Childhood Adversity and PTSD Experiences: Testing a Multiple Mediator Model

Siobhan Murphy a Mark Shevlina,b*, Cherie Armour c Ask Elklit a,b, Mogens N. Christoffersen d

a School of Psychology, University of Ulster, Magee Campus, Northern Ireland.
b National Centre for Psychotraumatology, University of Southern Denmark, Campusvej 55, DK-5230 Odense M, Denmark
c School of Psychology, University of Ulster, Coleraine Campus, Northern Ireland.
d The Danish National Centre for Social Research

* Address correspondence to: Professor Mark Shevlin, Psychology Research Institute, Faculty of Life and Health Sciences, University of Ulster at Magee Campus, L'Derry, BT48 7JL, Northern Ireland. Email: m.shevlin@ulster.ac.uk Tel: 0044(0)7876142643

Abstract

Objective

The association between childhood adversity and Posttraumatic Stress Disorder (PTSD) symptomatology has been argued to be both directly and indirectly explained through a number of psychological mechanisms. This study builds on recent findings from an analysis of childhood adversity co-occurrence that revealed four groups; emotional abuse, sexual abuse, and multiple (overall) abuse and a no-abuse group to investigate the relationship between PTSD experiences.

Methods

Data was analysed using a Danish stratified probability survey that included 2980 interviews of 24 year olds. A multiple mediator model was conducted to assess the role of self-esteem, social support and being bullied at school on the abuse types and PTSD experiences.

Results

Results indicated that the three mediating variables were all statistically significant with low social support exerting the strongest influence in the association between childhood adversity and PTSD experiences. Low self-esteem, however, was only associated with sexual abuse.

Conclusions

The current study supports that there are direct and indirect effects between childhood adversity and PTSD experiences but suggests there may be additional mechanisms underlying this relationship. Further exploration into underlying mechanisms will promote and inform intervention and treatment programmes.

Keywords: Childhood adversity; social support; self-esteem; bullying; PTSD experiences

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Childhood adversity, such as physical, sexual and psychological abuse has consistently been shown to predict negative outcomes, for example, post-traumatic stress disorder (PTSD) (Shenk, Putman, & Noll, 2012), general psychopathology (Kessler et al., 2010), psychotic disorders (Read, Fink, Rudegeair, Felitti, & Whitfield, 2008; Varese et al., 2012) and higher health care utilization (Chartier, Walker, & Naimark, 2010). Childhood adversity has further been associated with poorer psychological adjustment, peer related problems, and interpersonal variables such as low self-regard, poor self-esteem and perceived social support (Kendall-Tackett, 2002; Turner, Finklehor, & Ormrod, 2010). The prevalence of PTSD following childhood adversity varies across studies but it is estimated that between 25% and 62% of victims of childhood abuse subsequently develop PTSD (Albach & Everaerd, 1992; Chu & Dill, 1990). Ackerman, Newton, McPherson, Jones and Dykman, (1998) investigated the prevalence of PTSD in three groups of abused children. The abuse groups in this study were; sexual abuse (N= 127), physical abuse (N = 43) and both sexual and physical abuse (N = 43). Using both child and caregiver ratings the prevalence of PTSD as measured by the Diagnostic Interview for Children and Adolescents (DICA; Reich & Weluer, 1988) was reported as 36% and 30% respectively. It is evident from these studies that there is variability in the prevalence of PTSD following childhood adversity. There could be many reasons that explain the variability between studies, for example, sample composition, time since the abuse, type of abuse and the measurement of PTSD. Underlying this variability within studies is that not everyone who has experienced childhood adversity develops PTSD. This indicates that there may be additional mediating variables that may indirectly explain the transition to PTSD symptomatology.

Previous studies have predominately focused on isolated adverse experiences such as sexual abuse and physical abuse in relation to subsequent psychopathology (Brown & Anderson, 1991; Kendler et al., 2000) rather than a broad range of co-occurring adverse experiences. The co-occurrence of multiple adverse childhood experiences is more recently being investigated within a person centered framework by assessing adverse life events and traumatic history of individuals within large representative community samples (Armour et al., in press; Houston, Shevlin, Adamson, & Murphy, 2011; Shevlin & Elklit, 2008). The application of person centered approaches provides the opportunity to examine the nature of

traumatic experiences, such as childhood adversity in terms of developing comprehensive trauma profiles and assessing possible psychological sequelae. Shevlin and Elklit (2008) applied latent class analysis to examine multiple adverse experiences using a nationally representative sample of Danish adolescents. A four class solution was found to best fit the data and the classes were labeled: low risk, intermediate risk, pregnancy and high risk. Using the low risk class as a reference group results found that adolescents in the high risk class were 8 times more likely to have a PTSD diagnosis (OR = 8.15). Armour et al. (in press) also applied latent class analysis to childhood adverse experiences and revealed four abuse typologies, based on how respondents answered to 20 individual indicators of abuse across four different domains. The abuse classes were characterized as a no abuse, emotional abuse, sexual abuse and a group experiencing multiple abuse experiences (overall abuse). However, this study did not assess the relationship between the childhood adversity and subsequent psychological outcomes such as PTSD.

