



# Child maltreatment and parental domestic violence and abuse, co-occurrence and the effect on lifetime outcomes in the Avon Longitudinal Study of Parents and Children (ALSPAC)

Kevin Herbert<sup>a,\*</sup>, Qin Xi<sup>a</sup>, Gene Feder<sup>b</sup>, Ruth Gilbert<sup>c</sup>, Claire Powell<sup>d</sup>, Emma Howarth<sup>e</sup>, Stephen Morris<sup>a</sup>

<sup>a</sup> Primary Care Unit, Department of Public Health & Primary Care, University of Cambridge, Cambridge, UK

<sup>b</sup> Community Based Medicine, University of Bristol Medical School, Bristol, UK

<sup>c</sup> UCL Great Ormond Street Institute of Child Health, London, UK

<sup>d</sup> Institute of Psychiatry, Psychology & Neuroscience, King's College London, UK

<sup>e</sup> Institute of Child Health, University College London, London, UK

## ARTICLE INFO

### Keywords:

ALSPAC  
Child maltreatment  
Domestic violence and abuse  
Intimate partner violence  
Lifetime outcomes

## ABSTRACT

Exposure to child maltreatment (CM), and parental domestic violence and abuse (DVA), impose considerable adverse life outcomes in both the short and long term, yet, the extent and effects of their co-occurrence on outcomes have not been comprehensively quantified. This study describes the analysis of data from the Avon Longitudinal Study of Parents and Children, quantifying the prevalence of CM, parental DVA, co-occurrence rates, and the impact of different combinations of childhood exposures on life outcomes (health, economic, and likelihood of perpetrating intimate partner violence as a young person).

Childhood exposure prevalences were estimated at 41.7% for any form of CM, 19.3% for parental DVA, and 49.0% for exposure to at least one form of CM and/or parental DVA. Co-occurring parental DVA was reported in 21%–42% of CM-exposed households. Sexual abuse was reported in 2% of parental DVA-exposed households, whilst co-occurrence of other forms of CM ranged between 19% and 41%.

Co-occurring CM and parental DVA exposures were associated with increased risks of drug use, anxiety, depression, smoking, unemployment, social welfare use, and perpetration of intimate partner violence as a young person – highlighting the intergenerational effects of exposure. Increased risks across a wider range of adverse outcomes were associated with child-reported awareness of parental DVA, compared to parent-reported DVA exposure.

The high cumulative prevalence of childhood exposure to CM and/or parental DVA, and the scale of the resulting adverse impacts emphasise the need for policies and family interventions sensitive to the possibility of co-occurring forms of abuse.

## 1. Introduction

Child maltreatment (CM) and domestic violence and abuse (DVA) are widely prevalent violations of human rights, responsible for substantial adverse short- and long-term impacts on the health, wellbeing and life opportunities of affected individuals, with additional impacts on the family and society overall (Gilbert, Widom, et al., 2009; Oliver et al., 2019). In 2019, approximately 8.5 million people in England and Wales were estimated to have been exposed to CM (the physical, sexual or

emotional abuse or emotional or physical neglect of a child by a parent or caregiver) before reaching their 16th birthday (Office for National Statistics, 2020). Adverse outcomes for CM exposed children, span short- and long-term mental health and physical conditions (e.g., depression, anxiety, eating disorders, asthma, obesity, diabetes and cardiovascular disease) (Bellis et al., 2019; Liveri et al., 2023), behaviours conferring health risks (e.g., smoking, heavy alcohol consumption, illegal drug use), contact with the criminal justice system, and economic well-being as an adult (Conti et al., 2017; Peterson et al., 2018).

\* Corresponding author. Primary Care Unit, Department of Public Health & Primary Care, University of Cambridge, East Forvie Building, Robinson Way, Cambridge, CB2 0SR, UK.

E-mail address: [kch28@medschl.cam.ac.uk](mailto:kch28@medschl.cam.ac.uk) (K. Herbert).

<https://doi.org/10.1016/j.ssmph.2023.101555>

Received 18 April 2023; Received in revised form 21 October 2023; Accepted 4 November 2023

Available online 19 November 2023

2352-8273/© 2023 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

For the year ending March 2018, approximately 2.0 million individuals in the UK were estimated to have been subjected to DVA (non-sexual abuse, sexual assault or stalking by a partner of family member) (Oliver et al., 2019). A child witnessing such violence is considered to be an additional form of CM (National Society for the Prevention of Cruelty to Children, 2022), and currently around 30% of children aged under 18 are thought to have been exposed to DVA between adult parents or guardians (hereafter referred to as 'parental DVA') (Radford et al., 2013).

For each child identified as at-risk or as having been exposed to family violence, an extensive child protection process of assessment, monitoring and active intervention may be required across multiple services (National Institute for Health and Care Excellence, 2017), with the inherent associated costs that these incur.

Parental DVA shares common risk factors with CM, with estimates of co-occurrence ranging from 30% to 60% of households where either CM or parental DVA is reported (Edleson, 1999; Herrenkohl et al., 2008; Walby & Olive, 2014), making the separation of the impact on child witnesses to parental DVA from those of CM, problematic. Whilst the extent of harms from parental DVA exposure has been explored (Grasso et al., 2021; Jouriles et al., 2008), a comprehensive picture for the UK child population is not yet available, given a lack of prospective studies applicable to the UK setting, an inability to sufficiently distinguish harms from parental DVA from those of CM (Oliver et al., 2019; Walby, 2009), and difficulty in accounting for multiple interrelated socio-demographic factors that may potentially influence both exposure and outcome. The potential for polyvictimisation to cause disproportionately large impacts survivors (Radford et al., 2013), make it important to if the full effects on exposed children and the associated societal costs are to be fully captured. The aims of the present study were to perform a detailed descriptive analysis of childhood exposure to CM and/or parental DVA from a UK perspective, and to estimate causal associations between exposure and the risk of adverse health, social and economic outcomes, for both individual and co-occurring exposures.

This study adds important new information to the current literature on family violence in a UK setting. Through CM and/or parental DVA exposure constructs derived from contemporary and retrospective reports of exposure, from both adult and child perspectives, the ALSPAC longitudinal study dataset is a uniquely rich source of information on the study sample, their childhood circumstances, and life outcomes through early adulthood. By building on the recent development of binary constructs for adverse childhood experience (ACE) exposures from the ALSPAC data, the present study contextualises CM and parental DVA co-occurrence, and details their relationships with short- and long-term health, social and economic outcomes. The findings presented here, thus provide a foundation upon which policies and interventions targeting household family violence can be developed and evaluated.

## 2. Material and methods

### 2.1. ALSPAC study cohort

The data for this analysis were taken from the Avon Longitudinal Study of Parents and Children (ALSPAC), a population-based prospective study (Boyd et al., 2013; Fraser et al., 2013; Northstone et al., 2019), based upon pregnant women resident in Avon (UK) with expected dates of delivery from April 1, 1991 to December 31, 1992. An initial 14,541 pregnancies enrolled in the study was increased to 15,454 with additional enrolment when children were aged seven, resulting in a total of 15,589 fetuses (including those from multiple pregnancies), 14,901 of whom were alive at one year of age. ALSPAC is comprised of three cohorts: 'G0', recruited pregnant women and the biological father or other carers/partners; 'G1', the index child cohort; and, 'G2', the offspring of the index children.

