

## **Double disadvantage: The influence of childhood maltreatment and community violence exposure on adolescent mental health**

SELF-ARCHIVING VERSION

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## **Abstract**

**Background:** Childhood maltreatment is a key risk factor for maladjustment and psychopathology. Although maltreated youth are more likely to experience community violence, both forms of adversity are generally examined separately. Consequently, little is known about the unique and interactive effects that characterise maltreatment and community violence exposure (CVE) on mental health.

**Methods:** Latent Profile Analysis (LPA) was applied to data from a community sample of high-risk adolescents and young adults ( $n = 204$ ,  $M = 18.85$ ) in order to categorize groups of participants with similar patterns of childhood (i.e. past) maltreatment exposure. Associations between childhood maltreatment, CVE and mental health outcomes were then explored using multivariate regression and moderation analyses.

**Results:** LPA identified three groups of individuals with low, moderate, and severe levels of childhood maltreatment. Maltreatment was associated with more internalizing, externalizing, and trauma related symptoms. By contrast, CVE showed independent associations with only externalizing and trauma-related symptoms. Typically, childhood maltreatment and CVE exerted additive effects; however, these forms of adversity interacted to predict levels of anger.

**Conclusions:** Exposure to maltreatment and community violence is associated with increased levels of clinical symptoms. However, while maltreatment is associated with increased symptoms across a broad range of mental health domains, the impact of community violence is more constrained, suggesting that these environmental risk factors differentially impact mental health functioning.

**Keywords:** Maltreatment, community violence, mental health, trauma

**Abbreviations:** LPA, Latent Profile Analysis; CVE, Community violence exposure

## Introduction

Children who experience maltreatment are more likely to suffer from a wide range of enduring psychosocial, emotional and behavioural difficulties, including post-traumatic stress disorder, depression, anxiety and antisocial behaviour (Cicchetti & Toth, 2005). Maltreatment remains an on-going public health concern, with recent estimates indicating that as many as 5% to 15% of children experience severe maltreatment by a parent or caregiver in the United Kingdom (Radford et al., 2011). Maltreatment also poses a significant financial burden on judicial and social welfare services and decreases economic productivity in the longer term (Currie & Widom, 2010). Consequently, maltreatment is regarded as a salient developmental risk factor and an important target for prevention and intervention efforts (Gilbert et al., 2009).

While a considerable body of research has investigated direct associations between childhood maltreatment and mental health outcomes, little is known about factors that may moderate such associations (Zielinski & Bradshaw, 2006). Influences within different levels of a child's ecology may interact with one another to potentiate or diffuse the effects of maltreatment (Lynch & Cicchetti, 1998). The importance of specific influences likely varies with developmental stage; the immediate family environment may be particularly salient for younger children, while community-level factors may gain importance with age (Margolin & Gordis, 2000). Although a number of studies have investigated how family factors can moderate mental health outcomes in maltreated youth, the role of the wider community context remains a relatively under-researched area (Zielinski & Bradshaw, 2006).

A particularly salient contextual risk factor for adolescents and young adults is community violence exposure (CVE; Cooley-Strickland et al., 2009). A recent meta-analysis found that at least half of youth in urban areas had witnessed or directly experienced violence within their community (Fowler, Tompsett, Braciszewski, Jacques-Tiura, & Baltes, 2009). CVE has been found to correlate significantly with experience of maltreatment (Overstreet & Braun, 2000). Furthermore, both maltreatment and CVE are associated with poor psychosocial outcomes (Fowler et al., 2009; Lynch & Cicchetti, 1998). Despite this, CVE is generally overlooked within the maltreatment literature (Aisenberg & Mennen, 2000). Given that a considerable proportion of research is carried out with adolescents or young adults using retrospective reports of maltreatment, failure to assess current levels of CVE may result in the overestimation of maltreatment effects (Aisenberg & Herrenkohl, 2008). That is, effects associated with more temporally proximal CVE may be misattributed to childhood history of maltreatment. Similarly, failing to account for maltreatment exposure may lead to an overestimation of the effects of CVE. Although independent effects of CVE on global trauma

symptomatology, controlling for maltreatment history, have been previously reported (e.g. Garrido, Culhane, Raviv, & Taussig, 2010), we are not aware of any studies that have investigated whether childhood maltreatment and current CVE independently affect common or distinct areas of individual functioning using a broader range of mental health outcomes.

Recent CVE may also serve to moderate the association between childhood maltreatment and adolescent outcomes (Cicchetti & Lynch, 1993). It has been previously reported that family-level factors such as parental attachment moderate the association between CVE and mental health outcomes (e.g. Salzinger, Feldman, Rosario, & Ng-Mak, 2011). Yet, little is known about the existence of interactive effects between current CVE and childhood history of maltreatment. Interactions with maltreatment may occur in a number of ways. Exposure to community violence may have an exponential effect on maltreated youth; for example, hypervigilant responses to threat and dissociative symptoms associated with maltreatment exposure may be further reinforced by CVE. On the other hand, it is possible that CVE does not exacerbate established vulnerabilities in maltreated youth but rather has more pronounced effects on individuals who have *not* experienced childhood maltreatment. Such non-maltreated youth may have developed fewer coping resources and thus be more traumatised by violence (Buka, Stichick, Birdthistle, & Earls, 2001). It is also possible that instead of acting as a moderator, CVE serves to increase risk for negative outcomes regardless of maltreatment history. In fact, maltreatment and CVE may exert additive rather than interactive effects on negative outcomes. It has already been shown more generally that the experience of polyvictimization is associated with poorer outcomes compared to the experience of isolated forms of adversity (e.g. Finkelhor, Ormrod & Turner, 2007), and that the number of adversities experienced linearly increases risk for negative developmental outcomes (Anda et al., 2006; Arata, Langhinrichsen-Rohling, Bowers, & O'Brien, 2007; Edwards, Holden, Felitti, & Anda, 2003). However, whether childhood maltreatment and current CVE additively combine to affect a range of mental health outcomes is currently unclear.

To our knowledge, no study to date has comprehensively investigated unique, additive and interactive effects between past history of maltreatment and current levels of CVE. The aims of the present study were three-fold. First, we wished to examine the effects of maltreatment on maladjustment and trauma-related symptomatology in a sample of high-risk youth. We used Latent Profile Analysis (LPA; Lanza, Flaherty, & Collins, 2003) to identify groups of individuals with different maltreatment profiles and then examined associations between each of these groups and mental health symptoms. Second, we aimed to investigate the impact of CVE. Specifically, whether maltreatment and CVE independently predicted clinical symptoms and whether the strength of associations between maltreatment and clinical symptoms would decrease after accounting for

current CVE. Third, we wished to explore interactive effects between childhood maltreatment and current levels of CVE to investigate whether individuals with distinct maltreatment profiles are differentially affected by CVE. By controlling for socio-demographic characteristics and neighbourhood deprivation we exclude the contribution of these possible confounds. Based on previous studies, we predicted that more severe maltreatment would be associated with greater psychological maladjustment and trauma-related symptomatology. We also hypothesised that CVE would independently predict these outcomes and that once CVE was taken into account the strength of associations between maltreatment and mental health symptoms would diminish. Interactive effects were examined on an exploratory basis.