Research has explored possible mechanisms and psychological processes that mediate the relationship between childhood adversity and psychological sequelae. In particular, it has been implied that the association between trauma and PTSD symptomatology may be both directly and indirectly explained by a number of psychological mechanisms (Jones et al., 2013; Vranceanu, Hobfoll, & Johnson, 2007). Social support has been argued to play a positive role in a variety of domains such as social interactions with others and can be argued to act as a protective factor in coping following trauma. However, if an individual perceives their relationships to be unsupportive this can result in social withdrawal and peer rejection. Subsequently, this may increase negative schematic beliefs and psychopathology (Turner, Bernard, Birchwood, Jackson, & Jones, 2012) which are factors believed to play a role in the development and maintenance of PTSD (Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). If these feelings of social disconnection are embedded from early childhood it may lead to difficulties in securing social bonds and interpersonal relationships with others. This in turn, can increase vulnerability for these individuals being at risk for peer related problems such as bullying. Research has found that children who experience maltreatment have smaller social support networks and perceive their interpersonal relationships as less supportive (Harmer, Sanderson, & Mertin, 1999). One theory explaining this perceived low social support is that children who experience maltreatment are more likely to come from dysfunctional family environments. Empirical support for this assertion was evident in a study that investigated

child protection status in predicting membership of abuse typologies. This study found that child protection status significantly increased an individual's chance of being in a group representing emotional abuse class, sexual abuse and multiple abuse when compared to non-abuse class (Armour et al. in press).

A number of studies have explored the role of social support in predicting psychological outcomes in victims of childhood adversity. For example, Vranceanu et al. (2007) investigated multiple childhood adversities (sexual abuse, physical abuse, psychological maltreatment, neglect and witnessing family violence) and the association with PTSD and depression. Using structural equation techniques childhood adversity was directly predictive of lower social support and increased stress in adulthood. Results further found that social support partially mediated the relationship between childhood adversity and PTSD symptomatology. This suggests that exposure to childhood adversity may make it difficult to develop and secure social support networks as a means of coping with adverse experiences which can then have deleterious psychological effects. However, research in this area has revealed inconsistent findings. A methodological shortcoming in social support research is how the construct is conceptualized due to its multifaceted nature and the range of interpersonal behaviours and types of support that individuals engage in. Social support has also been argued to vary across cultures, samples, type of adversity and measurement qualities (Speery & Widom, 2013).

Childhood adversity has also been attributed to changes in an individual's self-worth and can have negative effects on the development of positive self-concept (Kim & Cichetti, 2006). Numerous studies have investigated the role as self-esteem as a mediator in relationship between childhood adversity and psychopathology. For example, these studies have shown that exposure to emotional and physical abuse (Bolger et al., 1998) and sexual abuse (Feiring, Taska & Lewis, 2002) have been associated with lower self-esteem. However, again these studies have predominantly focused on one type of adversity and psychological sequelae rather than measuring a range of adverse experiences. Turner et al. (2010) attempted to address these shortcomings by investigating the extent that self-esteem and mastery mediated associations between different forms of childhood adversity (sexual, non-sexual and peer victimization) and depression. This longitudinal study used data from the Developmental Victimization Survey (DVS) that assessed adolescents aged 11to 18 years of age across two time points. The results found that only sexual victimization was associated with lower self-

esteem suggesting that this type of adversity has a unique effect on self-esteem and depressive symptoms.

Children who have been exposed to one form of maltreatment have been found to be at increased risk of being re-victimized and exposed to different victimizing behaviours. Finkelhor, Ormrod,Turner and Hambly (2005) found that on average the children who experience maltreatment are more likely to experience three distinct types of adversity (peer assault, sexual harassment and neglect). However, less research has focused on whether exposure to familial adversity created vulnerability for children to be re-victimised within the peer context. Peer victimization or bullying is increasingly being recognized as a traumatic experience during adolescence and has been associated with post -traumatic stress symptomatology. These traumatic symptoms can manifest through recurring intrusive thoughts about the experience, avoidance of peer interactions and feelings of powerlessness and helplessness (Crosby, Oehler, & Capacciolo, 2010; Mynard, Joseph & Alexander, 2000). Research has further investigated the association between peer victimisation and posttraumatic stress disorder (PTSD) and found that one third of bullied children may experience clinically relevant levels of PTSD (Mynard et al. 2000). In examining the association between different types of bullying behaviours it was found that social manipulation (for example, spreading rumours or gossiping) was associated with PTSD and verbal bullying (for example, being called names) was associated of feelings of low self-worth (Mynard et al., 2000). The long term effects of peer rejection was retrospectively investigated in a sample of young adults and results revealed that peer rejection made a significant contribution to psychological distress in terms of PTSD and depression (Lev-Wiesel, Nuttman-Shwartz, & Sternberg, 2006). Research has further suggested that exposure to one type of adversity increases the likelihood that an individual will be more vulnerable to continued risk of victimization/adversity (Hodges, Godbout, Brierem Lanktree, Gilbert, & Kletzka, 2013; Shevlin & Elklit, 2007; Shevlin, Houston, Dorahy, & Adamson, 2008). Therefore, it would be interesting to investigate whether childhood adversity could predispose individuals to be more vulnerable to peer-related problems, such as bullying.