This study used longitudinal clinic and questionnaire-based data collected periodically from during the pregnancy of the G0 mothers, up

to the most recent validated collection point for G1 children of approximately 25 years of age. Study data were collected and managed using REDCap electronic data capture tools hosted at the University of Bristol (Harris et al., 2009) (<http://www.bristol.ac.uk/alspac/researchers/our-data/>).

Eligibility of the G1 child participants for the present study was based upon a total of 19 binary ACE exposure constructs, derived from 582 variables from the ALSPAC dataset (Houtepen et al., 2018), covering an overall age window of pregnancy to 18 years of age (definitions are detailed in Appendix A). For each of the CM and parental DVA data collection timepoints across the study period (G0 mother pregnancy to G1 child at 23 years of age), responses were received for 3074 G1 child study participants on average (range: 2075–3131).

Participants were eligible for this study if overall, answers were provided to at least 50% of all survey items used to define the 19 binary ACE exposure constructs. After screening, approximately 40% of the original G1 child cohort (6252 total participants; 3018 males; 3234 females) remained eligible for subsequent data analysis. Whilst this criterion may reduce the size of the eligible sample, it was selected to ensure sufficient coverage of the ACE exposure variables required for accurate imputation and regression analysis modelling. The remaining ACE constructs cover a range of adversities, which evidence indicates have associations with both exposures and outcomes (Houtepen et al., 2018; Mersky et al., 2016).

### 2.2. Exposure

#### 2.2.1. Exposure definitions

Binary childhood exposure constructs for CM and/or parental DVA ('ever/never exposed') were derived from waves of data collected across the ALSPAC study (G1 child age of data collection, timespan the measure relates to, and ALSPAC participant response rates are mapped in Appendix B). The data collected were either parent- or child-reported measures from a contemporaneous (e.g., "... the child was exposed to 'x' within the last year") or retrospective (e.g., "... the child was ever exposed to 'x', prior to the age of ...") perspective. Exposure to CM was defined as the G1 child ever having been reported as being exposed to one or more of the following, at any time between the ages of 0–16 years.

- Physical abuse – an adult in the family had ever been physically cruel towards, or hurt the child;
- Sexual abuse – had ever been sexually abused, forced to perform sexual acts or touch someone in a sexual way;
- Emotional abuse – a parent had ever been emotionally cruel towards the child or had often said hurtful/insulting things to the child;
- Emotional neglect – a child always felt excluded, misunderstood or never important to their family, and/or parents never asked or never listened when the child talked about their free time;

Parental DVA was defined as the reporting (by either mother, partner or child) of an adult family member displaying physically cruel behaviour or violence towards their partner, including: hitting; choking; strangling; beating; or shoving. We included exposure to parental DVA from the start of pregnancy to when the child was 16 years of age.

The co-occurrence of CM and parental DVA during childhood was defined as a recorded instance of parental DVA within the household, in addition to any instance of the relevant form of CM in the period from pregnancy to the child reaching 16 years of age.

#### 2.2.2. Exposure scenarios

The impact of the following exposures to CM AND/OR parental DVA was explored separately for males and females.

- Exposure to ANY form of CM combined, excluding any parental DVA exposure (a single model with an individual indicator for all forms of CM combined [yes/no] – either physical abuse AND/OR sexual

- abuse AND/OR emotional abuse AND/OR emotional neglect vs none of these);
2. Exposure to parental DVA, excluding any CM exposure (a single model with an individual indicator for parental DVA vs no parental DVA [yes/no]);
  3. Exposure to ANY form of CM combined AND/OR parental DVA (a single model with an individual indicator for CM AND/OR parental DVA vs neither [yes/no]);
  4. Exposure to co-occurring emotional abuse AND parental DVA (a single model with an individual indicator for exposure to emotional abuse and parental DVA combined vs neither emotional abuse OR DVA [yes/no]);
  5. Exposure to co-occurring emotional abuse AND physical abuse AND parental DVA, combined (a single model with an individual indicator for exposure to emotional abuse AND physical abuse AND parental DVA combined vs none of emotional abuse OR physical abuse OR DVA [yes/no]);
  6. Exposure to an individual form of CM, excluding any co-occurring parental DVA exposure (four separate models each with individual indicators for physical abuse vs no physical abuse [yes/no], sexual abuse vs no sexual abuse [yes/no], emotional abuse vs no emotional abuse [yes/no] and emotional neglect vs no emotional neglect [yes/no]);

Models 4 and 5 were selected as emotional abuse was the form of CM most highly correlated with parental DVA, and emotional abuse and physical abuse being the two most highly correlated forms of reported CM (Table 1). Results for model 6 were provided for context with regards to individual exposure prevalences and outcomes.

### 2.3. Outcomes

Building on existing evidence for the relationships between CM or parental DVA exposure and physical, emotional or social harms (Conti et al., 2021; Oliver et al., 2019), binary (“ever/never”) outcome constructs were created from a selection of ALSPAC variables, defining a range of long-term outcomes spanning physical and mental health, social and economic, and criminal justice domains (Table 2; Appendix C). For monthly earnings outcomes, categorical variables were created using reported monthly take-home pay.

#### 2.3.1. Long-term mental health

**2.3.1.1. Mental health: anxiety, depression and eating disorders.** Anxiety (generalised anxiety disorder OR social phobia OR specific phobia OR agoraphobia OR panic disorder) was defined as a diagnosis at the ages of 17 or 24 years, via the Computerised Interview Schedule – Revised (CIS-R) (Capron et al., 2015). Depression was defined as a diagnosis of depression at the ages of 17 or 24 years via the CIS-R assessment (Capron

**Table 1**

Pearson’s Correlation between exposures to different forms of CM, and between CM and parental DVA in eligible children from the ALSPAC (Exposures between 0 and 16 years of age).

Exposure	Physical abuse	Sexual abuse	Emotional abuse	Emotional neglect	Parental DVA
Physical abuse	1				
Sexual abuse	0.121	1			
Emotional abuse	<b>0.316</b>	0.101	1		
Emotional neglect	0.017	0.088	0.017	1	
Parental DVA	0.187	0.044	<b>0.248</b>	0.031	1

**Table 2**

Characteristics of variables used to derive binary outcome constructs for the G1 child (age ranges for each outcome are defined in the main text and Appendix C). Total numbers of variables used, the number and percentage of which were prospective (as opposed to retrospective), or child reported (as opposed to parent reported).