## **Methods**

### Participants

The sample comprised of 204 inner-city adolescents and young adults aged 16 to 24 years ( $M = 18.85$ ). Multiple recruitment channels were used in order to include individuals with varying levels of maltreatment. Of the total sample, 48% ( $N = 98$ ) were recruited and assessed at Kids Company, a charity that provides services to vulnerable, high-risk youth (typically via self-referral) who have experienced severe developmental adversity. Kids Company staff introduced young people to the research; interested participants then met with one of the research team who provided additional information about the study. After the testing session a key worker from the charity, who knew each participant well, completed a short questionnaire booklet. The other 52% ( $N = 106$ ) were recruited via London-based secondary schools ( $N = 78$ ) and websites ( $N = 28$ ). Participants from schools received information about the research during a brief presentation and students interested in the research were provided with additional information. After the testing session, a teacher who knew each participant well completed the questionnaire booklet. Several websites, including Gumtree, Experimatch, and the UCL subject pool were also used to recruit participants. Interested individuals were asked to fill in a brief screening form and 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 provided informed consent prior to participation. Participants from Kids Company and from the 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 the total sample, 53% were girls ( $N = 108$ ). The sample was ethnically diverse, with 44% Caucasian, 41% Black, 10% Mixed, and 5% Asian participants. Of all external

ratings, 54% were provided by key workers and 46% were provided by teachers from schools. 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 and how recruitment sites compared in relation to the study variables are provided as an online supplement (OS1).

### Procedure

The current study examined data collected as part of a larger project investigating the effects of childhood maltreatment. All procedures were approved by the University College London Research Ethics Committee (ID No: 2462/001). Testing took place in a quiet room within Kids Company, the young person's school or at UCL depending on recruitment source.

### Measures

A more detailed report of the study measures is available as an Online Supplement (OS2).

#### *Socio-demographic covariates*

Data on age, sex, ethnicity and IQ were collected from all participants. Cognitive ability was assessed using the two-subtest version of the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). Participant postcode information was used to obtain an Index of Multiple Deprivation (IMD, 2011) score which is derived from population census data and encompasses multiple indicators of neighbourhood deprivation. Higher values indicate female gender, non-white ethnicity, older age, higher cognitive ability and greater deprivation.

#### *Childhood Maltreatment*

Childhood maltreatment was assessed using the Childhood Trauma Questionnaire – Short Form (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, physical abuse, sexual abuse, emotional neglect and physical neglect. The scales show high internal consistency in our sample ( $\alpha = .70 - .97$ ). 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 were currently vulnerable to violence in the domestic environment (e.g. by family or partner).

### *Community Violence Exposure (CVE)*

Exposure to community violence over the past year was assessed using items from the validated, self-report Children's Report of Exposure to Violence (CREV; Cooley, Turner, & Beidel, 1995). Three subscales were used in the present study: hearing about, witnessing, and directly experiencing (i.e. being a victim of) community violence ( $\alpha = .79 - .89$ ). A composite measure of CVE was derived by averaging scores across the three subscales due to the large degree of overlap between subscales. Please refer to OS3 for details of correlations between subscales as well as information regarding the proportion of youth experiencing each form of community violence.

### *Mental Health Outcomes*

Mental health outcomes were assessed making use of both informant- and self-report measures. Teachers or key workers (i.e. informants) completed four subscales from the 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.

Participants completed the Trauma Symptom Checklist for Children (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- and hyper-response). Chronbach's alpha for the scales varied from .84 to .87. 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 external reports. Post-traumatic stress, anger and dissociation were kept separate and represented trauma-related symptoms.

### Statistical Analysis

All analyses were performed using Mplus version 6.1.1. (Muthén & Muthén, 2011). A Latent Profile Analysis (LPA) was first conducted to identify groups of individuals differing in maltreatment profile across the five CTQ subscales. LPA uses the latent structure of maltreatment experience to derive a person-centered categorical variable, whereby each individual is assigned to a mutually exclusive maltreatment class (i.e. profile) based on a data-driven analytic strategy. As a

result, unlike other commonly used approaches (e.g. count variables, categories based on severity or maltreatment type ‘hierarchy’), the LPA does not require any a priori assumptions about what cut-offs to use in order to classify individuals, how many combinations of maltreatment types to include, or which combinations should be treated as more ‘detrimental’ (Roesch, Villodas, & Villodas, 2010). We estimated five different LPAs, starting with a 1-group model and ending with a 5-group model. All models had random starting values. The physical abuse, physical neglect and sexual abuse CTQ subscales were censored due to non-normality of the score distribution. Best fit was determined using the adjusted Bayesian Information Criteria (BIC), the Lo-Mendell-Rubin likelihood ratio test (LMR), and entropy, where values greater than 0.80 indicate higher classification accuracy.

Fit statistics indicated that the 2- and 3-class solutions had the highest entropy values (0.91 and 0.87, respectively). The 2-class solution differentiated only a small ‘severe maltreatment’ group from the rest of participants despite marked variation in maltreatment scores. As a result, the 3-class solution was adopted to increase descriptive power. As shown in Figure 1, the 3-class solution identified a gradient of maltreatment exposure, whereby 122 (58%) participants were assigned to a ‘Low Maltreatment’ (Low MT) group, 57 (30%) to a ‘Moderate MT’ group and 25 (12%) participants to a ‘Severe MT’ group. Full model fit indices for the 1- to 5-class solutions are available as an online supplement (OS4). In order to validate the 3-class solution, a series of One-Way Analysis of Variance (ANOVA) tests and Pair-wise Post-hoc Comparisons were conducted; these confirmed that the three groups differed significantly from one another across all CTQ subscales ( $p < .001$ ). Classes were further validated by comparing CTQ subscale means for each group with the maltreatment thresholds specified in the CTQ Manual (Bernstein & Fink, 1998). Please refer to OS5 for further details.

\*\*\*\*\* Figure 1 \*\*\*\*\*

Two separate multivariate regression models were then conducted: one model was used to predict informant-rated outcomes (i.e. teacher/key worker ratings on ASI subscales) and the other to predict self-report outcomes (TSCC subscales). Within each of these regression models, outcomes were modelled together to account for correlations in error terms. Missing values were handled through maximum likelihood estimation with robust standard errors (MLR). To provide robustness to non-normality and adjust for small sample size bias, regression analyses were bootstrapped 10,000 times from which we obtained bias-corrected 95% confidence intervals. As a result,



information about the significance of effects is established via the examination of bias-corrected confidence intervals, while a measure of effect size is obtained by looking at standardized estimates.