Aims of the Study

The current study, therefore, aims to extend the findings of the Armour et al. (in press) study and utilize the abuse classes to further assess the psychological impact of childhood adversity and the development of PTSD experiences. This study firstly aimed to test the hypothesis that

a direct relationship exists between multiple childhood adversities (as measured through emotional, sexual and overall abuse) and PTSD experiences. The relationship between the abuse classes and the probability of PTSD experiences was also expected to be 'dose-response' in nature with the overall abuse class displaying higher risk for PTSD experiences. It was also hypothesised that several mechanisms may play a mediating role in childhood adversity and PTSD experiences. Mediators were selected to reflect psychological variables that may be sensitive to negative effects of childhood adversity, including low self-esteem, low social support and being bullied at school. The identification of underlying mechanisms that may mediate the association between childhood adversity and PTSD experiences may inform clinical intervention and target prevention initiatives to those individuals who are at greatest risk.

Method

This study was based on data from a Danish national study conducted by The Danish National Centre for Social Research in 2008 and 2009 using a stratified random probability survey. This study was founded by the Danish Research Council. Statistics Denmark randomly selected 4718 participants, aged 24, from the total birth cohort of Denmark in 1984. Structured interviews were conducted by trained interviewers either in the home or via the telephone. Participation in the study was voluntary and was approved by the Danish Data Protection Agency. A total of 2980 interviews were successfully conducted, with a response rate of 63%. To increase the number of participants who had experienced childhood abuse and neglect children who had been in child protection where over-sampled by stratifying the number of "child protection cases" versus "non-child protection cases" (1/3:2/3). A child protection case was defined as a case where the council (according to the files of local social workers) had provided support for the child and the family or placement with a foster family due to concerns about the well-being and development of the child. Eight hundred and fifty two interviews were conducted with individuals who had been previously identified by the Danish authorities as child protection cases.

The most common reason for non-participation was refusal (21%). Other reasons included illness, disability, and being un-contactable. The sample consisted of 1579 males and 1401 females The majority of the sample either owned or rented their own private accommodation (93.7%) and almost half were married or cohabiting (46.0%). All demographics were analyzed employing a weight variable to account for the oversampling of child protection

cases so that findings are representative of the total Danish population of young people aged 24 years. Child protection status (weighted) was given to 6.3% of the total sample.

The interview administered a series of questions pertaining to several psychological and physical domains in addition to querying about several demographics. Respondents answered several specific questions across four domains of childhood maltreatment; physical abuse, emotional abuse, neglect, and sexual abuse. Sample Characteristics

The abuse typologies were derived by Armour et al. (in press) who implemented the statistical technique of latent class analysis (LCA). Posterior probabilities from the LCA model were used to assign each participant to their latent class. The resultant latent classes revealed four classes which were labeled an emotional abuse group (N = 263, 8.8%), a sexual abuse group (N = 59, 2.0%), overall abuse group (physical abuse + neglect + emotional abuse) (N = 64, 2.1%) and the non-abused group (N = 2595, 87.1%). In this study the non-abused group was used as a reference class.

Measures

Possible Mediators

Three mediating variables were assessed including social support, self-esteem, and bullying at school.

The Crisis Support Scale (CSS; Joseph, Andrews, Williams, & Yule, 1992) is a measure used to rate perceived social support following a traumatic event. The scale consists of seven items that are rated on a 7-point Likert-type scale, ranging from 1 (never) to 7 (always). A sample item asks the participant about having "contact with people in a similar situation". Item 6 is reverse coded. Higher scores indicate higher levels of perceived social support. This scale has previously undergone psychometric testing for use in a Danish population and revealed an alpha value of α.82 (Elklit, Schmidt Pedersen, & Jind, 2001). The reliability in this sample was high (Cronbach's alpha =.82).

The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965) is a measure of global self-esteem and consists of 10 items (in which 5 are positively worded and 5 are negatively worded). The response format uses a 4-point Likert scale. A sample question from the positively worded items is "*On the whole, I am satisfied with myself*" and a sample negatively worded item is "*At times I think I am no good at all*". Negative items are reverse coded.

Higher scores indicate higher self-esteem. This scale has also been validated in a Danish adolescent population and displayed high internal reliability with an alpha value of α .88 (Lasgaard & Elklit, 2009). The reliability for the scale in this sample was high (Cronbach's alpha = .80).