Outcome category	Total number of variables	Prospective variables <sup>a</sup> N (%)	Child reported variables N (%)
<b>Long-term mental health</b>			
Mental health - Anxiety	10	10 (100%)	10 (100%)
Mental health - Depression	101	100 (99%)	101 (100%)
Mental health - Eating disorder	9	9 (100%)	9 (100%)
<b>Physical health</b>			
Health - Asthma	20	20 (100%)	20 (100%)
Health - Diabetes	5	4 (80%)	5 (100%)
Health - Hypertension	3	1 (33%)	3 (100%)
Risky sexual behaviour	5	5 (100%)	5 (100%)
Smoking (any/heavy)	17	14 (82%)	17 (100%)
<b>Substance abuse</b>			
Alcohol - Heavy drinking	16	16 (100%)	16 (100%)
Drug use	28	28 (100%)	28 (100%)
<b>Economic and social outcomes</b>			
Employment - Earnings	6	6 (100%)	6 (100%)
Employment - Likelihood	49	49 (100%)	42 (86%)
Problem gambling	1	1 (100%)	1 (100%)
Social welfare use	2	2 (100%)	2 (100%)
<b>Criminal justice</b>			
Criminal and antisocial behaviour	18	18 (100%)	18 (100%)
IPV (as a YP) - Perpetration	12	0 (0%)	12 (100%)

Abbreviations: IPV, intimate partner violence; YP, young person.

<sup>a</sup> Prospective defined as current status at the relevant sweep in the longitudinal study.

et al., 2015), or a score of 10 or greater in the Short Mood and Feelings Questionnaire (Kwong, 2019) between the ages of 9.5 and 25 years.

Eating disorders were classified as the child having reported at 24 years of age, one of the following eating disorder behaviours in the previous 12 months.

- exercised to lose weight OR avoid gaining weight, even when sick or injured;
- exercising to lose weight OR avoid gaining weight had made their daily routine made difficult;
- fasted OR took medications to lose weight OR avoid gaining weight;
- threw up OR took laxatives to lose weight OR avoid gaining weight;
- ever felt their eating was out of control OR couldn’t stop eating even if wanted to, AND they had gone on an eating binge.

#### 2.3.2. Physical health

**2.3.2.1. Health: asthma, diabetes and hypertension.** Physical health outcomes for asthma, diabetes and hypertension were classified as the child or young person having had or been or treated for asthma (at 16.5–22 years), had diabetes (at 17 or 24 years), or ever had, been treated for, or diagnosed with hypertension (reported at 17 or 22 years).

**2.3.2.2. Risky sexual behaviour.** Risky sexual behaviour (reported at 12.5, 13.5, 15.5 and 17.5 years), was defined as a report of any of the following in the previous 12 months: sexual intercourse with another young person under the age of 16 years; sexual intercourse having taken

place with at least three different partners; a condom having not been used on the most recent occasion of sexual intercourse.

### 2.3.3. Substance use and abuse

**2.3.3.1. Smoking (any/heavy).** Moderate to very high degree of nicotine dependence (reported at 17.5, 20, 22 and 24 years), was defined as a score greater than 4 on the Fagerström Test for Nicotine Dependence (FTND) scale (Kennedy et al., 2017). The FTND is a widely used measure of nicotine dependence, which despite recognised limitations (Korte et al., 2013), has been used in previously published ALSPAC studies (Kennedy et al., 2017). By restricting the interpretation of data for this measure to a “moderate, to very high degree of nicotine dependence” threshold, the potential impact of these limitations was minimised.

**2.3.3.2. Alcohol - heavy drinking.** Both the AUDIT and DSM-5 measures of alcohol use disorder have been confirmed to be valid and reliable tools in the detection of hazardous alcohol consumption and dependence (Bohn et al., 1995; Mannes et al., 2021). Heavy drinking was defined as either.

- a score greater than 8 (hazardous, harmful or high-risk alcohol consumption) on the 10-item Alcohol Use Disorders Identification Test (AUDIT) (Babor et al., 2001), as reported at 17.5 or 20 years of age;
- a score of at least 2 (mild, moderate, or severe disorder) on the DSM5 (Diagnostic and Statistical Manual of Mental Disorders V) scale (Houtepen et al., 2018), at the ages of 22 or 24 years;

**2.3.3.3. Drug use.** Drug use (reported at 17, 22 and 24 years of age) was defined as either.

- the use of illegal drugs (cocaine, amphetamines, inhalants, sedatives, hallucinogens, or opioids) within the previous 12 months;
- a score of 1 or greater in the Cannabis Abuse Screening Test (problem cannabis use as indicated by a response of ‘fairly often’ or ‘very often’ to any of the 6 test items);

### 2.3.4. Economic and social outcomes

**2.3.4.1. Employment: earnings and likelihood.** If the participant was in paid employment, their total monthly take-home pay was derived from ordered categorical variables as reported at 18, 20, 22, 23 or 25 years of age. For example, at age 23, available categories for monthly take-home pay, were: £0, Not doing paid work; £1 - £499; £500 - £999; £1000 - £1499; £1500 - £1999; £2000 - £2499; £2500 - £2999; £3000 and above. Their pay was then assumed to be the category mid-point value, rounded up to the nearest pound. If they reported the highest pay category (£3000 and above), their pay was assumed to be £250 greater than the lower boundary value for this category (e.g., £3250).

A binary variable for NEET (not in education, employment or training status) (Hammerton et al., 2019), was derived from a self-report questionnaire taken at age 22 years.

**2.3.4.2. Problem gambling.** Moderate or problem gambling at the age of 20 years was defined as a score of 3 or greater (moderate or problem gambler) on the Problem Gambling Severity Index (4-level), a measure which assessed gambling behaviours and their impact over the previous 12 months (Emond et al., 2020).

**2.3.4.3. Social welfare use.** Social welfare use (at either 20 or 25 years of age) was defined as a report of claiming state benefits or tax credits (including state pension, allowances, child benefit or National Insurance credits) within the previous week.

### 2.3.5. Criminal justice

**2.3.5.1. Criminal and antisocial behaviour.** A binary variable for criminal and antisocial behaviour was created for the child ever having reported the following (at 17 or 24 years of age).

- a fixed penalty notice by the police;
- an official police caution;
- a fine from the Court;
- an antisocial behaviour/community behaviour/Community Service Order;
- a police charge for committing a crime or being on trial for something they had done;
- time in a Secure Unit, Young Offenders Institution or prison;

**2.3.5.2. IPV as a young person, perpetration (G1 child).** Perpetration of intimate partner violence as a young person (IPV as a YP), was defined as the reporting of physical or emotional abuse, or controlling behaviour perpetrated by the YP (G1 child) towards a partner, with whom they are in a relationship. Questions were presented at 22 years and structured to discern the age window in which the reported outcome occurred (before the age of 18 years, between 18 and 21 years, or across both age groups) (Houtepen et al., 2018).