For each of the two models, the main regression analysis followed three steps. First, LPA classes were entered as dummy coded variables, after controlling for age, sex, ethnicity, IQ and neighbourhood IMD in order to examine the effect of LPA maltreatment classes on the outcome measures. Second, community violence exposure was added as a predictor in order to examine: (i) whether both LPA classes and CVE independently predicted the outcomes (i.e. unique effect of one form of adversity on outcomes, controlling for the other); (ii) whether the associations between LPA classes and outcomes remained significant after accounting for current levels of CVE; and (iii) whether the addition of CVE significantly improved model fit, tested by running a 1-degree of freedom chi-square difference test. In the third step, we added as a predictor the multiplicative term of the categorical LPA variable by CVE to test possible interaction effects on the outcome measures. In order to run the above analyses and obtain comparable standardized estimates across the different regression steps, only participants who had complete data on both maltreatment and CVE were included. This resulted in a total sample of  $N = 148$  for the model predicting informant-rated outcomes, and  $N = 189$  for the model predicting self-report outcomes. The difference in sample size between informant-rated and self-rated outcomes resulted from the fact that it was not possible to obtain teacher or key worker (i.e. for Kids Company) ratings for all participants in the study. The reduced samples did not differ from the full sample ( $N = 204$ ) on any of the study variables.

## Results

Descriptives and bivariate correlations across the study variables are presented in Table 1. The categorical LPA maltreatment variable was moderately and positively correlated with current CVE. Both the LPA variable and CVE were significantly correlated with all outcome measures.

\*\*\*\*\* Table 1 \*\*\*\*\*

### Regression Analyses

#### *Step 1: Dose-response effect of maltreatment*

The regression model predicting informant-rated outcomes is shown in Table 2 - Model A. After controlling for demographic and neighbourhood characteristics, history of childhood maltreatment

significantly predicted developmental maladjustment. The ‘Low MT’ group experienced significantly less internalizing and externalizing problems compared to the ‘Severe MT’ group, and this contrast had a large effect size. The ‘Low MT’ group also experienced lower externalizing difficulties compared to the ‘Moderate MT’ group, but these two groups did not differ in levels of internalizing difficulties. The ‘Moderate MT’ group only differed significantly from the ‘Severe MT’ group on internalizing difficulties (i.e. lower scores).

Results from the model predicting self-report outcomes are shown in Table 2 - Model B. Consistent with Model A, individuals in the ‘Low MT’ group reported experiencing significantly lower internalizing problems and trauma symptomatology than the ‘Severe MT’ group, with large effect sizes across outcomes. For all negative outcomes, except Anger, there was a dose-response effect of maltreatment (Low MT < Moderate MT < Severe MT). For Anger, the ‘Low MT’ group reported experiencing significantly lower symptoms than both the ‘Moderate MT’ and ‘Severe MT’ groups; however, the ‘Moderate MT’ and ‘Severe MT’ groups did not differ from one another in anger levels.

### *Step 2: Independent effects of maltreatment and CVE*

In the second step of the analysis we re-ran the regression models adding CVE as a predictor. For informant-rated outcomes (Model A, Table 2), the associations between LPA classes and internalizing and externalizing problems remained significant even after accounting for CVE. Current levels of CVE independently predicted externalizing problems, but not internalizing problems. Consistent with this, the 1-degree of freedom Chi-Square difference test showed that the addition of CVE significantly improved model fit only for externalizing problems ( $\Delta\chi^2(1) = 11.60$ ,  $p < .001$ ).

For self-report outcomes (Model B, Table 2), the associations between LPA classes and clinical symptoms remained significant even after accounting for CVE. CVE did not independently predict internalizing problems and did not significantly increase model fit for this outcome. However, CVE did independently predict trauma-related symptomatology, reducing the predictive strength of maltreatment and significantly improving model fit for anger ( $\Delta\chi^2(1) = 13.83$ ,  $p < .001$ ), PTSD ( $\Delta\chi^2(1) = 9.572$ ,  $p < .001$ ) and dissociation symptoms ( $\Delta\chi^2(1) = 15.12$ ,  $p < .001$ ).

In summary, maltreatment exerted a moderate-to-large effect across all clinical outcomes examined. Effects remained significant after controlling for CVE but decreased in size. CVE independently predicted externalizing problems and trauma symptoms, but not internalizing problems.

\*\*\*\*\* Table 2 \*\*\*\*\*

### *Step 3: Moderation analyses*

In the third step of the analysis, the interaction term of the categorical LPA class variable by CVE was included in Model A and Model B. One interaction, predicting self-report anger levels, was significant ( $B = -.35$ ,  $SE = .04$ ,  $p = .03$ ). This interaction is shown in Figure 2. The ‘Low MT’ group showed the steepest increase in anger levels as exposure to community violence increased, followed by the ‘Moderate MT’ group. By contrast, self-reported anger symptoms in the ‘Severe MT’ group were similar regardless of CVE levels. With regard to the other outcome measures, the absence of significant interactions suggests that maltreatment and CVE exert additive effects on externalizing problems, PTSD and dissociation symptoms, whereas internalizing problems appear affected by maltreatment exposure only.

\*\*\*\*\* Figure 2 \*\*\*\*\*

### **Discussion**

To our knowledge, the present study was the first to comprehensively investigate independent, additive and interactive influences of childhood maltreatment and community violence on mental health. Using Latent Profile Analysis, we identified three groups differing in maltreatment severity. Severity of maltreatment exposure exerted a dose dependent effect on levels of externalizing, internalizing and trauma-related symptoms. These effects attenuated but remained significant after accounting for current levels of CVE, suggesting that failing to account for CVE may lead to an overestimation of maltreatment effects. While childhood maltreatment had an impact across the spectrum of mental health symptoms assessed, CVE independently predicted only externalizing and trauma-related symptoms. Our results therefore suggest that these environmental risk factors differentially impact mental health functioning. Moderation analyses showed that while maltreatment and CVE typically exert additive effects (in relation to externalizing problems, PTSD and dissociation symptoms), they interact with one another to predict anger levels.