School bullying was assessed using the question "Where you ever bullied at school?" The response format was "Yes = 1", "Sometimes = 2" and "No = 3".

Post-traumatic Stress Disorder (PTSD) Experiences

Screening for PTSD experiences was assessed using the Primary Care PTSD Screen (PC-PTSD; Prins et al., 2003). This measure consists of an introductory statement that states; "In your life, have you ever had any experience that was so frightening, horrible or upsetting". Respondents are asked four items representing the main symptom groups, including intrusive memories, avoidance, increased arousal, and emotional numbing and whether they experienced any of these symptoms in the past month. The authors conducted signal detection analysis to test the validity of the screener in detecting PTSD caseness and found that the scale had an optimally efficient cutoff score of 3 (k(0.5)=0.61), with a sensitivity rate of .78, a specificity rate of .87. A positive predictive value of .65, and a negative predictive value of .92 was reported (Prins et al., 2003). This scale has been validated against other screening measures and been found to be reliable screener for the detection of both PTSD and sub-threshold PTSD. (van Dam, Ehring, Vedel, & Emmelkamp, 2010).

Results

Data Analysis

As seen in Figure 1, the model specified direct effects from emotional abuse to the mediating variables: social support (a1), self-esteem (a2), and being bullied at school (a3). The direct effects from sexual abuse to the mediating variables are represented by the pathways: social support (a4), self-esteem (a5) and school bullying (a6). The direct effects of overall abuse to the mediating variables are denoted: social support (a7), self-esteem (a8) and school bullying (a9). The model also specified effects of the mediating variables on PTSD experiences (b1 to b3). In Figure 1 the path c_1-c_3 represents the effect of emotional abuse, sexual abuse and overall abuse on PTSD experiences respectively while controlling for the mediated effects. Prior to analyzing the mediation model, the direct effect of the abuse

typologies on PTSD experiences was estimated (i.e., path $c_1 - c_3$); the difference in the estimate for path c and path c' indicates the strength of the mediation. Full mediation is evident when c is statistically significant, but becomes non-significant after the inclusion of the mediators. Partial mediation is evident when c' is lower than c, but remains statistically significant.

The overall model was tested using the approach proposed by Preacher and Hayes (2008) that allows multiple mediators to be included in the analysis. The model was specified and estimated using Mplus 6 (Muthén & Muthén, 2010) based on maximum likelihood estimation and 1000 bootstrap draws. Maximum likelihood estimation provides estimates that are not biased under conditions of non-normality, but the associate test statistics may be incorrect (Bollen, 1989). Therefore, the statistical significance of the mediated effects was calculated using bootstrapped bias-corrected and accelerated percentile based confidence intervals (Efron, 1987; Efron & Tibshirani, 1993). The empirically based confidence intervals used in this study should avoid making incorrect inferences about statistical significance.

The means and standard deviations of the mediating variables self-esteem and social support are reported in Table 1. The results show significant differences between the class variable and self-esteem with individuals in the no abuse class reporting higher levels of self-esteem in comparison to the sexual abuse class who reported lowest self-esteem. Within the abuse classes however, there was little variability between self-esteem. In terms of social support the overall abuse class reported lowest levels of social support and there were significant differences with all three abuse typologies and social support when compared to the reference/no abuse class. With regards to being bullied at school the results showed that those in the overall abuse were most likely to report being bullied in comparison to other classes, individuals in the no abuse class displayed the highest means indicating that they were less likely to experience bullying at school. There was little difference between the emotional and sexual abuse classes with regards to experiences of bullying.

TABLE 1 HERE

The standardised estimates from the mediation model are displayed in table 2. The results showed that the regression coefficients for the hypothesised mediation variables (social support and being bullied at school) on abuse classes (emotional, sexual, and overall) in

comparison to the no abuse class were statistically significant. Self-esteem was however only significantly associated with the sexual abuse class when compared to the reference/no abuse class. The model also showed that for the mediators (social support and being bullied at school) the regression coefficients from each of the mediator variables direct to the post-traumatic stress variable were also statistically significant, however self-esteem was not significantly associated with PTSD. The r squared value for PTSD experiences (.14) and social support (.31) indicate a moderate to strong percentage of the variation explained by the abuse types. Self-esteem (.00) and bullying (.04) expressed much lower levels of variance.

TABLE 2 HERE

Table 3 outlines the mediated effects of the abuse types (emotional, sexual and overall abuse) on post-traumatic stress via self-esteem, social support and being bullied at school. The results show that the social support and being bullied mediators were significant to the abuse classes in comparison to the reference class (no abuse) and post-traumatic stress were significantly associated. Self-esteem was not found to play a mediating role in this relationship.

TABLE 3 HERE

The regression coefficients of post-traumatic stress on psychological abuse (c_1, B = .114, p <.05) and sexual abuse (c_2, B = .153, p <.05) and overall abuse (c_3, B = .136, p <.05) were significant. This suggests that the relationship between both emotional, sexual abuse and overall abuse to possible post-traumatic stress are strongly influenced by direct effects and partially mediated by social support and being bullied at school. In terms of the mediating role of self-esteem this only partially mediated the relationship between sexual abuse and PTSD experiences. The bootstrapping estimates of the indirect paths were also statistically reliable.

