Childhood maltreatment and violence: mediation through psychiatric morbidity

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ABSTRACT
Childhood maltreatment is associated with multiple adverse outcomes in adulthood including poor mental health and violence. We investigated direct and indirect pathways from childhood maltreatment to adult violence perpetration and the explanatory role of psychiatric morbidity. Analyses were based on a population survey of 2,928 young men 21-34 years in Great Britain in 2011, with boost surveys of black and minority ethnic groups and lower social grades. Respondents completed questionnaires measuring psychiatric diagnoses using standardized screening instruments, including Antisocial personality disorder (ASPD), Drug and alcohol dependence and Psychosis. Maltreatment exposures included childhood physical abuse, neglect, witnessing domestic violence and being bullied. Adult violence outcomes included: any violence, violence toward strangers and intimate partners (IPV), victim injury and minor violence. Witnessing domestic violence showed the strongest risk for adult violence (AOR 2.70, 95%CI 2.00, 3.65) through a direct pathway, with Psychotic symptoms and ASPD as partial mediators. Childhood physical abuse was associated with IPV (AOR 2.33, 95%CI 1.25, 4.35), mediated by ASPD and Alcohol dependence. Neglect was associated with violence toward strangers (AOR 1.73, 95%CI 1.03, 2.91), mediated by ASPD. Prevention of violence in adulthood following childhood physical abuse and neglect requires treatment interventions for associated alcohol dependence, psychosis, and ASPD. However, witnessing family violence in childhood had strongest and direct effects on the pathway to adult violence, with important implications for primary prevention. In this context, prevention strategies should prioritize and focus on early childhood exposure to violence in the family home.

Keywords: Early maltreatment; Violence; Trauma; Mediation; Psychopathology; Witnessing domestic violence
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Childhood maltreatment - including physical abuse, sexual abuse, witnessing domestic violence and neglect - has a highly adverse impact on physical and mental health and is strongly associated with both internalizing and externalizing behaviors later in life (Asgeirsdottir, Sigfusdottir, Gudjonsson, & Sigurdsson, 2011; Brown et al., 2009; Gilbert et al., 2009; Goodwin & Stein, 2004; Hart & Rubia, 2012; Turner, Finkelhor, & Ormrod, 2006). Psychopathology attributed to maltreatment is often severe and extensive, and has been specifically associated with mood and anxiety disorders (Branje, van Doorn, van der Valk, & Meeus, 2009; Horwitz, Widom, McLaughlin, & White, 2001; Turner et al., 2006), personality disturbance (Johnson, Cohen, Brown, Smailes, & Bernstein, 1999; Luntz & Widom, 1994), substance misuse (Asgeirsdottir et al., 2011; Harrison, Fulkerson, & Beebe, 1997; Nelson et al., 2006) and psychosis in adulthood (Bebbington et al., 2011; Morgan & Fisher, 2007). It is also linked to adolescent delinquency (Stouthamer-Loeber, Loeber, Homish, & Wei, 2001) and adult criminal offending, including perpetration of violence (Fagan, 2005; Gilbert et al., 2009; Maas, Herrenkohl, & Sousa, 2008). The “cycle of violence” hypothesis postulates that children exposed to abuse and neglect will develop abusive tendencies themselves in adulthood (Widom, 1989b). Nevertheless, recent investigation was unable to confirm this hypothesis (Forsman & Langstrom, 2012). One reason is that pathways by which childhood maltreatment is linked to adult psychopathology and adult violence perpetration remain unclear. Literature reviews have also cast doubt and shows methodological inconsistencies across studies (Maas et al., 2008; Widom, 1989a). To enable better-targeted and more effective interventions for reducing the harmful impact of childhood maltreatment, it is important to establish a better understanding of whether and how maltreated children may become violent adults.

A key question is whether childhood maltreatment leads directly to later violence, for example through learning and socializing mechanisms, or whether psychiatric morbidity mediates this association. Genetic susceptibility to aggression may partly explain intergenerational
transmission of violence (Caspi et al., 2002), whilst social factors may also be important. Social learning theory suggests that children learn through observing how others’ behavior is rewarded and punished – and imitate rewarded behavior (Bandura, 1965). By exposing children to repeated violence, adults model violence as an effective strategy for attaining their needs and regulating their own emotions. Children learn to view violence as a justified response, incorporate violence into their schema for responding to conflict, and readily attribute hostile intentions to others (Huesmann & Kirwil, 2007). Additionally, repeated exposure to violence can lead to desensitization whereby over time the emotional arousal triggered by exposure diminishes (Molitor & Hirsch, 1994; Paik & Comstock, 1994). This may be magnified if maltreating adults ignore or punish children’s initial distressed response, encouraging a reduced emotional response to violence – whether as victim or perpetrator.

Alternatively, maltreatment may lead to violence via psychopathology. Maltreatment has damaging effects on the development of key brain regions involved in information processing, social cognition and emotion regulation (Nemeroff & Binder, 2014), predisposing children to the development of adult psychopathology. Psychological and social consequences of maltreatment which place children at risk of developing psychopathology include insecure attachment, low self-esteem, emotional dysregulation, a fractured sense of self, difficulties trusting others, peer rejection and poor educational attainment (Cichetti & Toth, 2005). Maltreatment often occurs in the context of other risk factors for mental illness, including poverty, disrupted family relationships, and parental psychopathology (Hecht & Hansen, 2001). In turn, psychopathology may in some cases increase the risk of violence. Substance misuse, psychotic disorders and antisocial personality disorder may particularly predispose individuals to violence (Coid et al., 2006; Coid, Ullrich, Kallis, et al., 2013), either through their association with low impulse control, impaired affect regulation, paranoid ideation and narcissistic cognitions (Nestor, 2002).
Few studies have investigated the explanatory and mediating role of psychiatric morbidity on associations between early maltreatment and violence, showing mixed results. White & Widom (2003) examined mediation on intimate partner violence through antisocial personality disorder (ASPD) and alcohol misuse. They found that while ASPD completely mediated the link between child abuse and neglect and violence, there was no mediation from alcohol amongst men. Another study failed to find significant mediation, however their conclusions were likely affected because they used a general composite measure of mental health problems (Millett, Kohl, Jonson-Reid, Drake, & Petra, 2013), which lacked specificity in terms of psychopathology. Meanwhile, a more recent study conducted amongst Chinese males reported partial mediation through ASPD/BPD traits on the path between abuse in childhood and intra-familial aggression. Therefore, to date, only two studies have found that antisocial personality disorder (ASPD) fully or partially mediates the link between child abuse and neglect and later intimate partner violence among men (Liu et al., 2012; White & Widom, 2003). These studies are all limited in terms of the amount of information collected regarding psychopathology (Liu et al., 2012), and on the types of adult violence outcomes.