### 2.4. Statistical analysis

#### 2.4.1. Missing data and imputation

Those subject to greater deprivation may be more likely to have missing data on average, resulting in underestimation of exposure prevalences and selection bias (Howe et al., 2013). To address this, multiple imputation models using chained equations (MICE), incorporating auxiliary variables associated with missingness (sociodemographic indicators and adversity exposure), were employed to impute missing values for the exposure and covariate variables relevant to this study. The imputation models were based upon those reported by Houtepen et al. (2018), amended as required for incorporation of additional variables (for outcome and regression modelling) required for this study. Imputation was performed separately for male and female datasets, to allow for accommodation of sex-based interactions within the data, and to address the risk of bias from pooling information across the total sample. The number of imputations (M) required to achieve analysis reproducibility, was determined using a rule of thumb calculation ( $M \geq 100 \times \text{fraction of missing information}$ ) (White et al., 2011). 90 imputations were performed per dataset (30 iterations per imputation), based upon FMI estimate ranges of 0.01–0.55 for the separate ACE exposure variables (including CM and parental DVA), and 0.39 to 0.78 for individual outcome variables. Where appropriate, binary, ordered or multinomial logistic regression distributions were used for categorical variables, with linear regression or predictive mean matching used for continuous variables. From the derived imputations, parameter standard errors were subsequently pooled to a single estimate by application of Rubin’s “combination rules” (White et al., 2011).

#### 2.4.2. Statistical modelling

Analysis of the exposure-outcome relationships to be studied (CM and/or parental DVA with either health, economic or social outcomes), requires statistical modelling to account for the numerous complex relationships between exposure, outcome, and multiple sociodemographic variables (e.g., ethnicity, deprivation, maternal age, household education) that may influence any observed effect between the two.

Specification of each model was therefore optimised using the directed acyclic graph (DAG) approach (Austin et al., 2019). Using the Dagitty application (<http://www.dagitty.net/>) a DAG (network of causal pathways) was constructed for each scenario, based upon variables related to either the exposure and/or outcome, or other relevant

variables (e.g., potential mediators). From the completed DAG, causal and biasing pathways are highlighted, thus identifying potential sources of bias (e.g., via confounding) that could result from inclusion of specific variables in the relevant regression model. A minimal adjustment set of controlling variables can then be identified, minimising the potential for residual bias or the underestimation of the association between exposure and outcome, through over-specification of the regression model.

For the exposure-outcome scenarios in this study, DAGs were constructed based upon previously published literature, and reviewed in consultation with clinical experts (Appendix D). Owing to the high complexity of the causal and temporal relationships between the ACE variables available for inclusion in the regression models, a pragmatic decision was taken limit inclusion to the variables for social class and IPV as a YP individually when drafting the DAGs. The minimally sufficient covariate sets identified for the respective exposure-outcome regression models are detailed in Table 3. For the regression analyses themselves, logistic regression for binary (yes/no) outcomes and linear regression for the monthly earnings outcomes (ordered categorical variables) were used.

Regression results are reported as marginal effects – defined as the absolute difference in the probability of the specified outcome for children reporting exposure, relative to those reporting that exposure did not occur (e.g., children reporting childhood physical abuse vs children reporting that childhood physical abuse did not occur).

### 2.5. Software used

Estimation of exposures, outcomes and analyses of marginal effects were performed using the R statistical software platform version 3.6.3, and Stata/IC version 14.2. The code is available on request.

## 3. Results

### 3.1. Sample characteristics

Sample sociodemographic characteristics including those in minimum adjustment set variables for the regression analyses, are presented in Table 4. Missing data for sociodemographic characteristics in the total ALSPAC population ranged between 20.6% (social class) to 67.8% (sexual orientation), and between 1.2% (highest maternal qualification, females) to 42.7% (deprivation, females) for the study population.

### 3.2. Total exposure prevalence estimates

The prevalence of exposure to any form of CM and/or parental DVA in the study sample was 49.0% for males (95% confidence interval [CI] 47.0%–52.9%) and 49.1% for females (95% CI 47.2%–51.0%) (Table 5).

**Table 3**

Minimally sufficient adjustment variable sets for marginal effects regression models for the total effect of CM health, economic and social outcomes.

Outcome type Controlling Variable	Health outcomes			Economic and social outcomes		
	Exposure type			CM	Parental DVA	Co-occurring CM and parental DVA
	CM	Parental DVA	Co-occurring CM and parental DVA			
Ethnicity	X		X	X	X	X
Sexual orientation <sup>a</sup>	X	X	X	X	X	X
Deprivation	X	X	X	X	X	X
Subject to IPV as YP	X	X	X	X	X	X
Social class <sup>b</sup>		X	X			
Maternal pre-pregnancy BMI	X					
Maternal qualifications				X	X	X
Birth weight, G1 child		X				
Maternal age at birth of G1 child		X			X	

Abbreviations: BMI, body mass index; CM, child maltreatment; DVA, domestic violence and abuse; IPV, intimate partner violence; YP, young person.

<sup>a</sup> Not included for IPV perpetration outcomes, as insufficient members of subpopulations available for analysis.

<sup>b</sup> Social class of family and hence G1 child by inference. Derived from occupations of the G0 mother and G0 partner, using the 1991 UK Office of Population Censuses and Surveys classification (Houtepen et al., 2018).

This comprised approximately 42% of children exposed to any form of CM (males: 42.0% [95% CI 40.0%–43.9%]; females: 41.5% [95% CI 39.7%–43.3%]), overlapping with approximately 19.3% exposed to parental DVA, (19.5% [95% CI 18.0%–20.1%]; 19.2% [95% CI 17.7%–20.7%]).

### 3.3. Prevalence of co-occurring CM and parental DVA

Approximately 12.5% of children (males: 95% CI [11.2%–13.8%]; females 11.6% [95%CI, 10.4%–12.8%]) were estimated to be exposed to parental DVA co-occurring with any form of CM (Fig. 1; Appendix E). Individual forms of CM were estimated to co-occur with parental DVA at between 0.4% (sexual abuse, males: 0.4% [95% CI, 0.2%–0.6%]; females: 1.3% [95% CI 0.9%–1.8%]) to approximately 8% (emotional abuse, 7.9% [95% CI, 6.9%–8.9%]; 7.7% [95% CI 6.7%–8.7%])

As a proportion of households reporting parental DVA, co-occurring CM was rarest for sexual abuse (2.1% for males, 6.8% for females), and ranged from 19.4% (emotional abuse) to 40.5% (emotional abuse) for other forms of CM. For households reporting CM, between 21% (emotional abuse) and 42% (emotional abuse) reported co-occurring parental DVA.

### 3.4. Outcomes: prevalences and marginal effects

Outcome prevalences and rates of missing data for the ALSPAC G1 child cohort and the imputed dataset, are reported in Appendix F. The marginal effects of exposure on the risk of adverse health, economic and social outcomes (adjusted regression models using imputed data [n = 6252]), are summarised in Figs. 2 and 3. Full results for all models, including unadjusted regressions and models excluding a potential collider (IPV as YP), are tabulated in Appendices G, H and I.

The regression analyses did not identify and sex-based differences in exposure or outcomes, with the exception of exposure to sexual abuse (Appendix E), and the risk of criminal justice system involvement, which was higher for males compared to females exposed to either any form of CM, or any form of CM and/or parental DVA (Sections 3.4.1 and 3.4.3).