### *Childhood maltreatment impacts mental health following a dose-response gradient*

In the current study maltreatment profiles were identified using LPA, an individual-centered and empirically-driven approach that enables to model multiple maltreatment types concurrently. As a result, the LPA allowed to account for the complexity and comorbidity of maltreatment experiences, thus offering a substantial methodological advantage over previously used methods (Roesch, Villodas, & Villodas, 2010). Interestingly, the LPA identified a gradient of maltreatment

exposure, meaning that severity of maltreatment, rather than the main type or combination of types experienced, emerged as a more informative criterion for classifying maltreatment experience. When relating LPA groups to mental health outcomes, maltreatment severity predicted clinical symptoms following a dose-response gradient (Low <Moderate<Severe), even when accounting for demographic characteristics, neighbourhood deprivation and CVE. Given that for all maltreated youth experience of maltreatment was reported to have occurred in the past (i.e. none reported currently feeling unsafe within their domestic environment), these findings are likely to reflect the enduring consequences of child abuse and neglect on later psychological and emotional functioning. Results using this stringent approach are also consistent with epidemiological and neurobiological studies documenting the profound and cumulative effect of maltreatment on multiple domains of individual functioning (see McCrory, De Brito, & Viding, 2011, for a review).

*Community violence exposure is a risk factor for maladjustment and trauma symptoms*

Current levels of CVE independently predicted externalizing problems and trauma symptomatology beyond the effects of childhood maltreatment. These findings are in line with previous studies that point to CVE as an important risk factor for mental health and well-being (Fowler et al., 2009). Although little empirical evidence is currently available to shed light on specific underlying mechanisms, a number of possibilities have been suggested. First, community violence may potentiate hostile attribution biases and hypervigilance to threat, which in turn may increase reactive aggression (Fowler et al., 2009). Second, repeated witnessing of violent acts may model violent responses as a socially acceptable and effective way of resolving conflict or achieving desired goals (Cooley-Strickland et al., 2009). Third, the perceived and actual threat of CVE may maintain a state of physiological and emotional hyper-arousal that could contribute to the development of post-traumatic stress and feelings of anger. Dissociative responses may also develop as a coping strategy to distance oneself from emotionally aversive and threatening situations (Buka et al., 2001). Given that the experience of maltreatment and community violence share a number of common features (Foster & Brooks-Gunn, 2009) these mechanisms may also be of relevance in characterising the impact of childhood maltreatment (Margolin & Gordis, 2000). In the present study, CVE did not significantly predict informant-rated or self-reported internalizing difficulties. These findings contrast with those reported by a meta-analysis, which found a small positive effect of CVE on internalizing difficulties (Fowler et al., 2009). However, because the meta-analysis did not take into account maltreatment exposure we propose that such an association may have been secondary to the effects of maltreatment.

*The additive and interactive effects of maltreatment and community violence*

Moderation analyses showed that the effects of maltreatment and community violence combine in outcome-specific ways. Additive effects were found in relation to externalizing problems, post-traumatic stress and dissociation symptoms, indicating that maltreatment and CVE both independently augment symptoms in these domains. Because internalizing problems were uniquely predicted by childhood maltreatment, CVE was not associated with increased in anxiety and depression symptoms. However, in relation to one domain – anger –we observed an interaction between childhood maltreatment and CVE. Specifically, the steepest increase in self-reported anger as a result of increasing levels of CVE was seen in the low maltreatment group. In other words, while this group showed the lowest levels of anger when not exposed to community violence, anger levels linearly increased with CVE until they exceeded even those reported by the severe maltreatment group. It is possible that youth in the low maltreatment group are emotionally and physiologically unprepared for high levels of violence in the community. Consistent with this hypothesis, a recent meta-analysis exploring predictors of anger in adolescence found that stress and exposure to violence were among the strongest predictors, exerting a moderate-to-substantial effect size (Mahon, Yarcheski, Yarcheski, & Hanks, 2010).

*Limitations*

The present findings should be interpreted in light of a number of limitations. First, our measure of maltreatment was based on self-report. Although it is possible that retrospective biases and unwillingness to disclose were present, a recent study found that associations between maltreatment and psychopathology were comparable when making use of retrospective versus prospective reports (Scott, McLaughlin, Smith, & Ellis, 2012). Moreover, the use of official data has been found to considerably underestimate the true extent of maltreatment experienced, casting doubt on the reliability of this method (Cicchetti & Toth, 2005). Second, the fact that maltreatment, community violence exposure and a proportion of outcome measures were reported by youth themselves raises the possibility of shared method variance. In their meta-analysis, Fowler and colleagues (2009) found that studies using the same reporter for both community violence and outcomes resulted in a larger effect size. We assessed internalizing difficulties via informant and self-report ratings. Importantly, results across reporters were highly consistent regarding the lack of a unique effect of CVE on internalizing difficulties. Third, because of sample size limitations we were unable to explore whether the degree of proximity to CVE moderates the association between

childhood maltreatment and mental health outcomes. It would be informative in future to examine whether hearing about, witnessing or directly experiencing community violence may interact differently with childhood maltreatment to exacerbate levels of maladjustment and trauma symptomatology. It is important to note; however, that different forms of community violence in the present study were found to be highly interrelated and as such findings suggest that single forms of community violence rarely occur in isolation. Fourth, the recruitment strategy used in the present study precludes us from determining to what degree the participants were representative of youth from the settings from which they were sampled. In addition, because the Latent Profile Analysis assigns individuals to mutually exclusive categories, our analytic strategy may have resulted in lower statistical power to detect effects compared to dimensional approaches. Finally, our findings suggest a causal effect of childhood maltreatment and community violence exposure on mental health; however, the cross-sectional nature of the study meant that we were unable to establish the directionality of effects found. For example, it is possible that instead of CVE increasing risk for externalizing difficulties, having externalizing difficulties in the first place increases risk for CVE. More research is needed to explore longitudinal bidirectional associations between CVE exposure and mental health functioning, with a particular focus on behavioural difficulties.

## **Conclusion**

The present study provides evidence for both common and distinct effects of maltreatment and community violence. Childhood maltreatment emerged as a powerful predictor of mental health symptoms above and beyond the impact of CVE. Maltreatment exerted a generic and detrimental effect on all domains of functioning examined, underscoring the importance of preventive efforts and early intervention strategies. Nevertheless, the effect of maltreatment was reduced after controlling for CVE suggesting that future research examining the sequelae of child abuse and neglect should account for CVE as to not overestimate the impact of maltreatment.

CVE uniquely predicted levels of externalizing problems and trauma symptomatology over and above the effects of childhood maltreatment. Severe CVE was particularly associated with elevated symptoms of anger. Given the high prevalence of CVE in urban areas, our findings highlight the importance of addressing CVE in adolescent populations (Cooley-Strickland et al., 2009). At present, preventive measures and intervention solutions targeting youth exposed to CVE are limited and lack systematic evaluation (Fowler et al., 2009). Tailored programmes that focus on the development of healthy coping strategies and the provision of counselling services may be particularly effective in reducing aggressive or traumatic responses to violence exposure,

particularly if these are made easily accessible within school settings or youth centres. It remains unclear whether treatment approaches should be tailored for individuals presenting with common clinical symptoms, but with different kinds of prior risk experiences. Finally, these findings highlight the need for clinicians to more routinely assess CVE in young people as a potential risk factor for trauma related symptomatology and externalizing problems.