In the present study, we investigated a wider range of childhood exposures and psychopathology in adulthood than in previous studies to test for multiple mediators whilst controlling for coexisting psychiatric morbidity. Besides studying childhood experiences of physical, sexual abuse and neglect, we also included witnessing domestic violence and being the victim of bullying which may be associated with an elevated risk of adult violent behavior (Brockenbrough, Dewey, & Loper, 2002), but have often been omitted from existing explanatory studies. In addition to antisocial personality disorder, we also examined substance dependence and psychotic disorder as potential mediators, since these are associated both with childhood maltreatment and adult violence (Douglas, Guy, & Hart, 2009; Pickard & Fazel, 2013), but have been overlooked in previous studies.

We aimed, firstly, to investigate whether direct associations existed between different types of early maltreatment and violence perpetration, and whether there was an incremental degree of
association from exposure to multiple maltreatment types. Secondly, to identify potential clinical mediators, we investigated associations between mental health categories with childhood maltreatment and violent outcomes in adulthood. Finally, we quantified the magnitude of any explanatory role we identified in these associations.

**Methods**

**Participants and sample selection**

The second Men’s Modern Lifestyles Survey (MMLS) is a cross-sectional survey of young adult men, 18-34 years (n=3,798) carried out in 2011 in Great Britain. We employed Random Location Methodology, an advanced form of quota sampling shown to reduce bias. Individual sampling units (areas of 150 households based on census) were randomly selected within British regions, in proportion to their population. In addition, 2 boost surveys included: (1) young black/minority ethnic men selected from output areas with a minimum of 5% black/minority ethnic (BME) inhabitants; (2) young men from lower social grades D/E (unemployed) from output areas with a minimum of 30 men on the target age range. The study’s primary aim was to study violence in the young male population of the UK. The oversampling of deprived areas was planned to increase representation of the outcomes and risk factors according to existing theory, and to enable consideration of diversity and high deprivation level areas in the study. Questions on violent outcome covered violent incidents in the past 5 years. Details of this survey have been published elsewhere (Coid, Ullrich, Keers, et al., 2013). Maltreatment and abuse questions referred to experiences before age 16. To avoid overlap between exposure and outcomes, participants aged 18-20 were excluded (n=758, 20.0%). From the remaining total of 3,040 men, we excluded participants with missing values in the main violence outcome ‘Any violence in the past 5 years’ (n=112, 3.7%). The final sample under study was 2,928.

Respondents completed a pencil and paper questionnaire in privacy and were paid £5 for participation. All information collected was self-reported. Informed written consent was obtained
from all study participants. The ethics committee of Queen Mary, University of London, approved the study.

Measures

Sociodemographic characteristics

Social class was based on the UK Registrar General’s Classification (OPCS, 1991) which uses the most recent occupation of the head of household: I – professional, II – managerial, IIIA – skilled manual, IIIB – skilled non-manual, IV – partly skilled, V – unskilled. These were combined in three categories: I & II (upper middle class), III (lower middle and skilled working class) and IV & V (less skilled and unskilled). This classification aptly represents income, education, and level of responsibility at work (Elovainio et al., 2011).

Early maltreatment

Early maltreatment was defined by affirmative responses to self-reported experiences before age 16. Specifically, each question in this section read “Have you ever suffered from”, followed by these choices: bullying, witness violence in the home, witness parents or carers fighting, sexual abuse/assault, physical abuse and neglect. Witnessing domestic violence was derived from witnessing violence in the home and/or witnessing parents or carers fighting.

Psychiatric morbidity

Participants screened positive for psychosis on the basis of 3+ criteria from the Psychosis Screening Questionnaire (Bebbington & Nayani, 1995), which includes 5 main and secondary items covering mania, thought insertion, paranoia and hallucinations in the past year. The PSQ has been extensively used in psychiatric epidemiology, with documented sensitivity and specificity values above 0.90 (Bebbington & Nayani, 1995) and construct validity based on population data (Bebbington et al., 2013). Sample questions for the PSQ read: (over the past year) “have there been times when you felt that people were against you?” and “have there been times when you heard or saw things that other people couldn’t?”
Antisocial personality disorder was identified using the Structured Clinical Interview for DSM-IV patient questionnaire (SCID-II screen) (First, Gibbon, Spitzer, Williams, & Benjamin, 1997). Participants gave “yes” or “no” responses to questions in order to screen for the category of DSM-IV Axis-II included in this study (i.e., ASPD) (American Psychiatric Association, 2000). Cut-off points were manipulated to increase levels of agreement, measured by the Kappa coefficient, between both individual criteria and clinical diagnoses as previously reported (Ullrich et al., 2008). A similar algorithm was used in the present survey for categorical classification.

Alcohol dependence was identified by a score of 20+ on the Alcohol Use Disorders Identification Test (Babor, Higgins-Briddle, Saunders, & Monteiro, 2001). The Drug Use Disorders Identification Test (Berman, Bergman, Palmstierna, & Schlyter, 2005) was used to establish drug dependence (score of 20+). Both substance misuse measures are based on behaviors over the past year.

**Violence outcomes**

Participants were asked about their violent behavior (“have you been in a physical fight, assaulted or deliberately hit anyone in the past 5 years”), as used in previous UK surveys of violence (Coid et al., 2006; Gonzalez, Kallis, & Coid, 2013). All participants were queried regarding their violent behavior with the initial question: “Have you been in a physical fight, assaulted, or deliberately hit anyone in the past five years?” If respondents replied positively, additional questions covered location of incidents and their outcome. Spouses or cohabiting partners and girlfriends or boyfriends were combined into a single category of “intimate partner violence”. Subsequent questions aimed to gather information on whether the victim was injured, was an intimate partner or stranger, and whether violence was minor (with no injuries or police involvement).