#### 3.4.1. Exposure to any form of CM

When exposed to any form of CM (physical abuse, sexual abuse, emotional abuse or emotional abuse) children had a higher risk of illegal drug use (3.8% males;  $p \leq 0.05$ , 3.6% females;  $p \leq 0.05$ ), anxiety 2.7%;  $p \leq 0.05$ , 4.2%;  $p \leq 0.05$ ), eating disorders (4.4%;  $p \leq 0.05$ , 4.2%;  $p \leq 0.05$ ) depression (8.8%;  $p \leq 0.001$ , 10.2%;  $p \leq 0.001$ ), excessive gambling (4.5%;  $p \leq 0.05$ ), 3.3%;  $p \leq 0.05$ ) and perpetration of IPV (5.2%;  $p \leq 0.001$ , both males and females). Males also had an increased risk of being involved with the criminal justice system (1.9%;  $p \leq 0.05$ ). Exposed children were also more likely to have NEET status (males:

**Table 4**  
Study sample missing data and sociodemographic characteristics, by sex.

Characteristic	ALSPAC study sample N (% of completed responses)		Imputed dataset <sup>†</sup> % (95% CI)	
	Observations (% of total)		Total 6252 (100)	
	Male 3018 (48.3)	Female 3234 (51.7)	Male 3018 (48.3)	Female 3234 (51.7)
<b>Ethnicity</b>				
White	2894 (97.3)	3042 (96.8)	97.3 (96.7–97.9)	96.7 (96.0–97.3)
Non-white	79 (2.7)	102 (3.2)	2.7 (2.1–3.3)	3.3 (2.7–3.9)
Missing (% of ALSPAC total)	45 (1.5)	90 (2.8)	–	–
<b>Sexual orientation</b>				
Heterosexual	1654 (91.4)	1827 (86.2)	91.4 (90.2–92.6)	86.2 (84.8–87.6)
Bisexual	135 (7.5)	281 (13.3)	7.4 (6.3–8.6)	13.3 (11.9–14.7)
Homosexual	21 (1.2)	11 (0.5)	1.1 (0.6–1.6)	0.5 (0.2–0.8)
Missing (% of ALSPAC total)	1208 (40.0)	1115 (34.5)	–	–
<b>Social class</b>				
I – Professional	397 (13.5)	385 (12.3)	13.4 (12.2–14.6)	12.2 (11.0–13.3)
II – Managerial and technical	1301 (44.1)	1385 (44.1)	44.0 (42.2–45.78)	43.8 (42.1–45.6)
IIINM – Skilled non-manual	833 (28.3)	900 (28.7)	28.4 (26.7–30.0)	28.7 (27.1–30.2)
IIIM – Skilled manual	288 (9.8)	323 (10.3)	9.8 (8.8–10.9)	10.4 (9.3–11.5)
IV – Partly skilled	112 (3.8)	121 (3.9)	3.8 (3.1–4.5)	4.0 (3.3–4.7)
V – Unskilled	16 (0.5)	26 (0.8)	0.5 (0.3–0.8)	0.9 (0.5–1.2)
Missing (% of ALSPAC total)	71 (2.4)	94 (2.9)	–	–
<b>Highest Maternal Qualification</b>				
CSE	307 (10.3)	358 (11.3)	10.3 (9.2–11.4)	11.5 (10.3–12.6)
Vocational	245 (8.2)	235 (7.4)	8.2 (7.2–9.2)	7.5 (6.5–8.4)
O Level	1044 (35.0)	1111 (35.0)	35.0 (33.3–36.7)	35.1 (33.4–36.7)
A Level	833 (27.9)	876 (27.6)	27.9 (26.3–29.5)	27.5 (25.9–29.1)
Degree	552 (18.5)	592 (18.7)	18.5 (17.1–19.9)	18.5 (17.2–19.8)
Missing (% of ALSPAC total)	37 (1.2)	62 (1.9)	–	–
<b>Deprivation</b>				
Least deprived	568 (32.6)	621 (33.5)	33.0 (30.9–35.1)	33.6 (31.7–35.5)
2	330 (18.9)	318 (17.2)	18.8 (17.2–20.5)	17.1 (15.5–18.7)
3	299 (17.1)	304 (16.4)	17.0 (15.4–18.7)	16.4 (14.8–18.0)
4	284 (16.3)	314 (16.9)	16.2 (14.6–17.8)	16.9 (15.3–18.5)
Most deprived	264 (15.1)	297 (16.0)	14.9 (13.4–16.4)	16.0 (14.5–17.4)
Missing (% of ALSPAC total)	1273 (42.2)	1380 (42.7)	–	–
<b>Characteristic (Non-missing; total sample n = 6252)</b>	Mean (SD)	Mean (SD)	Mean (95% CI)	Mean (95% CI)
Maternal pre-pregnancy BMI (n = 5794)	22.9 (3.7)	22.8 (3.6)	22.4 (±0.1)	22.3 (±0.1)
Birth weight, G1 child (n = 6169)	3.52 kg (0.49 kg)	3.40 kg (0.44 kg)	3.51 kg (±0.02)	3.40 kg (±0.02)
Maternal age at birth of G1 child (n = 6242)	29.5y (4.4y)	29.2y (4.3y)	29.2y (±0.2y)	29.2y (±0.2y)

Abbreviations: BMI, Body Mass Index; CM, child maltreatment; DVA, domestic violence and abuse; kg, kilograms; y, years.

5.6%;  $p \leq 0.00$ ; females: 4.8%;  $p \leq 0.001$ ), and require social welfare support (8.0%;  $p \leq 0.001$ ; 8.1%;  $p \leq 0.001$ ). The estimated average take-home pay for exposed children was reduced by £96.90 per month (95% CI, £40.85–£152.92), relative to the mean earnings of £1578 for unexposed children at 25 years of age.

#### 3.4.2. Exposure to parental DVA

Children exposed to parental DVA had an increased risk of alcohol misuse (males: 6.2%;  $p \leq 0.05$ , females: 7.0%;  $p \leq 0.05$ ). Those reporting awareness of parental DVA (variable YPA5050), had a higher risk of drug use, risky sexual behaviour, and perpetration of IPV as a YP towards their own partner(s) ( $p \leq 0.05$ ; Appendix G).

#### 3.4.3. Exposure to any form of CM and/or parental DVA

Exposure to CM and/or parental DVA resulted in a higher risk of illegal drug use (males: 5.4% [95% CI, 2.2%–8.5%], females: 5.1% [95% CI, 2.1%–8.2%]), anxiety (3.0% [95% CI, 1.1%–5.0%], 4.6% [95% CI, 1.7%–7.6%]) eating disorders (3.9% [95% CI, 0.3%–7.5%], 3.8% [95% CI, 3.0%–7.2%]), depression (9.2% [95% CI, 6.4%–11.9%], 10.6% [95% CI, 7.5%–13.8%]), engaging in risky sexual behaviour (3.8% [95% CI, 0.8%–6.7%], 4.2% [95% CI, 0.9%–7.2%]), heavy smoking (8.4% [95% CI, 2.5%–14.2%], 6.9% [95% CI, 2.0%–11.8%]), ad perpetrate IPV as a YP (5.4% [95% CI, 2.4%–8.4%], 5.5% [95% CI, 2.5%–8.5%]), relative to children unexposed to CM or DVA (Fig. 2). Males also had increased risk of being involved with the criminal justice system (1.9% [95% CI, 0.1%–3.7%]). Those exposed in childhood were also more likely to be to have NEET status (6.3% [95% CI, 3.6%–8.9%], 5.4% [95% CI, 3.2%–7.7%]), and more likely to require social welfare support (7.1% [95% CI, 3.5%–10.7%], 7.2% [95% CI, 3.7%–10.6%]). By 25 years of age, where in employment, this group earned £88.77 (95% CI, £39.57–£137.96) less than the mean monthly earnings, £1575.