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## **Key Points**

- Maltreated youth are more likely to experience community violence, yet little is known about the unique and interactive effects of these distinct forms of early adversity on mental health.
- Childhood maltreatment is associated with increased internalizing, externalizing, and trauma related symptoms. Accounting for levels of community violence exposure reduces but does not eliminate these associations.
- Exposure to community violence, over and above maltreatment experience, independently predicts externalizing and trauma-related symptoms but not internalizing symptoms such as general anxiety and depression.
- These findings shed light on how different forms of adversity combine to affect multiple areas of individual functioning.

Table 1. Descriptive statistics and intercorrelations across study variables.

Variables	LPA Classes	CVE	Mean (SD) or %
<i>Violence Exposure</i>			
LPA Classes	–	.37***	–
CVE	.37***	–	17.60 (13.08)
<i>Socio-Demographic Variables</i>			
<i>Ethnicity<sup>a</sup></i>			
White	-.20**	-.33***	44.1%
Black	.23***	.37***	40.7%
Mixed	-.08	.01	9.8%
Asian	.04	-.10	5.4%
Sex (Female)	.02	-.08	53%
Age	.25***	.16*	18.85 (2.27)
IQ	-.02	-.23**	–
IMD	.13	.26***	28.55 (10.73)
<i>Clinical Symptoms</i>			
<i>Informant report<sup>b</sup></i>			
Internalizing Problems	.41***	.28***	3.65 (3.88)
Externalizing Problems	.34***	.38***	2.34 (3.60)
<i>Self-report<sup>c</sup></i>			
Internalizing Problems	.49***	.24***	6.55 (4.56)
Anger	.33***	.39***	7.15 (5.64)
PTSD	.52***	.40***	9.58 (6.52)
Dissociation	.42***	.40***	9.12 (6.02)

Note. \*\*\* =  $p < .001$ ; \*\* =  $p < .01$ ; \* =  $p < .05$

Abbreviations = LPA Classes, Latent Profile Analysis maltreatment classes (0 = ‘Low MT’, 1 = ‘Moderate MT’, 2 = ‘Severe MT’); CVE, past year Community Violence Exposure; IMD, Index of Multiple Deprivation; PTSD, Post-Traumatic Stress Disorder.

<sup>a</sup> Ethnicity: White (yes = 1; no = 0); Black (yes = 1; no = 0); Mixed (yes = 1; no = 0); Asian (yes = 1; no = 0).

<sup>b</sup>  $N = 148$ .

<sup>c</sup>  $N = 189$ .

**Table 2.** Multivariate regression predicting informant and self-report clinical symptoms

	Model A: Informant Report Outcomes <sup>a</sup>								Model B: Self-Report Outcomes <sup>b</sup>															
	Internalizing Problems				Externalizing Problems				Internalizing Problems				Anger				PTSD				Dissociation			
	95% CI		95% CI		95% CI		95% CI		95% CI		95% CI		95% CI		95% CI		95% CI							
	<i>B</i> (Std. <i>B</i> )	UL	LL	<i>B</i> (Std. <i>B</i> )	UL	LL	<i>B</i> (Std. <i>B</i> )	UL	LL	<i>B</i> (Std. <i>B</i> )	UL	LL	<i>B</i> (Std. <i>B</i> )	UL	LL	<i>B</i> (Std. <i>B</i> )	UL	LL	<i>B</i> (Std. <i>B</i> )	UL	LL			
<b>Step 1: Main Effects<sup>c</sup></b>																								
LPA Classes																								
<i>Low MT (vs severe)</i>	-3.46*	(-.47)	-5.11	-1.65	-2.74*	(-.39)	-4.51	-1.08	-6.14*	(-.66)	-8.01	-4.22	-4.54*	(-.40)	-6.79	-2.24	-9.11*	(-.68)	-11.39	-6.09	-7.08*	(-.58)	-9.37	-4.21
<i>Low MT (vs moderate)</i>	-.77	(-.11)	-1.90	.38	-1.41*	(-.21)	-2.51	-.45	-2.13*	(-.23)	-3.35	-.86	-2.93*	(-.26)	-4.27	-1.44	-3.22*	(-.24)	-4.91	-1.38	-2.35*	(-.19)	-3.94	-.72
<i>Severe MT (vs moderate)</i>	3.18*	(.31)	1.22	5.08	1.61	(.17)	-.20	3.60	4.49*	(.31)	2.52	6.65	2.13	(.12)	-.07	4.63	2.13*	(.33)	4.03	9.37	5.34*	(.29)	2.62	8.03
<b>R<sup>2</sup></b>	<b>.29</b>				<b>.23</b>				<b>.25</b>				<b>.15</b>				<b>.31</b>				<b>.20</b>			
<b>Step 2: Main Effects<sup>c,d</sup></b>																								
LPA Classes																								
<i>Low MT (vs severe)</i>	-3.46*	(-.47)	-5.24	-1.66	-2.05*	(-.30)	-3.08	-.40	-5.93*	(-.64)	-7.90	-3.86	-2.94*	(-.26)	-5.49	-.32	-7.82*	(-.58)	-10.4	-4.44	-5.46*	(-.45)	-7.94	-2.38
<i>Low MT (vs moderate)</i>	-.75	(-.10)	-1.91	.43	-1.21*	(-.18)	-2.35	-.24	-2.08*	(-.22)	-3.32	-.78	-2.49*	(-.22)	-3.81	-.95	-2.87*	(-.21)	-4.55	-1.04	-1.90	(-.15)	-4.55	-1.04
<i>Severe MT (vs moderate)</i>	3.12*	(.31)	1.15	5.11	1.00	(.10)	-.76	2.95	4.36*	(.30)	2.35	6.56	.96	(.05)	-1.33	3.61	5.82*	(.28)	2.89	8.71	4.20*	(.22)	2.89	8.71
CVE	.01	(.03)	-.03	.05	.07*	(.27)	.04	.11	.01	(.04)	-.21	.56	.12*	(.28)	.07	.18	.10*	(.19)	.04	.17	.12*	(.26)	.04	.19
<b>R<sup>2</sup></b>	<b>.29</b>				<b>.29†</b>				<b>.25</b>				<b>.21†</b>				<b>.33†</b>				<b>.26†</b>			