**Analytical strategy**

For descriptive purposes, absolute (n) and relative frequencies (%) were reported for all dichotomous/polytomous categorical variables.
We initially investigated associations between early maltreatment and violence in the past 5 years and tested their independent associations by including all forms of maltreatment simultaneously. Next we examined whether these associations were mediated by adult psychiatric morbidity. Mental disorders in adulthood were considered as potential mediators when they demonstrated a significant relationship between both (1) violence and (2) childhood maltreatment. The statistical approach followed Preacher & Hayes (Preacher & Hayes, 2008) recommendations for testing multiple mediators, which has the advantage of specifying the magnitude of a potential mediator of the association conditioned on the presence of other mediators. By comparing standardized regression coefficients from models with and without categories of mental illness as covariate (MacKinnon & Dwyer, 1993), we estimated the proportion of the direct effects that were mediated and tested the significance of these effects using bootstrapped standard errors and confidence intervals. Because of the likelihood of non-normality of the total indirect effect bootstrapping is advised (Shrout & Bolger, 2002). We improved the bootstrapped confidence intervals by adjusting the percentile values of the sorted distribution using bias-corrected and accelerated estimates. A mediated effect exists when the explanatory variable significantly attenuates the association between maltreatment and violence.

Studies analyzing the association between ASPD and violence have been criticized as tautological because one of the diagnostic criteria for ASPD is violent behavior. We therefore conducted a sensitivity analysis using a continuous measure of number of ASPD criteria, from which the violence criterion (i.e. Irritability and aggressiveness, as indicated by repeated physical fights or assaults) was omitted, to examine whether our findings on mediation by ASPD still held.

To estimate the impact of exposure to multiple adverse childhood events, we combined the binary maltreatment variables and regressed the violence outcomes using adjusted logistic regression models. Results of these models were plotted as adjusted predicted probabilities.
To control for differences between samples, survey boost was included as a fixed covariate in all estimates. We also used robust standard errors to account for correlations within survey areas due to clustering within postcodes. All analyses were performed in STATA version 13 (StataCorp).

Results

Demography and sampling

The weighted final sample included 2,928 men aged 21-34 years: 1,588 (54.2%) from the main survey; 853 (29.1%) from the BME sample; and 487 (16.6%) from lower social grades. Of the total sample, 177 (6.0%) reported physical abuse before age 16, 72 (2.5%) sexual abuse, 132 (4.5%) neglect, 415 (14.2%) witnessing domestic violence, 786 (26.8%) victim of bullying.

Age was inversely associated with having being a victim of bullying (aOR 0.77, 95% CI 0.62, 0.95, p<0.05) and physically abused (aOR 0.67, 95% CI 0.46, 0.99, p<0.05) before age 16. Participants originating from the Indian subcontinent or other minority group were less likely to report having been bullied (aOR 0.49, 95% CI 0.32, 0.73, p<0.001) or witnessed domestic violence (aOR 0.42, 95% CI 0.24, 0.72, p<0.01). Compared to those in higher social classes (I & II), unemployed men were more likely to report witnessing domestic violence before age 16 (aOR 2.10, 95% CI 1.24, 3.54, p<0.01). Men who reported sexual abuse were more likely to be single (aOR 2.06, 95% CI 1.04, 4.07, p<0.05; Table 1).

Early maltreatment and violence

Table 2 shows the associations between all types of early maltreatment and violent outcomes. The prevalence for all violence response variables were: Any violence 26.1%, IPV 3.3%, Minor violence 6.1%, Violence toward strangers 14.7% and Victim injury 13.3%. Having witnessed domestic violence demonstrated the strongest association with all outcomes of adult violence after adjusting for all other types of maltreatment. Childhood physical abuse was associated with IPV (aOR 2.33, 95% CI 1.25, 4.35, p<0.01) and with victim injured (aOR 1.92, 95% CI 1.22, 3.03, p<0.01). Violence toward strangers was the only outcome associated with childhood neglect (aOR
1.73, 95% CI 1.03, 2.91, \( p < 0.05 \)). Having been a victim of bullying demonstrated a positive relationship with any violence (aOR 1.40, 95% CI 1.09, 1.81, \( p < 0.01 \)).

**Multiple maltreatment types and violence**

Figure 1 shows the proportional increase of violence for each additional type of maltreatment reported. The regression for each violent outcome on the continuous score of multiple maltreatment types provides evidence of significant linear trends: Any violence OR 1.68 (1.50, 1.89), \( p < 0.001 \); IPV 1.83 (1.58, 2.12), \( p < 0.001 \); Minor violence 1.18 (1.02, 1.37), \( p < 0.05 \); Violence toward strangers OR 1.46 (1.32, 1.62), \( p < 0.001 \); and victim injured OR 1.58 (1.42, 1.76), \( p < 0.001 \).

The adjusted predicted probabilities for each of these models are included in Figure 1.

**Early maltreatment, psychiatric morbidity, and violence**

Physical abuse in childhood was associated with adult alcohol dependence (aOR 1.99, 95% CI 1.06, 3.71, \( p < 0.05 \)) and ASPD (aOR 2.72, 95% CI 1.47, 5.04, \( p < 0.01 \)). Early neglect was associated with ASPD (aOR 2.44, 95% CI 1.39, 4.26, \( p < 0.01 \)). Having witnessed domestic violence was related to ASPD (aOR 3.88, 95% CI 2.58, 5.83, \( p < 0.001 \)), alcohol (aOR 1.57, 95% CI 1.01, 2.45, \( p < 0.05 \)) and drug dependence (aOR 2.40, 95% CI 1.02, 5.65, \( p < 0.05 \)), and psychosis (aOR 4.93, 95% CI 2.22, 10.94, \( p < 0.001 \); Table 3).

After adjustment for additional psychiatric morbidity, alcohol dependence was positively associated with IPV (aOR 4.25, 95% CI 2.03, 8.90, \( p < 0.001 \)); ASPD demonstrated a relationship with any violence (aOR 9.61, 95% CI 6.57, 14.04, \( p < 0.001 \)), IPV (aOR 6.49, 95% CI 3.42, 12.31, \( p < 0.001 \)), victim injured (aOR 7.90, 95% CI 5.16, 10.31, \( p < 0.001 \)) and violence toward strangers (aOR 6.51, 95% CI 4.63, 9.16, \( p < 0.001 \)). Psychosis was associated with any violence only (aOR 3.72, 95% CI 1.60, 8.67, \( p < 0.01 \)). Drug dependence was not directly (i.e., after adjustments) associated with any exposure to early maltreatment (Table 4).

**Explanatory role of psychiatric morbidity in the association between early maltreatment and violence**
Childhood maltreatment variables qualifying for mediation analyses were selected on the basis of their association with the violent outcomes (Table 2). Mental disorders were considered potential explanatory variables when they showed a significant association with both (1) childhood maltreatment and (2) violent outcome. Detailed bootstrapped estimates for all direct and indirect effects are included in the online supplement for this article.