FIGURE 1 HERE

Discussion

The aims of this study were twofold. First, the study aimed to test the hypothesis that a direct relationship exists between specific childhood adversity (as measured through emotional, sexual and overall abuse) and PTSD experiences. This study also aimed to examine the

mediated relationship between childhood adversity and PTSD experiences through self-esteem, social support and being bullied at school while controlling for the effect of gender.

The results are consistent with previous studies highlighting that childhood adversity is associated with PTSD symptomatology (Shenk et al., 2012; Shevlin & Elklit, 2008). In light of the research aims the current study found that each of the direct paths from the abuse types (emotional, sexual and overall-abuse) in comparison to the non-abuse control displayed significant associations to low social support ($a_{2,}$ $a_{5,}$$a_{8)}$ and being bullied at school ($a_{3,}$ $a_{5,}$ $a_{7)}$ whilst controlling for covariate of gender. These findings are consistent with the suggestion that childhood adversity is associated with a range of psychological and psychosocial variables (Kendall-Tackett, 2002). However, low self-esteem only acted as a partial mediator in the sexual abuse and PTSD relationship. The results from the mediating variables direct to Total PTSD (path b1-b3) displayed significant associations between the mediating variables social support and being bullied. More specifically, the significant findings for the mediating role of social support in relation to PTSD experiences is consistent with findings reported in other studies examining how these variables are related to PTSD symptomatology (Hyman, Gold, & Cott, 2003; Reynolds, Wallace, Hill, Weist, & Nabors, 2001; Vranceanu et al., 2007). The results indicate that low social support exerted the strongest influence in explaining the relationship between childhood adversity and PTSD experiences. These significant trends can be interpreted in light of the literature that suggests social support is an important variable following a traumatic experience and are related with psychopathology (Sperry & Widom, 2013). Similar findings were reported by Vranceanu et al. (2007) who also found low social support acted as a mediator in the relationship between child multi-maltreatment and PTSD. These findings also support to a certain extent those reported in a study by Runtz and Schallow (1997) who examined the mediating role of social support and coping between childhood sexual and physical abuse and psychological sequelae. They found that social support, in particular, was a strong mediator in this relationship.

With regards to re-victimisation that was assessed via being bullied at school these findings suggest that bullying did act as a mediator in the relationship between all abuse classes when compared to the non-abuse control and PTSD experiences. To our knowledge being bullied has not been assessed as a mediator in the association between childhood adversity and PTSD previously. The findings, however, are consistent with previous work that has found early

childhood adversity to be a risk factor for later adverse experiences (Finkelhor, Ormrod, & Turner, 2007) and that peer victimization has been found to be related to PTSD symptomatology (Crosby et al., 2010; Mynard et al., 2000). However, despite the significant trend this role was not particularly robust. This may be associated with the fact that bullying was measured by a single item which, consequently, may have resulted in under-reporting of this particular experience. The non-significant findings with the self-esteem variable were unexpected with self-esteem only being associated with sexual abuse. This however supports findings reported by Turner et al. (2010) who also only found self-esteem to be associated with sexual abuse when compared to a range of other adverse experiences.

Furthermore, within the abuse classes exposure to multiple types of abuse (overall abuse) was the highest predictor of PTSD experiences with 31.7% of individuals within this class scoring over the threshold for the presence of likely post-traumatic symptoms. It was also found that individuals who were exposed to multiple adversities reported lower social support and were more likely to be bullied at school. These findings are consistent with other research that suggests that individuals who are exposed to one type of victimisation or adverse life events are at increased risk of experiencing cumulative traumas and more negative outcomes (Shevlin & Elklit, 2007; Shevlin et al., 2008). The sexual abuse class also displayed higher levels of PTSD symptoms with 28.8% endorsing three or more items on the PC-PTSD screener which is consistent with other studies that have examined sexual abuse as a predictor of negative outcomes, such as PTSD when compared to non-abuse controls (Feerick & Snow, 2005). However, it is noteworthy that the results of the current study indicated that there were strong associations between all forms of childhood adversity and PTSD when the mediators were controlled in the analysis. The r squared values reported in the current study were relatively low which suggests that there may be additional indirect pathways that have not been specified in this analysis that may contribute to the link between different types of childhood adversity and PTSD in adulthood.