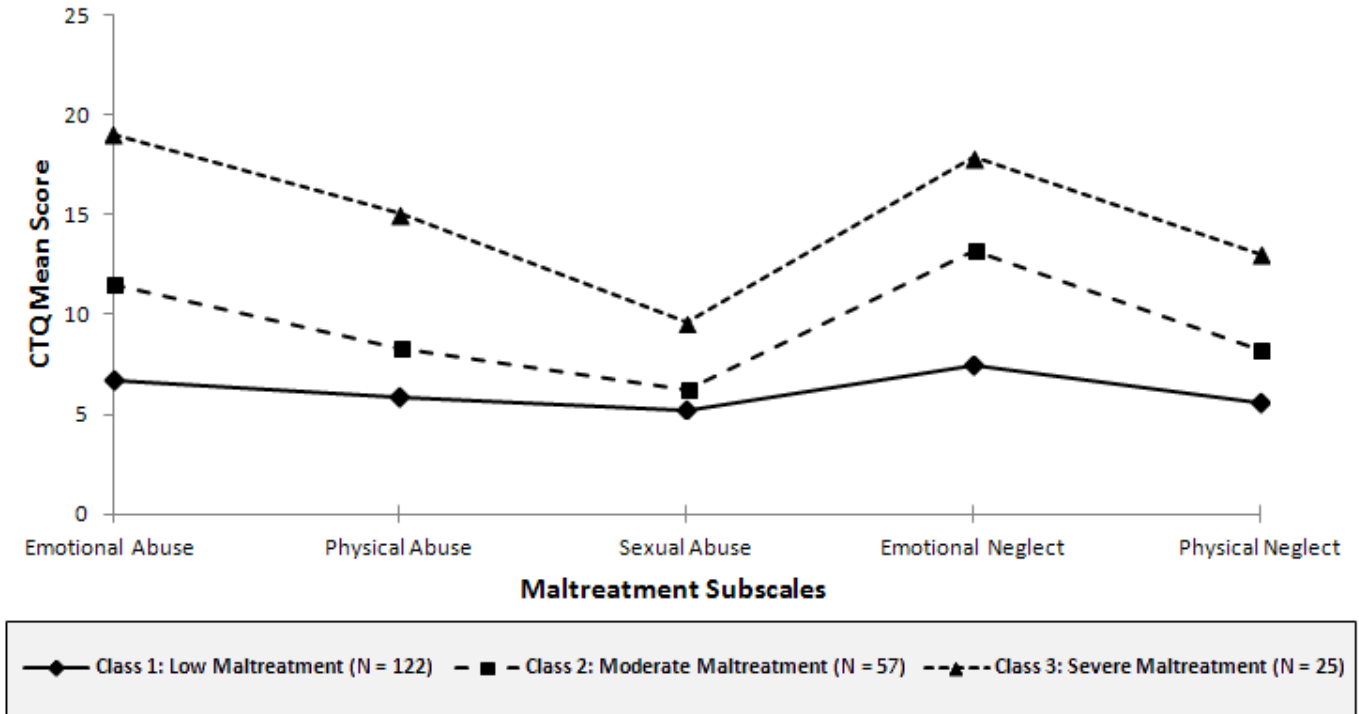
<sup>b</sup> N = 189.

<sup>c</sup> Main effects shown also control for age, sex, ethnicity, IQ, and index of multiple deprivation.

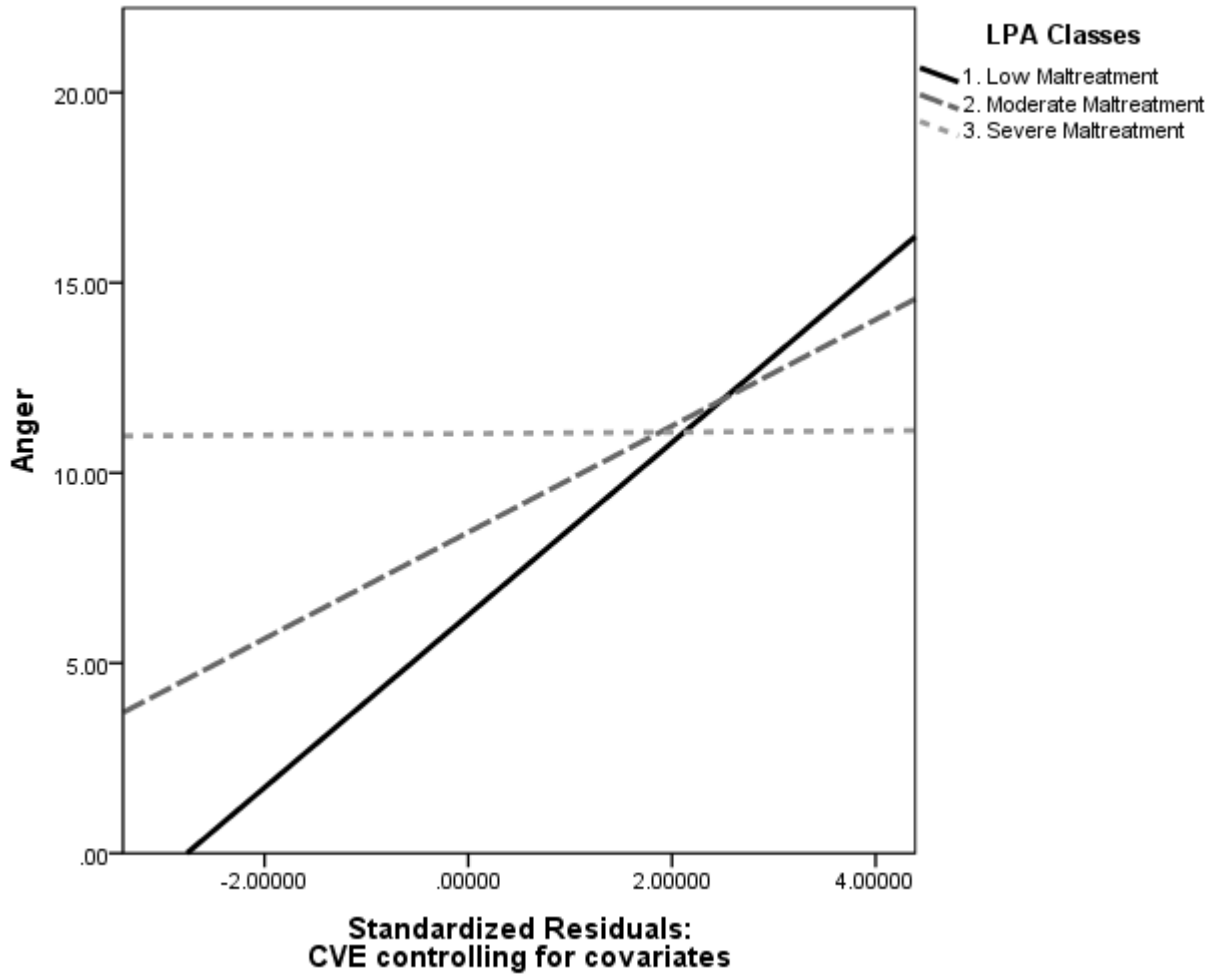
<sup>d</sup> Chi-squared difference test significant at  $\dagger = p < .001$ .