As a subset of this group, children with exposure to a co-occurrence of CM (any form) with parental DVA resulted in increased risk of illegal drug use, heavy smoking, anxiety, depression, and perpetration of IPV as a YP, relative to those exposed to neither ( $p \leq 0.01$ ). They were also more likely to have NEET status, and require social welfare, with take-home pay reduced by relative to the monthly mean, at 25 years of age ( $p \leq 0.01$ , Appendix G).

Where exposure to CM and/or awareness of parental DVA (YPA5050) was reported, these children had increased risk ( $p \leq 0.05$ ) of illegal drug use, heavy smoking, anxiety, eating disorders, and depression, relative to those reporting neither. Exposed children were also more likely to engage in risky sexual behaviour, perpetrate IPV toward a partner, become involved with the criminal justice system, and gamble excessively. They were also more likely to have NEET status receive social welfare benefits, and at 25 years of age have monthly take-home pay £106 lower than the mean of £1581 (Appendix G).

#### 3.4.4. Individual CM co-occurring with parental DVA

Co-occurring emotional abuse and parental DVA, resulted in a higher risk of illegal drug use (10.0% [95% CI, 3.5%–16.6%], 9.8% [95% CI, 3.2%–16.4%]), heavy smoking (15.4% [95% CI, 4.8%–25.9%], 13.2% [95% CI, 3.8%–22.7%]), anxiety (5.5% [95% CI, 1.3%–9.7%], 8.1% [95% CI, 2.1%–14.2%]), depression (13.7% [95% CI, 7.4%–19.9%], 15.1% [95% CI, 8.7%–21.6%]), and perpetration of IPV as a YP (9.3% [95% CI, 3.4%–15.2%], 9.4% [95% CI, 3.4%–15.4%]), compared to those unexposed to neither CM nor IPV. They were more likely to have NEET status (8.8% [95% CI, 2.9%–14.7%], 7.7% [95% CI, 2.5%–12.9%]) and receive social welfare benefits (11.1%, both males [95% CI, 3.8%–18.3%] and females [95% CI, 3.9%–18.4%]), with monthly take-home pay reduced by £134.79 [95% CI, £38.09–£231.49] relative to the mean expected earnings (£1548) at 25 years of age.

Co-occurring physical abuse, emotional abuse and parental DVA,

**Table 5**  
Prevalence and missing data estimates, for exposures to CM and/or parental DVA.

Exposure	Study sample (ALSPAC)				Houtepen et al. (2018)		
	Pre-imputation N (%)	Pre-imputation N (%)	Pre-imputation N (%)	Imputed dataset <sup>a</sup> % (95% CI)		ACE-derived group: pre-imputation	Imputed dataset % N (%)
	Observations N (%)			Total 6252 (100)		Total	Total
	Total	Male	Female	Male 3018 (48.3)	Female 3234 (51.7)		12,087 (100)
Any form of CM							
Yes	2282 (49.0)	1078 (50.0)	1204 (48.2)	42.0	41.5	ND	ND
No	2373 (51.0)	1078 (50.0)	1295 (51.8)	(40.0–43.9)	(39.7–43.3)		
Missing (% of ALSPAC total)	1597 (25.5)	862 (28.6)	735 (22.7)				
Parental DVA							
Yes	1026 (18.7)	512 (18.9)	514 (18.4)	19.5	19.2	6419 (19.1)	24.1
No	4474 (81.3)	2200 (81.1)	2274 (81.6)	(18.0–20.1)	(17.7–20.7)		
Missing (% of ALSPAC total)	752 (12.0)	306 (10.1)	446 (13.8)				
Any CM and/or parental DVA							
Yes	2733 (58.3)	1299 (58.8)	1434 (57.8)	49.0	49.1	ND	ND
No	1956 (41.7)	909 (41.2)	1047 (42.2)	(47.0–52.9)	(47.2–51.0)		
Missing (% of ALSPAC total)	1563 (25.0)	810 (26.8)	753 (23.3)				
Parental DVA (YPA5050) <sup>b</sup>							
Yes	134 (4.8)	41 (4.1)	93 (5.3)	4.3 (3.1–5.4)	5.7 (4.7–6.7)	ND	ND
No	2636 (95.2)	968 (95.9)	1668 (94.7)				
Missing (% of ALSPAC total)	3482 (55.7)	2009 (66.6)	1473 (45.5)				
Any CM and/or parental DVA (YPA5050) <sup>b</sup>							
Yes	2318 (66.0)	1089 (71.2)	1229 (61.9)	43.2	43.3	ND	ND
No	1195 (34.0)	440 (28.8)	755 (38.1)	(41.2–45.2)	(41.4–45.2)		
Missing (% of ALSPAC total)	2739 (43.8)	1489 (49.3)	1250 (38.7)				
Individual exposures							
Physical abuse							
Yes	891 (15.2)	397 (14.0)	494 (18.0)	14.0	16.5	6447 (14.9)	17.6
No	4959 (84.8)	2433 (86.0)	2256 (82.0)	(12.7–15.2)	(15.2–17.8)		
Missing (% of ALSPAC total)	402 (6.4)	188 (6.2)	214 (6.6)				
Sexual abuse							
Yes	193 (3.1)	35 (1.2)	158 (4.9)	1.2 (0.8–1.6)	5.0 (4.2–5.7)	9120 (2.8)	3.7
No	5983 (96.9)	2941 (98.8)	3042 (95.1)				
Missing (% of ALSPAC total)	76 (1.2)	42 (1.4)	34 (1.1)				
Emotional abuse							
Yes	1140 (19.1)	543 (18.7)	597 (19.4)	18.7	19.5	6921 (19.3)	22.5
No	4838 (80.9)	2361 (81.3)	2477 (80.6)	(17.3–20.1)	(18.1–20.9)		
Missing (% of ALSPAC total)	274 (4.4)	114 (3.8)	160 (4.9)				
Emotional neglect							
Yes	873 (19.2)	449 (21.4)	424 (17.3)	21.7	17.6	5716 (19.3)	22.1
No	3670 (80.8)	1649 (78.6)	2021 (82.7)	(19.9–23.4)	(16.1–19.1)		
Missing (% of ALSPAC total)	1709 (27.3)	920 (30.5)	789 (24.4)				
Subject to IPV as a YP							
Yes	292 (10.0)	163 (11.9)	129 (8.3)	11.7	8.0 (6.8–9.2)	4003 (10.8)	13.9
No	2636 (90)	1203 (88.1)	1433 (91.7)	(10.2–13.2)			
Missing (% of ALSPAC total)	3324 (53.2)	1652 (54.7)	1672 (51.7)				

Abbreviations: CM, child maltreatment; DVA, domestic violence and abuse; IPV, intimate partner violence; ND, Not done; YP, young person.