The conclusions drawn from the current study should be considered in light of a number of limitations. First, childhood adversity was assessed retrospectively using a two-point single item with a focus more on the co-occurrence of abuse experiences rather than re-occurrence. This may have had an impact on the results, as it has been indicated, that more severe and long enduring levels of adversity leads to a higher risk of PTSD and other psychopathology

(Briere & Runtz, 1988). Secondly, the PC-PTSD Screen is proxy for PTSD consisting of four items and therefore does not capture diagnostic symptomology. However, in a study that validated the PC-PTSD Screener against the Post-Traumatic Diagnostic Scale (PDS: Foa et al., 1997) which includes all 17 DSM-IV criteria for PTSD, both measures performed equally well (van Dam et al., 2010). Finally, the cross sectional nature of the study limits the findings to one specific time point and therefore cannot infer causation. It is suggested that future work using longitudinal designs would be useful to assess changes in adversity over time. Additionally, participants were recruited from the Danish population therefore it is unknown whether current results will generalise to other populations.

Despite these limitations, the current study makes a significant contribution to the literature by presenting a person centred approach to examining different childhood adversities and with PTSD experiences while incorporating a multiple mediator model to examine possible mechanisms that may contribute to the relationship. However, the findings revealed that there may be additional indirect mechanisms underlying the association between childhood adversity and PTSD and therefore future studies should explore other possible mechanisms that may explain this relationship. In addition, future research could extend the findings of the current study by using a multidimensional measure of bullying that could incorporate different types of bullying experiences or explore the frequency, severity and duration of these experiences. Finally, the current findings present an area for early intervention that should target promoting social support networks within the school environment and bullying intervention programmes.

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References

Ackerman, P. T., Newton, J. E., McPherson, W. B., Jones, J. G., & Dykman, R. A. (1998). Prevalence of posttraumatic stress disorder and other psychiatric diagnoses in three groups of abused children (sexual, physical, and both). *Child Abuse & Neglect, 22(8), 759-774.*

Albach, F., & Everaerd, W. (1992). Posttraumatic stress symptoms in victims of childhood incest. *Psychotherapy and psychosomatics, 57(4), 143-151.*

Armour C, Elklit A, Christoffersen M (in press). Co-occurring Childhood Maltreatment in Denmark: A Latent Class Analysis. *Journal of Loss and Trauma.*

Bolger, K. E., Patterson, C. J., & Kupersmidt, J. B. (1998). Peer Relationships and Self-Esteem among Children Who Have Been Maltreated. *Child Development, 69(4), 1171-1197.*

Bollen, K. A. (1989). Structural equations with latent variables. New York: Wiley.

Briere, J., & Runtz, M. (1988). Symptomatology associated with childhood sexual victimization in a nonclinical adult sample. *Child Abuse & Neglect, 12(1), 51-59.*

Brown, G R., & Anderson, B. (1991). Psychiatric morbidity in adult inpatients with childhood histories of sexual and physical abuse. *American Journal of Psychiatry, 148 (1), 55-61.*

Chartier, M. J., Walker, J. R., & Naimark, B. (2010). Separate and cumulative effects of adverse childhood experiences in predicting adult health and health care utilization. *Child Abuse & Neglect, 34(6), 454-464.*

Christoffersen, M. N., Armour, C., Lasgaard, M., Andersen, T. E., & Elklit, A. (in press). The Prevalence of Four Types of Childhood Maltreatment in Denmark. *Child Abuse & Neglect.*

Chu, J. A., & Dill, D. L. (1990). Dissociative symptoms in relation to childhood physical and sexual abuse. *The American Journal of Psychiatry, 147 (7), 887-892.*

Crosby, J. W., Oehler, J., & Capaccioli, K. (2010). The relationship between peer victimization and post-traumatic stress symptomatology in a rural sample. *Psychology in the Schools, 47(3), 297-310.*

Efron, B. (1987). Better bootstrap confidence intervals. *Journal of the American Statistical Association, 82, 171-185.*

Efron, B., & Tibshirani, R. J. (1993). An Introduction to the Bootstrap. Boca Raton, FL: Chapman & Hall.

Elklit, A., Schmidt Pedersen, S., & Jind, L. (2001). The crisis support scale: Psychometric qualities and further validation. *Personality and Individual Differences, 31(8), 1291-1302.*

Feerick, M. M., & Snow, K. L. (2005). The relationships between childhood sexual abuse, social anxiety, and symptoms of posttraumatic stress disorder in women. *Journal of Family Violence, 20(6), 409-419.*

Feiring, C., Taska, L., & Lewis, M. (2002). Adjustment following sexual abuse discovery: the role of shame and attributional style. *Developmental Psychology, 38(1), 79-92.*

Finkelhor, D., Hamby, S. L., Ormrod, R., & Turner, H. (2005). The Juvenile Victimization Questionnaire: reliability, validity, and national norms. *Child Abuse & Neglect, 29(4), 383-412.*

Finkelhor, D., Ormrod, R., & Turner, H. (2007). Poly-victimisation and trauma in a nationally representative longitudinal cohort. *Development and Psychopathology, 19(??), 149-166.*

Foa, E. B., Ehlers, A., Clark, D. M., Tolin, D. F., & Orsillo, S. M. (1999). The Posttraumatic Cognitions Inventory (PTCI): development and validation. *Psychological Assessment, 11(3), 303-314.*