As shown in Figure 2, the pathway from witnessing domestic violence in childhood to any violence in adulthood was partially mediated by ASPD and psychosis. ASPD and alcohol dependence showed significant indirect effects and partially explained the relationship with IPV. ASPD was a partial mediator in the association between witnessing domestic violence to adult violence toward strangers, and victim injured.

The association between physical abuse in childhood and IPV was no longer significant after inclusion of ASPD and alcohol dependence in the statistical model. ASPD partially explained associations with victim injury. The relationship between childhood neglect and violence toward a stranger was accounted for by ASPD.

In the sensitivity analysis using a continuous measure of the number of ASPD criteria met, and omitting the violence criterion, the results remained the same in terms of mediation, with the exception that there was not a significant indirect effect of psychosis from witnessing domestic violence to any violence. The total effect was solely accounted for by the alternative measure of ASPD, and may indicate increased variance explained using this continuous measure in the model. Detailed results from the sensitivity analysis are included in the online supplement for this article.

**Discussion**

In the present study, we examined the explanatory role of various forms of psychopathology on the associations between early maltreatment and adult violence perpetration. Our findings indicated that childhood maltreatment is a strong predictor of violent behavior in adulthood among
young adult men in the UK population. However, these associations were complex and involved more than one pathway.

The strongest effect was from witnessing IPV, with a more than three-fold increase in reported adult violence and involving more serious incidents where a victim was injured as well as minor incidents, including intimate partners as well as strangers. These pathways were partially explained by ASPD, together with additional, smaller effects from psychosis in the case of any adult violence, and alcohol dependence in the case of intimate partner violence. These direct effects of witnessing violence should therefore be considered in the context of previous studies showing that childhood abusive experiences and IPV (witnessed by the child) co-occur and increase risk for each other (Appel & Holden, 1998; Fantuzzo & Fusco, 2007; McCloskey, Figueredo, & Koss, 1995; Moffitt & Caspi, 2003). Furthermore, that additional factors commonly present among family members include substance misuse, criminality, psychiatric morbidity, neighborhood disadvantage, and violence toward others outside of the home (Herrenkohl, Sousa, Tajima, Herrenkohl, & Moylan, 2008).

A literature review concluded that early physical abuse is the most consistent predictor of youth violence, particularly when compounded by additional forms of maltreatment, including sexual abuse and neglect (Maas et al., 2008). Childhood physical abuse was independently associated with both serious incidents of violence resulting in victim injury and IPV in the present study. However, both pathways were entirely mediated by ASPD, and by alcohol dependence in the case of IPV. A general pattern of antisocial behavior, corresponding to ASPD (White & Widom, 2003), and violent delinquency (Millett et al., 2013) has previously been shown to mediate the pathway between combinations of childhood maltreatment and later IPV. Furthermore, both men and women who are abused in childhood are more likely to develop alcohol problems, and these then increase risks for perpetrating IPV (Leonard et al., 2000; White & Chen, 2002; White & Widom, 2003). However, it is
unclear whether this association is explained by frequent intoxication increasing risk of violence, or other factors leading to deterioration of intimate relationships secondary to alcohol dependence.

Neglect was associated only with violence toward strangers. This was entirely mediated by ASPD. Previous studies have not investigated effects of neglect independent of other maltreatment (Gilbert et al., 2009; Liu et al., 2012; Millett et al., 2013). These have found associations with later IPV, questioning whether failure of early attachments through neglect contributes to later intimate partner difficulties (Millett et al., 2013). However, in not finding this association among young adult UK men, our findings may suggest that neglect represents a failure to supervise childhood behavior and monitor peer influences. These factors increase risk for generalized delinquency and adult antisocial lifestyle (Farrington, 2005). In this context, violent altercations we observed with strangers would be more likely to occur through criminal social networks and confrontations with strangers occurring in heavy drinking situations.

Sexual abuse has also been combined with other forms of maltreatment in most previous studies. However, one study showed that victims of childhood sexual abuse were no more likely to be arrested in adulthood than victims of other forms of maltreatment, including for sexual offenses (Widom, 1989a). In the present study, no independent associations were observed between childhood sexual abuse and adult violence, with a non-significant trend toward negative associations following adjustments. Childhood sexual abuse has been found to increase risk of adult psychopathology (Dinwiddie et al., 2000; Nelson & Wampler, 2000) associated with self-harm (Asgeirsdottir et al., 2011; Noll, Horowitz, Bonanno, Trickett, & Putnam, 2003), and with increased risk of repeated sexual and other forms of victimization in adulthood in samples which have included women (Coid et al., 2001; Follette, Polusny, Bechtle, & Naugle, 1996; Messman-Moore, Long, & Siegfried, 2000). However, the absence of independent associations between adult psychopathology and reported childhood sexual abuse among this sample of young adult men was an unexpected finding. Whereas other forms of maltreatment were more highly prevalent, the reported
rate of sexual abuse appears to be low (2.5%), and failure to find a statistically significant association may be attributed to a lack of sufficient statistical power.

Our findings have shown both a direct and indirect (ASPD-mediated) influence of witnessing domestic violence on adult violence, consistent with a complex explanatory model (Dubow, Huesmann, & Boxer, 2009). A direct pathway is posited by social learning theory i.e. that observation of parental conflict may result in the child learning that violence is acceptable, and a legitimate way of solving conflicts within the family and with others (Bandura, 1986; Simons, Wu, Johnson, & Conger, 1995). Indirect effects via psychopathology may be attributed to the ‘double burden’ of the trauma of witnessing violence, in addition to the effect of the violence on parental functioning. Witnessing domestic violence can be so traumatic that children develop post-traumatic stress disorder (Levendosky, Bogat, & Martinez-Tortey, 2013), and exhibit both short and long-term altered physiological arousal and difficulties with emotion regulation (el-Sheikh, 1994; Katz, Hessler, & Annest, 2007; Saltzman, Holden, & Holahan, 2005). For the parents, being a victim of domestic violence has profoundly negative physical and mental health consequences (Riggs, Caulfield, & Street, 2000), which in turn may limit a parent’s ability to provide a safe, consistent and nurturing environment (Cleaver et al. 2011). There is also evidence that the effect of witnessing domestic violence on child behavior problems is mediated by parenting stress (Roberts, Campbell, Ferguson, & Crusto, 2013). Perpetration of domestic violence is also associated with parental mental health difficulties and alcohol and substance misuse (Riggs et al., 2000), which are themselves risk factors for children developing later mental health problems of their own.