<sup>a</sup> Total observations = 6252 (3018 male, 3234 female).

<sup>b</sup> Variable YPA5050: Child report of awareness of parental DVA during childhood.

resulted in an increased risk of illegal drug use (males: 10.0% [95% CI, 1.0%–19.9%], females: 9.8% [95% CI, 7.0%–18.8%]), heavy smoking (17.4% [95% CI, 3.3%–31.5%], 15.3% [95% CI, 2.2%–28.4%]), anxiety (6.4% [95% CI, 5.0%–12.4%], 9.4% [95% CI, 1.1%–17.7%]), depression (19.0% [95% CI, 10.5%–27.6%], 20.4% [95% CI, 12.1%–28.8%]), perpetration of IPV as a YP (12.4% [95% CI, 4.5%–20.4%], both males and females), NEET status (11.0% [95% CI, 2.6%–19.4%], 9.7% [95% CI, 2.2%–17.2%]), and need of social welfare support (16.0%, both males [95% CI, 6.8%–25.2%] and females [95% CI, 6.8%–25.1%]). At

25 years, their monthly take-home pay was also £222.92 (95% CI, £91.39–£354.44) lower than the mean (£1536).

The outcomes for these two co-occurrence scenarios were tested for statistical difference of the mean estimates relative to CM exposure alone. No evidence was found however, for difference in outcome mean estimates under either scenario (data not shown. Significance threshold, p-value  $\leq 0.05$ ).

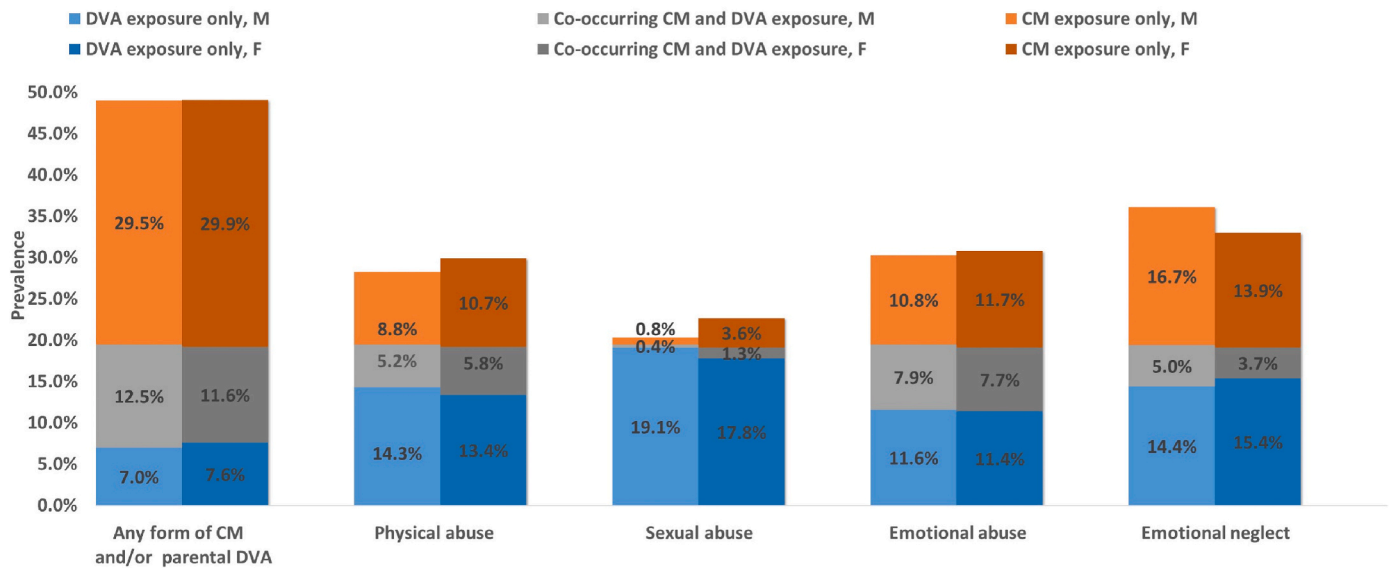


Fig. 1. Prevalence of exposures to CM only, parental DVA only, and co-occurring CM and parental DVA, by sex. Abbreviations: CM, child maltreatment; DVA, domestic violence and abuse, F, female; M, male.