Harmer, A. L., Sanderson, J., & Mertin, P. (1999). Influence of negative childhood experiences on psychological functioning, social support, and parenting for mothers recovering from addiction. *Child Abuse & Neglect, 23(5), 421-433.*

Hodges, M., Godbout, N., Briere, J., Lanktree, C., Gilbert, A., & Kletzka, N. T. (2013). Cumulative trauma and symptom complexity in children: A path analysis. *Child Abuse & Neglect.*

Houston, J. E., Shevlin, M., Adamson, G., & Murphy, J. (2011). A person-centred approach to modelling population experiences of trauma and mental illness. *Social Psychiatry and Psychiatric Epidemiology, 46(2), 149-157.*

Hyman, S. M., Gold, S. N., & Cott, M. A. (2003). Forms of social support that moderate PTSD in childhood sexual abuse survivors. *Journal of Family Violence, 18(5), 295-300.*

Joseph, S., Andrews, B., Williams, R., & Yule, W. (1992). Crisis support and psychiatric symptomatology in adult survivors of the Jupiter cruise ship disaster. *British Journal of Clinical Psychology, 31(1), 63-73.*

Jones, D. J., Lewis, T., Litrownik, A., Thompson, R., Proctor, L. J., Isbell, P., ... & Runyan, D. (2013). Linking childhood sexual abuse and early adolescent risk behavior: the intervening role of internalizing and externalizing problems. *Journal of Abnormal Child Psychology, 41(1), 139-150.*

Kim, J., & Cicchetti, D. (2006). Longitudinal trajectories of self-system processes and depressive symptoms among maltreated and nonmaltreated children. *Child Development, 77(3), 624-639.*

Kendall-Tackett, K. (2002). The health effects of childhood abuse: four pathways by which abuse can influence health. *Child Abuse & Neglect, 26(6), 715-729.*

Kendler, K. S., Bulik, C. M., Silberg, J., Hettema, J. M., Myers, J., & Prescott, C. A. (2000). Childhood sexual abuse and adult psychiatric and substance use disorders in women: an

epidemiological and cotwin control analysis. *Archives of General Psychiatry, 57(10), 953-959.*

Kessler, R. C., McLaughlin, K. A., Green, J. G., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., ... & Williams, D. R. (2010). Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. *The British Journal of Psychiatry, 197(5), 378-385.*

Lasgaard, M., & Elklit, A. (2009). Prototypic features of loneliness in a stratified sample of adolescents. *Interpersona, 3(Supplement 1), 85-110.*

Lev-Wiesel, R., Nuttman-Shwartz, O., & Sternberg, R. (2006). Peer rejection during adolescence: Psychological long-term effects-A brief report. *Journal of Loss and Trauma, 11(2), 131-142.*

Mynard, H., Joseph, S., & Alexander, J. (2000). Peer-victimisation and posttraumatic stress in adolescents. *Personality and Individual Differences, 29(5), 815-821.*

Muthen, L., & Muthen, B. (1998- 2010). Mplus User's Guide. Sixth Edition. Los Angeles, CA: Muthen & Muthen.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40(??), 879-891.*

Prins A., Oiumette P., Kimerling R., Cameron, R P., Hugelshofer D S., Shaw-Hegwer J., …Sheikh., J I. (2004). The primary care PTSD screen (PC-PTSD): development and operating characteristics. *Primary Care Psychiatry, 9, (1), 9-14.*

Read, J., Fink, P. J., Rudegeair, T., Felitti, V., & Whitfield, C. L. (2008). Child maltreatment and psychosis: a return to a genuinely integrated bio-psycho-social model. *Clinical Schizophrenia & Related Psychoses, 2(3), 235-254*

Reynolds, M. W., Wallace, J., Hill, T. F., Weist, M. D., & Nabors, L. A. (2001). The relationship between gender, depression, and self-esteem in children who have witnessed domestic violence. *Child Abuse & Neglect, 25(9), 1201-1206.*

Rosenberg, M. (1965). Rosenberg self-esteem scale (RSE). Acceptance and Commitment Therapy. Measures Package, 61.

Runtz, M.G., & Schallow, J.R. (1997). Social support and coping strategies as mediators of adult adjustment following child maltreatment. *Child Abuse & Neglect, 21 (2), 211-226.*

Shenk, C. E., Putnam, F. W., & Noll, J. G. (2012). Experiential avoidance and the relationship between child maltreatment and PTSD symptoms: Preliminary evidence. *Child Abuse & Neglect, 36(2), 118-126.*

Shevlin, M., & Elklit, A. (2008). A latent class analysis of adolescent adverse life events based on a Danish national youth probability sample. *Nordic Journal of Psychiatry, 62(3), 218-224.*

Shevlin M., Houston J E., Dorahy M J., & Adamson G. (2008). Cumulative traumas and psychosis: An analysis of the National Comorbidity Survey and British Psychiatric Morbidity Survey. *Schizophrenia Bulletin, 34(??),193-199.*

