58 (2.16)	17.05 (.68)	21.39 (1.89)	$F (2, 203) = 83.28, p < 0.001$	I > C > S
Ethnicity					
White	20.4%	83.8%	17.9%	$X^2 (2) = 78.83, \ p < 0.001$	S > C & I
Black	68.4%	11.5%	25.0%	$X^2 (2) = 61.43, \ p < 0.001$	C > S & I
Mixed	10.2%	3.8%	25.0%	$X^2 (2) = 10.46, \ p < 0.01$	I > C & S
Asian	1%	1.3%	32.1%	$X^2 (2) = 45.53, \ p < 0.001$	I > C & S
IQ	97.72 (12.20)	101.70 (9.29)	112.07 (10.50)	$F (2, 197) = 18.68, p < .001$	I > S & C
IMD	34.01 (10.11)	21.47 (7.27)	28.99 (12.47)	$F (2, 187) = 35.45, p < .001$	C > S & I
Community Violence Exposure	24.78 (14.08)	11.13 (7.61)	10.93 (7.88)	$F (2, 194) = 36.48, p < .001$	C > S & I
Childhood maltreatment					
Emotional abuse	11.25 (5.48)	7.79 (3.28)	9.25 (3.09)	$F (2, 203) = 13.18, p < 0.001$	C > S
Physical abuse	9.30 (5.39)	6.28 (2.84)	6.21 (1.50)	$F (2, 203) = 13.53, p < 0.001$	C > S & I
Sexual abuse	6.84 (4.46)	5.05 (.36)	6.00 (2.91)	$F (2, 203) = 6.45, p < 0.01$	C > S
Emotional neglect	12.27 (5.09)	8.37 (3.11)	9.61 (4.45)	$F (2, 203) = 18.07 \ p < 0.001$	C > S & I
Physical neglect	8.70 (3.84)	5.69 (1.47)	6.75 (1.78)	$F (2, 203) = 24.06, p < 0.001$	C > S & I
% Any maltreatment [c]	83.7%	48.7%	67.9%	$X^2 (2) = 24.44, \ p < 0.001$	C > S

Supplementary Table 1 - *Continued*

	Recruitment Source			Omnibus test[a]	Pairwise contrasts[b]
	Charity (*n* = 98) Mean (SD) or %	Schools (*n* = 78) Mean (SD) or %	Internet (*n* = 28) Mean (SD) or %		
Psychiatric symptoms					
Informant report [d]					
Internalizing Problems	5.21 (4.19)	1.81 (2.41)	-	$F (2, 160) = 37.95, p < 0.001$	-
Externalizing Problems	3.61 (4.20)	.84 (1.86)	-	$F (2, 160) = 27.55, p < 0.001$	-
Self- report					
Internalizing Problems	7.91 (5.16)	5.08 (3.47)	5.39 (2.71)	$F (2, 203) = 196.27, p < 0.001$	C > S & I
Anger	9.18 (6.04)	5.76 (4.85)	3.89 (2.97)	$F (2, 203) = 426.92, p < 0.001$	C > S & I
PTSD	12.32 (6.98)	6.85 (4.96)	7.60 (4.68)	$F (2, 203) = 712.86, p < 0.001$	C > S & I
Dissociation	11.20 (6.67)	7.36 (4.67)	6.71 (4.43)	$F (2, 203) = 414.80, p < 0.001$	C > S & I

A...

[a] (...

[b] I...

[c] Maltreated youth are defined as youth who had experienced at least one form of maltreatment at or above the Low maltreatment severity threshold specified by the CTQ manual

[d] Informant reports of internalizing and externalizing problems were only available for youth recruited from the charity and schools (i.e. not internet).

Supplementary Table 2. Associations between maltreatment types and forms of internalizing and externalizing psychopathologies

	Regression models							
	Individual				**Simultaneous**			
	B	*(Std B)*	95% CI		*B*	*(Std B)*	95% CI	
Psychiatric symptoms			LL	UL			LL	UL
Informant report								
MDD								
Emotional abuse	.29***	(.41)	.18	.41	.34***	(.47)	.16	.51
Physical abuse	.16*	(.21)	.03	.29	-.02	(-.03)	-.17	.13
Sexual abuse	.08	(.08)	-0.9	.26	-.05	(-.04)	-.23	.13
Emotional neglect	.18**	(.24)	.05	.31	-.09	(-.12)	-.29	.11
Physical neglect	.27**	(.25)	.09	.46	.09	(.09)	-.16	.35
GAD								
Emotional abuse	.25***	(.32)	.13	.37	.23*	(.30)	.04	.41
Physical abuse	.20**	(.25)	.07	.34	.09	(.11)	-.08	.25
Sexual abuse	.21*	(.18)	.03	.39	.12	(.10)	-.07	.31
Emotional neglect	.16*	(.19)	.02	.29	-.10	(-.12)	-.31	.10
Physical neglect	.24*	(.21)	.05	.43	.04	(.04)	-.22	.31
ODD								
Emotional abuse	.17*	(.20)	.02	.31	.11	(.12)	-.11	.32
Physical abuse	.21**	(.23)	.05	.36	.16	(.17)	-.03	.34
Sexual abuse	.15	(.12)	-.05	.35	.09	(.07)	-.13	.31
Emotional neglect	.11	(.12)	-.04	.26	-.08	(-.09)	-.32	.16
Physical neglect	.19	(.15)	-.02	.41	.04	(.03)	-.26	.35
CD								
Emotional abuse	.14**	(.23)	.04	.24	.13	(.21)	-.02	.27
Physical abuse	.11*	(.17)	.01	.21	.06	(.09)	-.07	.19
Sexual abuse	.23***	(.25)	.09	.37	.20**	(.22)	.06	.35
Emotional neglect	.09	(.14)	-.02	.20	-.04	(-.06)	-.20	.13
Physical neglect	.08	(.09)	-.07	.24	-.10	(-.10)	-.31	.11
Self-report								
Depression								
Emotional abuse	.48***	(.47)	.34	.62	.51***	(.49)	.30	.71

Physical abuse	.22*	(.19)	.05	.39	-.12	(-.10)	-.31	.07
Sexual abuse	.17	(.12)	-.03	.38	-.02	(-.01)	-.21	.18
Emotional neglect	.34***	(.32)	.19	.49	.02	(.02)	-.20	.23
Physical neglect	.45***	(.28)	.22	.68	.07	(.05)	-.23	.38
Anxiety								
Emotional abuse	.46***	(.44)	.31	.61	.52***	(.50)	.30	.74
Physical abuse	.22*	(.19)	.04	.39	-.09	(-.08)	-.29	.11
Sexual abuse	.19	(.13)	-.02	.40	-.09	(-.08)	-.29	.11
Emotional neglect	.28***	(.26)	.12	.43	-.09	(-.09)	-.32	.13
Physical neglect	.43***	(.26)	.19	.66	.13	(.08)	-.19	.44

N.B. All models control for sex, ethnicity, age, IQ, neighbourhood deprivation and community violence exposure over the past year. Abbreviations: MDD, Major Depressive Disorder; GAD, Generalized Anxiety Disorder; ODD, Oppositional Defiant Disorder; CD, Conduct Disorder. *p <.05, **p < .01, ***p < .001