Mediation and psychopathology

We confirmed that childhood maltreatment in the form of physical abuse contributes to the development of ASPD (Johnson et al., 1999; Luntz & Widom, 1994), alcohol dependence (Harrison et al., 1997; Widom, White, Czaja, & Marmorstein, 2007), and psychosis (Bebbington et al., 2011; Morgan & Fisher, 2007). Alcohol dependence frequently co-occurs with ASPD and co-existing
ASPD is the strongest risk factor explaining the association between violence and psychotic illness (Bo, Abu-Akel, Kongerslev, Haahr, & Simonsen, 2011; Winsper et al., 2013). Early onset antisocial behavior persisting into adulthood is considered a familial disorder, with significant associations between mothers and fathers with ASPD and child externalizing behavior disorder (Connell & Goodman, 2002; Tremblay et al., 2005). Meta-analyses of twin and adoption studies have shown that genetic effects explain 44–47% of the variance (Rhee & Waldman, 2002). Continuity in aggression is largely mediated by genetic influence, whilst non-aggressive anti-social behavior is mediated by both genes and shared environment (Eley et al., 2003). Genetic risk may interact with childhood environment, including carriers of the low activity variant of the MAOA gene or serotonin transporter (5HTTLPR) (Caspi et al., 2002). Maltreatment in childhood of those with the low activity allele of MAOA would result in vulnerability among these individuals to becoming highly reactive to stressful environments (Kim-Cohen et al., 2006). However, cumulation of risk factors is thought to be important in the development of early-onset antisocial disorder, with the more adversity the greater the probability of developing ASPD. In this context, genetic may combine with environmental risk, and where child maltreatment may be part of a constellation of environmental factors including maternal smoking during pregnancy, poor maternal attachment and maternal sensitivity, and being raised in multiple adversity (Tremblay et al., 2005).

Limitations

Our survey had several limitations, including the measurement of early maltreatment that did not record detailed information, such as severity or frequency. There is evidence that the effects of abusive experiences vary according to chronological age (Hart & Rubia, 2012). Our results were also derived from a cross-sectional survey that did not include women, and maltreatment events were recalled retrospectively. Also, when employing rating scales such as the PSQ, or any other questionnaires, limitations arise in relation to the subjectivity and accuracy of self-reports (Naglieri & Goldstein, 2014). Recall bias is unaccounted for and may have been a factor in responses to
maltreatment and violence. Maltreatment was assessed solely by self-report. Although an important limitation, it may have also facilitated disclosure of sensitive information, especially amongst young men. Recent research found no differences between interviews, questionnaire and telephone interviewing methods for participants disclosing sensitive information that includes victimization and aggression (Rosenbaum, Rabenhorst, Reddy, Fleming, & Howells, 2006). Moreover, data from official records of validated cases of abuse will lose cases that go unreported.

It may give the impression that maltreatment categories in our study appear underrepresented when compared with confirmed cases from general population data. We corroborated household population UK survey data from 2000 and 2007, and when stratifying for males aged 21-34, the prevalence’s were almost identical (data available from authors), indicating representativeness of our current UK young men sample.

Diagnoses were assessed via self-report questionnaires and not confirmed by clinical interview. Although prevalence of mental disorders among young adult men in previous surveys in Great Britain (Coid et al., 2006; McManus, Multzer, Brugha, Bebbington, & Jenkins, 2009; Singleton, Bumpstead, & O'Brien, 2001) were similar to non-violent men in this survey, dating of specific episodes of psychiatric disorders was not possible with our design.

Replication of our results from mediation analyses is required from longitudinal study. However, the community-based design and amply powered sample size provided satisfactory statistical power to test complex models and to adjust for confounding from demographics and comorbidity. It also allowed us to examine independent associations between different categories of mental disorder and a wider range of childhood maltreatment than previous studies. The representative community-based design also avoided attrition associated with longitudinal study where case identification usually relies on identified cases of child maltreatment by official agencies. We did our best to preserve temporality in explanatory models. In statistical terms, making a contrast between mediational and confounding effects is not possible. These are similar regarding the
estimation of effects and standard errors. Nevertheless, the distinction between mediation and confounding requires directionality and understanding of the causative nature of relationships, which are determined conceptually. In this context, conceptual considerations such as temporal order among variables and the nature of variables is taken into account. Psychopathology in general, and specifically personality disorder, alcohol and drug dependence and psychotic symptoms form part of illnesses with complex and deeply rooted causes, and are not expected to occur in response to aggression and violence. Therefore, consistent with what would be expected in a causal relationship, we found that personality disorder traits, alcohol dependence and psychotic symptoms were intermediate variables in the pathway from early maltreatment to violence.

Approximately 10 million children witness domestic violence every year in the US (Department of Health, 2002) and observation of parental conflict may result in the child learning that violence is acceptable, and a legitimate way of solving conflicts within the family and with others (Simons et al., 1995). Because treatment of psychopathology mediating the pathways from child maltreatment to adult violence may be difficult, primary prevention strategies aimed to prevent children witnessing domestic violence may improve outcome for more persons and with greater effectiveness.

**Implications for Reducing the Risk of Adult Violence**

Our findings highlighted the damaging effects of multiple types of maltreatment for development of psychopathology and adult violence. Although the focus of our study was not on prevention, nonetheless our findings on both direct and indirect pathways from maltreatment to violence may raise potential implications for intervening at different points in this trajectory.

**Interventions focused on preventing maltreatment**

There was a direct pathway between the childhood experience of witnessing domestic violence and adult outcome, suggesting that it could be important to target interventions at the population level, with the aim of preventing children witnessing domestic violence in the first place.
Because the pathway between the childhood experience of witnessing domestic violence and adult outcome was direct, this suggests that population interventions which aim to prevent children witnessing violence between carers could be highly effective. Alternatively, by disrupting pathways involving social learning when violence has been witnessed by the child (Dubow et al., 2009), is then imitated (Bandura, 1986), and differentially reinforced by family members during early socialization.