\* Bootstrapped CI for standardized coefficient does not cross zero; i.e. significant effect size.

**Figure 1.** Mean maltreatment scores across Latent Profile Analysis classes



**Figure 2.** Interaction between maltreatment and community violence exposure in predicting self-report anger levels





## **Online Supplementary Materials**

### **OS1. Detailed information about recruitment sites**

#### *Recruitment procedures by site*

*Kids Company:* In accordance with Ethics procedures, the researchers exclusively came into contact with those Kids Company clients who had already been approached by their key workers, had already received information about the project by the key workers, and had shown interest in participating. As a result, all of the clients who met with the researchers had shown interest in the study and agreed to participate. No information is available regarding how many clients were initially approached by key workers but declined to meet with the researchers. Because the key workers have extremely heavy workloads and work in such a way that constant record keeping is difficult, they were not amenable to supply us with records beyond the consents.

*School setting:* within schools, students received information about the research during a presentation at a school assembly, for which precise attendance numbers are not available. Information sheets and consent forms were then distributed to students who had attended the presentation. Those students who were interested in taking part completed the consent form and returned it to the researchers, so that an appropriate time slot could be arranged for the testing session. As a result, researchers met exclusively with students who were interested in participating and had provided informed consent stating that they were willing to take part in the study. Out of the 87 participants who initially consented to take part in the study, 78 attended the agreed time slots and completed the testing session (89.6%). However, it is not possible to provide exact numbers of the students who attended each research presentation and as such we are unable to calculate the percentage of youth who agreed to participate in research. It should be noted that our ethical clearance would not have permitted us to obtain any information from the non-consenting participants and as such it would not have been possible for us to assess how representative the consenting youth were of the school population in general.

*Internet websites:* with regards to this recruitment channel, information about the study was posted online and interested individuals contacted the researchers directly. Interested individuals were then asked to complete a short screening form, so that it could be ensured that only participants with similar socio-demographic characteristics to youth recruited in other sites (i.e. Kids Company and schools) were included in the study (i.e. age, sex, ethnicity, and level of neighbourhood deprivation). All of the individuals who were invited to take part (based on the information provided in the screening form) agreed to participate.

**OS1 Table 1.** Descriptive statistics across the study variables by recruitment site

Variables	Recruitment Source <sup>a</sup>		
	Kids Company Mean (SD) or %	Schools Mean (SD) or %	Internet websites Mean (SD) or %
<i>Violence Exposure</i>			
Maltreatment (total)	48.39 (18.93)	33.19 (8.45)	37.82 (8.91)
CVE	24.78 (14.08)	11.13 (8.56)	10.93 (7.89)
<i>Socio-Demographic Variables</i>			
Ethnicity			
White	20.4%	83.3%	17.9%
Black	68.4%	11.5%	25.0%
Mixed	10.2%	3.8%	25.0%
Asian	1.0%	1.3%	32.1%
Sex (Female)	54.1%	52.6%	50.0%
Age	19.58 (2.15)	17.05 (.682)	21.39 (1.89)
IQ	97.72 (12.20)	101.70 (9.29)	112.07 (10.50)
IMD	34.01 (9.63)	21.56 (7.09)	28.34 (11.91)
<i>Clinical Symptoms</i>			
Informant report <sup>b</sup>			
Internalizing Problems	5.22 (4.20)	1.81 (2.42)	-
Externalizing Problems	3.61 (4.20)	.84 (1.86)	-
Self-report			
Internalizing Problems	7.91 (5.17)	5.08 (3.47)	5.39 (2.72)
Anger	9.18 (6.04)	5.75 (4.85)	3.89 (2.97)
PTSD	12.31 (6.98)	6.85 (4.96)	7.61 (4.68)
Dissociation	11.20 (6.67)	7.36 (4.67)	6.71 (4.43)

Abbreviations = CVE, past year Community Violence Exposure; IMD, Index of Multiple Deprivation; PTSD, Post-Traumatic Stress Disorder.

<sup>a</sup> Kids Company *N* = 98; Schools *N* = 78 ; Internet websites *N* = 28

<sup>b</sup> Informant reports not available for participants recruited via internet websites.

*Comparison between recruitment sites in experience of maltreatment and exposure to community violence*

We ran a One-Way ANOVA to examine whether youth recruited from the three settings (Kids Company, schools, websites) differed in mean levels of maltreatment and CVE. As expected, youth from Kids Company reported significantly higher levels of childhood maltreatment and CVE compared to both youth from schools ( $p < .001$ ) and youth from websites ( $p < .001$ ). Participants from schools and internet websites did not differ from one another in levels of childhood maltreatment and CVE.

*Comparison between key workers vs teachers in reported levels of internalizing and externalizing difficulties*

Key workers reported significantly higher levels of internalizing and externalizing difficulties compared to teachers ( $p < .001$ ). This likely reflects the fact that, as noted above, youth at Kids Company had experienced significantly greater levels of developmental adversity (i.e. maltreatment and CVE) compared to youth recruited from schools and websites. Importantly however, the direction and magnitude of correlations between maltreatment, CVE and mental health difficulties was similar across key-worker and teacher reports.

**OS1 Table 2.** Correlations between key-worker and teacher reports of mental health difficulties

	Internalizing Problems	Externalizing Problems
<b><i>Key worker report<sup>a</sup></i></b>		
Maltreatment	.34***	.29**
CVE	.07	.23*
<b><i>Teacher report<sup>b</sup></i></b>		
Maltreatment	.31**	.18
CVE	.08	.25*

*N.B.* Bivariate correlations significant at: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

<sup>a</sup>  $N = 80$

<sup>b</sup>  $N = 68$

## OS2. Detailed information about measures

### *Socio-demographic covariates*

Data on age, sex, ethnicity and IQ 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. Higher values indicate female gender, non-white ethnicity, older age and higher cognitive ability.

Area-level data was acquired using 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 an Index of Multiple Deprivation (IMD, 2011) 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). Higher values indicate greater deprivation.

### *Childhood Maltreatment*

Childhood maltreatment was assessed using the Childhood Trauma Questionnaire – Short Form (CTQ; Bernstein & Fink, 1998). The CTQ is a 28-item self-report measure screening for experiences of maltreatment “while growing up”. Items are rated on a 5-point scale from ‘*never true*’ to ‘*very often true*’ (e.g. ‘people in my family hit me so hard that it left me with bruises or marks’). The CTQ comprises 5 subscales measuring emotional abuse, physical abuse, sexual abuse, emotional neglect and physical neglect. The scales show high internal consistency in our sample ( $\alpha = .70 - .97$ ) and good overall convergent and discriminant validity (Bernstein, Ahluvalia, Pogge, & Handelsman, 1997). 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 were currently vulnerable to violence in the domestic environment (e.g. by family or partner).