Sperry, D. M., & Widom, C. S. (2013). Child abuse and neglect, social support, and psychopathology in adulthood: A prospective investigation. *Child Abuse & Neglect, 37 (6), 415-425.*

Turner, M., Bernard, M., Birchwood,M., Jackson,C., & Jones, C. (2012) The contribution of shame to post-psychotic trauma. *British Journal of Clinical Psychology 52 (2), 162-182.*

Turner, H., Finkelhor, D., & Comrod, R. (2010). The effects of adolescent victimization on self-concept and depressive symptoms. *Child Maltreatment 15 (1), 76-90.*

van Dam, D., Ehring, T., Vedel, E., & Emmelkamp, P. M. (2013). Screening for posttraumatic stress disorder in civilian substance use disorder patients: Cross-validation of the Jellinek-PTSD screening questionnaire. *Journal of substance abuse treatment, 44(1), 126-131.*

Varese, F., Smeets, F., Drukker, M., Lieverse, R., Lataster, T., Viechtbauer, W., ... & Bentall, R. P. (2012). Childhood adversities increase the risk of psychosis: a meta-analysis of patient-control, prospective-and cross-sectional cohort studies. *Schizophrenia Bulletin, 38(4), 661-671.*

Vranceanu, A. M., Hobfoll, S. E., & Johnson, R. J. (2007). Child multi-type maltreatment and associated depression and PTSD symptoms: The role of social support and stress. *Child Abuse & Neglect, 31(1), 71-84.*

Table 1. Means and Standard Deviations for the Abuse Typologies Self-Esteem and Social Support.

	Emotional	Sexual	Overall-Abuse	No-Abuse	Total
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD) F (df) p
Self-Esteem	30.81 (4.71)	30.10 (4.94)	30.27 (4.95)	32.98 (3.87)	32.51 (4.17) 54.653 (3,2905)***
Social Support	26.76 (8.13)	28.57 (8.70)	16.73(6.49)	35.77 (5.59)	33.54 (7.84) 619.608 (3,2843)***
Bullied at School	2.08 (.86)	2.09 (.90)	1.73 (.87)	2.45 (.75)	2.36 (.80) 63.66 (3,2955)***

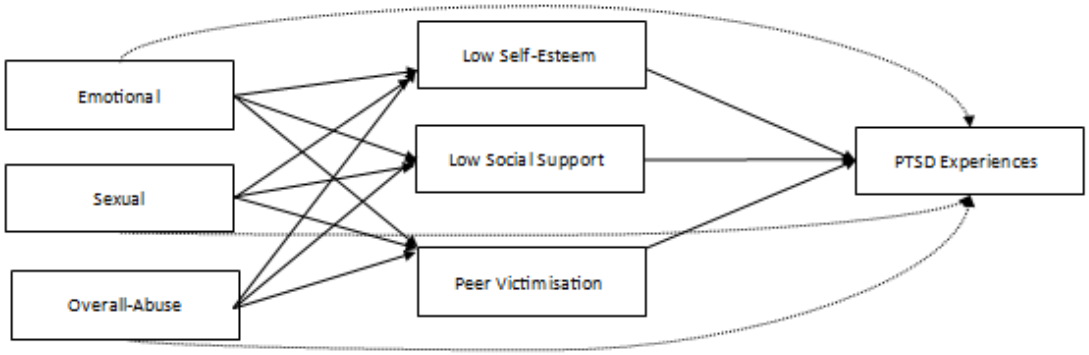
Table 2. Standardised Regression Coefficients and p-values for Direct Effects.

	Self-Esteem		Social Support		Bullied at School	
	β	p	β	p	β	p
Emotional (path a_1-a_3)	.011	.618	-.367	.000	-.108	.000
Sexual (path a_4 – a_6)	-.014	.001	-.150	.000	-.068	.002
Overall (path a_7 – a_9)	.018	.522	-.416	.000	-.161	.000
Total PTSD (path b_1 – b_3)	.003	.870	-.158	.000	-.079	.000

Table 3. Indirect (Mediated) Effects of Emotional Abuse, Sexual Abuse and Overall Abuse on PTSD with Bootstrapped Confidence Intervals.

	Self-Esteem		Social Support		Bullied at School	
	β	95% BS CI	β	95% BS CI	β	95% BS CI
Emotional Abuse	.000	(-.001,.001)	.058***	(.039,.077)	.009**	(.003,.014)
Sexual Abuse	.000	(-.001,.001)	.024***	(.012,.035)	.005*	(.001,.010)
Overall Abuse	.000	(-.001,.001)	.066***	(.044,.087)	.013***	(.006,.020)

Figure 1. Childhood Abuse Classes, PTSD and hypothesised mediating variables



Note: Dashed lines represent c pathways demonstrating the direct effects of the abuse typologies and PTSD experiences. Straight lines represent the indirect effects from the abuse typologies through each mediator to PTSD experiences.