However, several reviews have highlighted a lack of evidence for effective interventions to prevent domestic violence (Macmillan et al., 2009). Our findings reinforce the public health importance of establishing effective preventative interventions. Similarly, there was some evidence of a direct effect of childhood physical abuse on adult violence leading to victim injury. Again, this reinforces the importance of intervening to prevent physical abuse from occurring. Interventions targeted at at-risk families, such as the Nurse Family Partnership, have a strong evidence base (Macmillan et al., 2009). Interventions that aim to prevent children witnessing violence between carers could be highly effective.

**Interventions focused on preventing the development of psychopathology**

Our findings on partial or full mediation by multiple types of psychopathology (ASPD, alcohol dependence and psychotic disorder) highlight the importance of preventing children from developing mental health difficulties following childhood maltreatment. Potentially effective interventions include parent training for families in which there has been physical abuse and neglect, cognitive behavior therapy for children who have been sexually abused, and placement of children in foster care (Macmillan et al., 2009; Ramchandani & Jones, 2003).

**Interventions focused on treating conduct disorder**

We found that antisocial personality disorder was a full or partial mediator of the effects of multiple types of childhood maltreatment on adult violence. This suggests that children with conduct disorder – the childhood precursor of antisocial personality disorder – could be a particularly important subgroup to target for prevention of adult violence. Treatment programs for conduct
disorder have shown moderate benefit for future antisocial behavior (Connor, Boone, Steingard, Lopez, & Melloni, 2003; Woolfenden, Williams, & Peat, 2002), but with limitations in the context of multiple family problems. These include factors associated with abuse and neglect, including living in poor social conditions, family members with substance misuse, psychiatric morbidity, criminality, and violence toward others both within and outside the family (Herrenkohl et al., 2008).

**Implications for Further Research**

Our findings highlight the importance of witnessing domestic violence during childhood as a key risk factor for perpetrating violence toward others in adulthood. Research into this childhood exposure is relatively limited compared to other forms of maltreatment (Gilbert et al., 2009) and has concentrated on generalized antisocial behavior and where the later adverse effects have been thought greater following childhood physical abuse (Wilson & Widom, 2009). Further research could test the replicability of our findings on direct pathways between witnessing domestic violence and multiple types of adult violence, could explore whether the mechanisms proposed by social learning theory are responsible for this pathway, and could develop and test interventions based on social learning theory for preventing adult violence in children who witness domestic violence.
REFERENCES


10.1093/aje/kwj339


### Table 1.

Abuse exposure by sample characteristics among 2,928 young men (21-34) in the Men’s Modern Lifestyles survey

<table>
<thead>
<tr>
<th>Covariates</th>
<th>Victim of bullying 786 (26.8%)</th>
<th>Physical abuse 177 (6.0%)</th>
<th>Sexual abuse 72 (2.5%)</th>
<th>Neglect 132 (4.5%)</th>
<th>Witnessing domestic violence 415 (14.2%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-27</td>
<td>54.6 Ref.</td>
<td>59.2 Ref.</td>
<td>48.0 Ref.</td>
<td>50.4 Ref.</td>
<td>51.8 Ref.</td>
</tr>
<tr>
<td>28-34</td>
<td>45.4 0.77 (0.62, 0.95)#</td>
<td>40.8 0.67 (0.46, 0.99)#</td>
<td>52.0 0.83 (0.43, 1.61)</td>
<td>49.6 0.91 (0.58, 1.41)</td>
<td>48.2 0.98 (0.75, 1.27)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>73.8 Ref.</td>
<td>75.7 Ref.</td>
<td>65.3 Ref.</td>
<td>62.3 Ref.</td>
<td>74.4 Ref.</td>
</tr>
<tr>
<td>Black</td>
<td>11.1 0.67 (0.44, 1.02)</td>
<td>11.7 0.85 (0.39, 1.88)</td>
<td>7.6 0.55 (0.13, 2.41)</td>
<td>12.2 1.09 (0.47, 2.54)</td>
<td>12.3 0.74 (0.41, 1.34)</td>
</tr>
<tr>
<td>Asian and other</td>
<td>15.2 0.49 (0.32, 0.73)†</td>
<td>12.6 0.52 (0.23, 1.15)</td>
<td>27.2 1.47 (0.64, 3.37)</td>
<td>25.5 1.51 (0.83, 2.76)</td>
<td>13.4 0.42 (0.24, 0.72)†</td>
</tr>
<tr>
<td>Single</td>
<td>54.3 1.20 (0.96, 1.50)</td>
<td>47.4 0.82 (0.54, 1.22)</td>
<td>68.5 2.06 (1.04, 4.07)#</td>
<td>53.6 0.89 (0.55, 1.42)</td>
<td>50.3 0.84 (0.64, 1.10)</td>
</tr>
<tr>
<td>Social class</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I &amp; II</td>
<td>12.9 Ref.</td>
<td>12.6 Ref.</td>
<td>12.6 Ref.</td>
<td>12.6 Ref.</td>
<td>10.1 Ref.</td>
</tr>
<tr>
<td>III M and IIINM</td>
<td>31.1 1.15 (0.79, 1.68)</td>
<td>21.8 0.77 (0.37, 1.59)</td>
<td>24.9 0.72 (0.25, 2.09)</td>
<td>21.3 0.81 (0.36, 1.83)</td>
<td>23.4 1.09 (0.65, 1.83)</td>
</tr>
<tr>
<td>IV &amp; V</td>
<td>25.8 0.95 (0.64, 1.42)</td>
<td>26.2 0.95 (0.47, 1.93)</td>
<td>13.2 0.35 (0.11, 1.11)</td>
<td>22.5 0.78 (0.34, 1.77)</td>
<td>30.3 1.56 (0.93, 2.62)</td>
</tr>
<tr>
<td>Unemployed/Not classified</td>
<td>30.2 1.26 (0.86, 1.85)</td>
<td>39.4 1.72 (0.84, 3.53)</td>
<td>45.3 1.09 (0.36, 3.29)</td>
<td>43.7 1.65 (0.71, 3.84)</td>
<td>36.2 2.10 (1.24, 3.54)†</td>
</tr>
<tr>
<td>Survey type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>62.1 Ref.</td>
<td>58.6 Ref.</td>
<td>57.7 Ref.</td>
<td>48.2 Ref.</td>
<td>59.0 Ref.</td>
</tr>
<tr>
<td>Ethnic minorities</td>
<td>19.1 0.84 (0.54, 1.29)§</td>
<td>16.7 0.82 (0.35, 1.93)</td>
<td>22.8 0.66 (0.21, 2.06)</td>
<td>24.7 0.68 (0.32, 1.45)</td>
<td>18.6 0.96 (0.53, 1.73)§</td>
</tr>
<tr>
<td>Lower social classes</td>
<td>18.9 0.99 (0.76, 1.29)</td>
<td>24.8 1.25 (0.79, 1.97)</td>
<td>19.5 1.25 (0.57, 2.74)</td>
<td>27.1 1.69 (1.01, 2.81)#</td>
<td>22.4 1.07 (0.78, 1.48)</td>
</tr>
</tbody>
</table>

Note: All weighted frequencies and percentages; robust standard errors based on area clusters. Slight variation in numbers due to missing values, percentage of total N: Ethnicity (0.1%), Single (1.4%), Social class (3.2%), remaining variables (0.0%).