### *Community Violence Exposure*

Exposure to community violence over the past year was assessed using items from the Children’s Report of Exposure to Violence (CREV; Cooley, Turner, & Beidel, 1995). The CREV is a validated self-report measure that records frequency of exposure to different forms of violence, including being beaten up,

robbed, chased, shot and killed. Three subscales were used in the present study: hearing about, witnessing, and directly experiencing (i.e. being a victim of) community violence. Participants were asked to rate how often in the past year they had been exposed to each type of violence from 0 = 'never' to 4 = 'every day'. Chronbach's alpha for the scales varied from .79 to .89. A composite measure of Community Violence Exposure was derived by averaging scores across the three subscales.

### *Mental Health Outcomes*

Mental health outcomes were assessed making use of both external report and self-report measures.

Teachers or key workers completed four subscales from the 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 ( $\alpha = .89 - .94$ ). Items were rated on a 4-point scale from 'never true' to 'very often true'. 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 (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- and hyper-response). Each item is rated on a 4-point scale from 'never' to 'almost all of the time' and includes statements such as 'bad dreams or nightmares' and 'remembering things I don't want to remember'. Chronbach's alpha for the scales varied from .84 to .87. Construct, convergent and discriminant validity have been well-established using child and adolescent samples (Briere, 1996; Sadowski & Friedrich, 2000). 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 external reports. Post-traumatic stress, anger and dissociation were kept separate and represented trauma-related symptoms.

**OS3. Information about community violence exposure subscales**

As shown in OS3 Table 1, correlations between CVE subscales were moderate to strong, indicating the presence of significant interrelationships between different forms of community violence exposure ( $r = .37 - .66$ ). In order to examine the proportion of youth who have experienced each form of community violence, CVE subscales were dichotomized into binary variables (yes = 1; no = 0). Frequencies of exposure for each form of CVE are displayed in OS3 Table 2. While hearing about community violence was found to occur in isolation (15.8% of sample who reported CVE), the other two forms of CVE did not occur without also having heard about violence. More specifically, none of the youth witnessing community violence did not report also hearing about violence in the community. Similarly, of those participants who reported being directly victimized, only one did not report also hearing about violence. These findings point to (i) the large degree of overlap between CVE subscales, and (ii) the fact that witnessing and directly experiencing community violence rarely occur without also having heard about violence in the community. As such, we were unable in the present study to examine unique associations between individual forms of CVE on mental health outcomes, or to explore whether each form of CVE interacts differently with childhood maltreatment to affect levels of clinical symptoms.

**OS3 Table 1.** Correlations between CVE subscales

<i>CVE subscales</i>	1	2
1. Hearing about	–	
2. Witnessing	.66	–
3. Directly experiencing	.37	.54

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

**OS3 Table 2.** Frequency rates across CVE subscales

<i>CVE subscales</i>	Hearing about		Witnessing		Directly experiencing	
	No	Yes	No	Yes	No	Yes
	% ( <i>n</i> )	% ( <i>n</i> )	% ( <i>n</i> )	% ( <i>n</i> )	% ( <i>n</i> )	% ( <i>n</i> )
Hearing about ( <i>yes</i> )	–	–	35.8 (67)	64.2 (120)	32.1 (60)	67.4 (126)
Witnessing ( <i>yes</i> )	0 (0)	100 (120)	–	–	24.2 (29)	75.8 (91)
Directly experiencing ( <i>yes</i> )	0.8 (1)	98.4 (126)	28.1 (36)	71.1 (91)	–	–

*N.B.* Continuous subscales dichotomized into binary (yes/no) variables for descriptive purposes

**OS4** Latent Profile Analysis (LPA) model fit indices

	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
	<i>Class</i>	<i>Classes</i>	<i>Classes</i>	<i>Classes</i>	<i>Classes</i>
<b>Adj BIC</b>	4470.90	4124.557	4032.26	4015.585	3991.548
<b>Entropy</b>	NA	.907	.873	.863	.856
<b>LMR</b>	NA	2 v 1	3 v 2	4 v 3	5 v 4
		Value = -2224	Value = -2045	Value = -1992	Value = -1977
		<i>p</i> = .000	<i>p</i> = .052	<i>p</i> = .28	<i>p</i> = .54
<b><i>N for each class</i></b>	<b>C=204</b>	C1=155(76%) C2=49 (24%)	C1=122(58%) C2=57 (30%) C3=25 (12%)	C1=105(52%) C2=64 (31%) C3=16 (8%) C4=19 (9%)	C1=97(48%) C2=45 (22%) C3=17 (8%) C4=26 (13%) C5=19 (9%)

*Abbreviations* = Adj BIC, adjusted Bayesian information criterion; LMR, Lo-Mendell-Rubin likelihood ration test.

## OS5 Mean differences in maltreatment severity across LPA classes

Variable	LPA Three Class Solution				ANOVA <i>F</i>	Pairwise Post-hoc Comparisons
	Overall Item Means <i>M (SD)</i>	C1: Low MT <sup>a</sup> <i>M (SD)</i>	C2: Moderate MT <sup>b</sup> <i>M (SD)</i>	C3: Severe MT <sup>c</sup> <i>M (SD)</i>		
<b>Emotional Abuse</b>	9.66 (4.72)	6.76 (1.75)	11.71 (2.87)	19.08 (4.72)	$F(2, 203) = 334.97, p < .001$	C3 > C2 > C1
<b>Physical Abuse</b>	7.72 (4.42)	5.89 (1.83)	8.30 (3.68)	15.40 (6.13)	$F(2, 203) = 92.53, p < .001$	C3 > C2 > C1
<b>Sexual Abuse</b>	6.04 (3.38)	5.20 (1.34)	6.25 (3.24)	9.68 (6.76)	$F(2, 203) = 22.13, p < .001$	C3 > C2 & C1
<b>Emotional Neglect</b>	10.42 (4.70)	7.46 (2.41)	13.51 (3.08)	17.80 (3.39)	$F(2, 203) = 198.46, p < .001$	C3 > C2 > C1
<b>Physical Neglect</b>	7.28 (3.21)	5.59 (1.03)	8.35 (2.62)	13.12 (3.59)	$F(2, 203) = 154.99, p < .001$	C3 > C2 > C1

threshold. This was likely due to the wide variation in experience of sexual abuse within this group, as reflected by the larger standard deviation.



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