*Significance tests based on logistic regression models adjusted for age, being single, ethnicity, social class/unemployment and survey type.

#p<0.05, †p<0.01, ‡p<0.001.

§Protective association prior to adjustments in multivariate model.
Table 2.

Adjusted odds of violence in the past 5 years among young men exposed to early maltreatment (N = 2,928)

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Any violence</th>
<th>IPV</th>
<th>Minor violence</th>
<th>Violence toward strangers</th>
<th>Victim injured</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>763 (26.1%)</td>
<td>97  (3.3%)</td>
<td>178 (6.1%)</td>
<td>430 (14.7%)</td>
<td>391 (13.3%)</td>
</tr>
<tr>
<td>Victim of bullying</td>
<td>292 (37.2)</td>
<td>43 (5.4)</td>
<td>63 (8.0)</td>
<td>164 (20.8)</td>
<td>141 (17.9)</td>
</tr>
<tr>
<td>Physical abuse</td>
<td>98 (55.3)</td>
<td>26 (14.5)</td>
<td>9 (5.1)</td>
<td>49 (27.7)</td>
<td>62 (35.0)</td>
</tr>
<tr>
<td>Sexual abuse</td>
<td>25 (34.9)</td>
<td>5 (7.0)</td>
<td>4 (5.3)</td>
<td>15 (20.9)</td>
<td>14 (19.7)</td>
</tr>
<tr>
<td>Neglect</td>
<td>72 (55.0)</td>
<td>19 (14.1)</td>
<td>11 (8.7)</td>
<td>44 (33.4)</td>
<td>44 (33.2)</td>
</tr>
<tr>
<td>Witness DV</td>
<td>220 (52.9)</td>
<td>50 (12.0)</td>
<td>43 (10.4)</td>
<td>130 (31.2)</td>
<td>134 (32.4)</td>
</tr>
<tr>
<td>Fully adjusted</td>
<td>AOR (95%CI)</td>
<td>AOR (95%CI)</td>
<td>AOR (95%CI)</td>
<td>AOR (95%CI)</td>
<td>AOR (95%CI)</td>
</tr>
<tr>
<td>Victim of bullying</td>
<td>1.93 (1.54, 2.42)†</td>
<td>2.11 (1.34, 3.32)¶</td>
<td>1.49 (1.04, 2.14)†</td>
<td>1.61 (1.25, 2.06)†</td>
<td>1.45 (1.12, 1.88)¶</td>
</tr>
<tr>
<td>Physical abuse</td>
<td>3.79 (2.55, 5.64)†</td>
<td>5.92 (3.62, 9.68)†</td>
<td>0.70 (0.31, 1.55)</td>
<td>2.16 (1.47, 3.18)†</td>
<td>3.87 (2.67, 5.61)†</td>
</tr>
<tr>
<td>Sexual abuse</td>
<td>1.68 (0.94, 3.01)</td>
<td>2.43 (0.88, 6.71)</td>
<td>0.71 (0.20, 2.54)</td>
<td>1.72 (0.90, 3.27)</td>
<td>1.85 (0.94, 3.63)</td>
</tr>
<tr>
<td>Neglect</td>
<td>4.01 (2.68, 5.99)†</td>
<td>5.06 (2.78, 9.22)†</td>
<td>1.45 (0.75, 2.78)</td>
<td>3.21 (2.11, 4.88)†</td>
<td>3.81 (2.52, 5.76)†</td>
</tr>
<tr>
<td>Witness DV</td>
<td>3.71 (2.85, 4.84)†</td>
<td>6.16 (3.96, 9.56)†</td>
<td>1.86 (1.17, 2.96)†</td>
<td>2.97 (2.25, 3.92)†</td>
<td>3.84 (2.90, 5.09)†</td>
</tr>
</tbody>
</table>

Note: DV = domestic violence; IPV = Intimate partner violence. All weighted frequencies and row percentages; robust standard errors based on area clusters.

*Logistic regression models adjusted for age, being single, ethnicity, social class/unemployment and survey type.

**Logistic regression models adjusted for and statistically significant forms of maltreatment from univariate models.

#p < 0.05, †p < 0.01, ‡p < 0.001.
Table 3.
Early childhood maltreatment and psychiatric morbidity

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Alcohol dependence</th>
<th>Drug dependence</th>
<th>ASPD</th>
<th>Psychosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>AOR (95%CI)</td>
<td>N (%)</td>
<td>AOR (95%CI)</td>
</tr>
<tr>
<td>Victim of bullying</td>
<td>71 (9.3)</td>
<td>1.39 (0.90, 2.14)</td>
<td>27 (3.5)</td>
<td>2.35 (1.28, 4.30)</td>
</tr>
<tr>
<td>Physical abuse</td>
<td>29 (17.5)</td>
<td>2.89 (1.73, 4.81)†</td>
<td>16 (9.5)</td>
<td>6.62 (3.08, 14.23)</td>
</tr>
<tr>
<td>Sexual abuse</td>
<td>10 (13.9)</td>
<td>2.11 (0.88, 5.07)</td>
<td>3 (4.0)</td>
<td>1.75 (0.46, 6.59)</td>
</tr>
<tr>
<td>Neglect</td>
<td>21 (16.4)</td>
<td>2.62 (1.50, 4.60)¶</td>
<td>13 (9.9)</td>
<td>8.54 (3.62, 20.12)</td>
</tr>
<tr>
<td>Witness DV</td>
<td>51 (13.0)</td>
<td>2.11 (1.43, 3.10)†</td>
<td>25 (6.2)</td>
<td>4.96 (2.67, 9.21)†</td>
</tr>
<tr>
<td>Fully adjusted</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victim of bullying</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical abuse</td>
<td></td>
<td>1.20 (0.54, 2.66)</td>
<td></td>
<td>1.01 (0.72, 1.43)</td>
</tr>
<tr>
<td>Sexual abuse</td>
<td></td>
<td>1.99 (1.06, 3.71)#</td>
<td></td>
<td>2.39 (0.81, 7.06)</td>
</tr>
<tr>
<td>Neglect</td>
<td></td>
<td>1.35 (0.70, 2.60)</td>
<td></td>
<td>2.91 (1.00, 8.46)</td>
</tr>
<tr>
<td>Witness DV</td>
<td></td>
<td>1.57 (1.01, 2.45)#</td>
<td></td>
<td>2.40 (1.02, 5.65)#</td>
</tr>
</tbody>
</table>

Note: DV = domestic violence. All weighted frequencies and row percentages; robust standard errors based on area clusters.

*Logistic regression models adjusted for age, being single, ethnicity, social class/unemployment and survey type.

†Logistic regression models adjusted for * and statistically significant forms of maltreatment from univariate models.

#p < 0.05, ¶p < 0.01, †p < 0.001.
### Psychiatric morbidity as correlate of violence

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Any violence</th>
<th>IPV</th>
<th>Minor violence</th>
<th>Violence toward strangers</th>
<th>Victim injured</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Any violence</td>
<td>IPV</td>
<td>Minor violence</td>
<td>Violence toward strangers</td>
<td>Victim injured</td>
</tr>
<tr>
<td>Alcohol dependence</td>
<td>763 (26.1%)</td>
<td>97 (3.3%)</td>
<td>178 (6.1)</td>
<td>430 (14.7)</td>
<td>391 (13.3)</td>
</tr>
<tr>
<td>Drug dependence</td>
<td>11.67 (4.62, 29.47)†</td>
<td>7.24 (2.31, 22.68)¶</td>
<td>1.13 (0.38, 3.35)</td>
<td>3.53 (1.81, 6.90)†</td>
<td>6.35 (3.24, 12.45)†</td>
</tr>
<tr>
<td>ASPD</td>
<td>11.58 (8.18, 16.39)†</td>
<td>9.81 (6.00, 16.05)†</td>
<td>1.46 (0.89, 2.40)</td>
<td>6.54 (4.79, 8.93)†</td>
<td>8.41 (6.14, 11.52)†</td>
</tr>
<tr>
<td>Psychosis</td>
<td>4.97 (2.74, 9.02)†</td>
<td>7.33 (3.35, 16.07)†</td>
<td>2.06 (0.48, 8.83)</td>
<td>2.99 (1.57, 5.69)¶</td>
<td>3.59 (1.82, 7.10)†</td>
</tr>
</tbody>
</table>

**Fully adjusted**

<table>
<thead>
<tr>
<th>Exposure</th>
<th>AOR (95%CI)</th>
<th>AOR (95%CI)</th>
<th>AOR (95%CI)</th>
<th>AOR (95%CI)</th>
<th>AOR (95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol dependence</td>
<td>1.34 (0.76, 2.35)</td>
<td>4.25 (2.03, 8.90)†</td>
<td>AOR (95%CI)</td>
<td>1.19 (0.76, 1.88)</td>
<td>1.60 (0.98, 2.62)</td>
</tr>
<tr>
<td>Drug dependence</td>
<td>3.24 (0.79, 13.34)</td>
<td>1.89 (0.45, 7.89)</td>
<td>AOR (95%CI)</td>
<td>0.96 (0.44, 2.11)</td>
<td>1.73 (0.80, 3.73)</td>
</tr>
<tr>
<td>ASPD</td>
<td>9.61 (6.57, 14.04)†</td>
<td>6.49 (3.42, 12.31)†</td>
<td>AOR (95%CI)</td>
<td>6.51 (4.63, 9.16)†</td>
<td>7.30 (5.16, 10.31)†</td>
</tr>
<tr>
<td>Psychosis</td>
<td>3.72 (1.60, 8.67¶)</td>
<td>2.57 (0.87, 7.60)</td>
<td>AOR (95%CI)</td>
<td>1.63 (0.77, 3.47)</td>
<td>1.78 (0.81, 3.90)</td>
</tr>
</tbody>
</table>

Note: DV = domestic violence. All weighted frequencies and row percentages; robust standard errors based on area clusters.

*a* Logit models adjusted for age, being single, ethnicity, social class/unemployment and survey type.

*b* Logit models adjusted for *a* and statistically significant psychiatric morbidity from univariate models.

#p<0.05, ¶p < 0.01, †p < 0.001.
Multiple types of maltreatment and violence: proportions and predicted probabilities

Bars show the proportion of violence responders by number of maltreatment types. Lines denote adjusted logistic regression model’s predicted probabilities for each violence outcome: Any violence OR 1.68 (1.50, 1.89)†*, IPV OR 1.83 (1.58, 2.12)†, Minor violence OR 1.18 (1.02, 1.37)#; Violence toward strangers OR 1.46 (1.32, 1.62)†*, Victim injured 1.58 (1.42, 1.76)†*. The predicted probability linear trend for “minor violence” is noticeably lower than for the rest of the outcomes, denoting a slight association with the outcome when contrasted with other forms of violence.

Note: #P<0.05, ¶P<0.01, †P<0.001, *Significant quadratic effects
Figure 2.

Model-based coefficients for mediation of early abuse and maltreatment on violence outcomes

1.80† → ASPD → Any violence 2.22†
1.79† → Psychosis → Any violence 1.05¶

Witnessing domestic viol. 51.4% of total effect mediated

1.57† → ASPD → Alcohol dependence 1.58†
0.66¶ → Alcohol dependence → Any violence 1.14†

Witnessing domestic viol. 31.7% of total effect mediated

1.55† [1.07†] → Viol. toward strangers

Witnessing domestic viol. 41.0% of total effect mediated

1.55† → ASPD → Victim injured 1.81†

Witnessing domestic viol. 36.9% of total effect mediated

1.20† → ASPD → Victim injured 1.58†
0.92† → Alcohol dependence → Victim injured 1.14†

Physical abuse 43.4% of total effect mediated

1.23† → ASPD → Victim injured 1.81†

Physical abuse 38.4% of total effect mediated

1.17† → ASPD → Viol. toward strangers 1.70†

Neglect 74.0% of total effect mediated

Note. *P<0.05, †P<0.01, ‡P<0.001. Information contained in brackets ([ ]) indicate the mediated direct effect (’C).