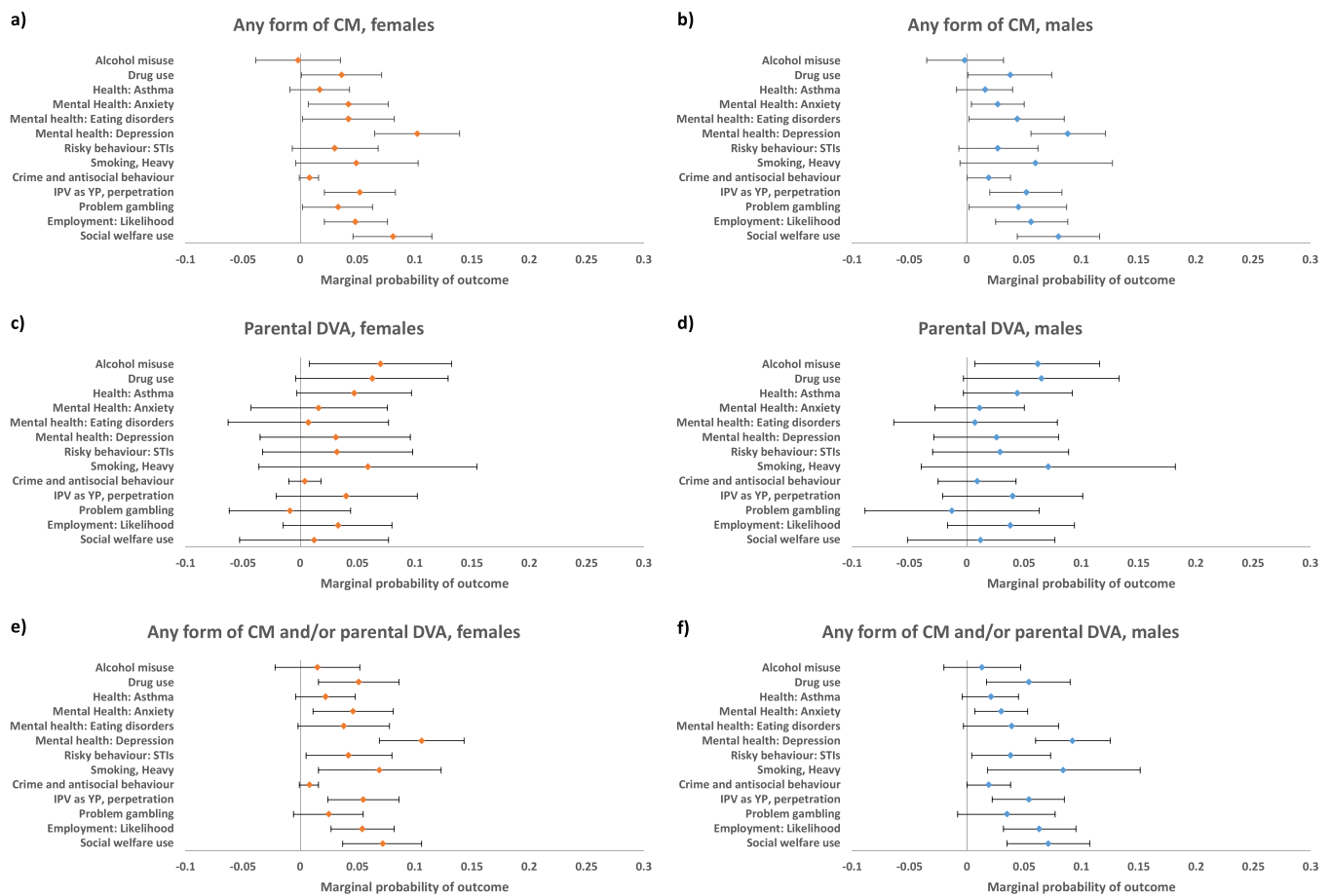
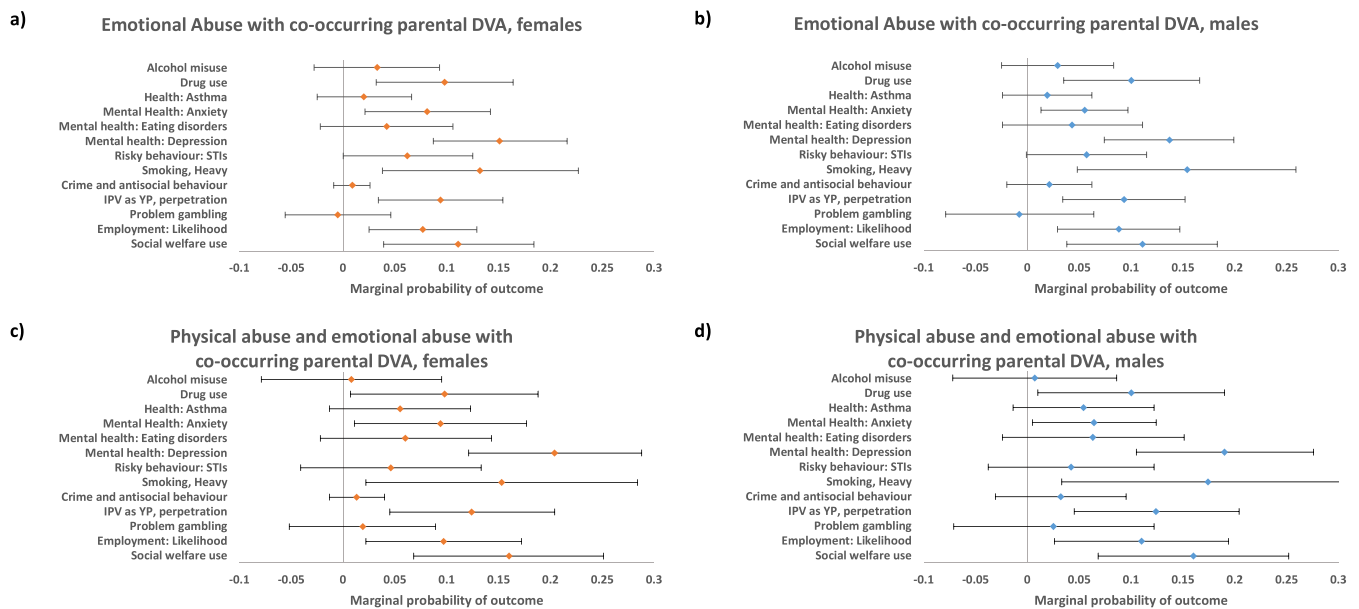


Fig. 2. Marginal probabilities of health and economic outcomes for exposure to child maltreatment and/or parental DVA, by sex. Adjusted analyses: (a, b) controlled for the minimally sufficient adjustment set variables as listed in Table 3, and interactions with exposure to parental DVA; (c, d) controlled for the minimally sufficient adjustment set variables as listed in Table 3, and interactions with exposure to any form of CM; (e, f) controlled for the minimally sufficient adjustment set variables as listed in Table 3.

Note: Error bars, 95%CI. Abbreviations: DVA, domestic violence and abuse; IPV, intimate partner violence; STIs, sexually transmitted infections; YP, young person.





**Fig. 3.** Marginal probabilities of health and economic outcomes for co-occurring exposures, by sex. Adjusted analyses: controlled for the minimally sufficient adjustment set variables as listed in Table 3, interactions with exposure to CM only, and parental DVA only. Note: Error bars, 95%CI. Abbreviations: DVA, domestic violence and abuse; IPV, intimate partner violence; STIs, sexually transmitted infections; YP, young person.

3.4.5. Outcomes where no effects observed for any scenario

Despite previous studies identifying CM being associated with increased risk of asthma, diabetes or cardiovascular disease (Liveri et al., 2023; Shields et al., 2016), little to no evidence for this was found in our study. There remains however, the potential for these outcomes to manifest in later stages of adulthood, beyond the current timeframe of the ASLPAC study.

3.4.6. Individual CM exposures

For context, we report the analyses for children exposed to individual forms of CM (Appendix J). These children had a range of poorer life outcomes relative to unexposed children, the profiles of which were unique to each type of exposure.

4. Discussion

In this study, we have produced a detailed descriptive analysis of childhood exposure to CM and/or parental DVA for a child cohort derived from a UK-based longitudinal study. Further to prevalence estimates of co-occurring and individual exposures, we have systematically constructed models across different exposure scenarios for the estimation of causal associations across a range of health, social and economic outcomes.

4.1. Prevalence of CM and/or parental DVA

Approximately one in every two children was estimated to have been exposed to CM and/or parental DVA at some point during childhood. Despite comparable prevalence estimates between the pre-imputation datasets reported in this study and in Houtepen et al. (2018) for the individual CM and parental DVA exposures, those for the imputed dataset were reduced (by between 13% and 19%) relative to analogous estimates in the Houtepen study. The differences observed may be reflective of adapting imputation model specifications for the accommodation of the outcome variables used in this study. Unfortunately, without measures of variance for the point prevalence estimates in the Houtepen study (these data were not reported in the published paper), it is not possible to draw any greater inference on the significance of

differences between the two. We do note however, that the prevalence estimates in this study remain comparable to those from other published studies (Bellis et al., 2014; Leung et al., 2016). We would thus argue that any effects in relation to prevalence estimates in this study have been minimised, whilst maximising the ability to estimate associations between exposures and outcomes in the subsequent analyses.

The estimate of CM co-occurring in almost two thirds of households reporting DVA is at the top end of the range of previous estimates reported (Edleson, 1999; Herrenkohl et al., 2008; Walby & Olive, 2014). Together with the findings that parental DVA co-occurs in approximately one third of CM cases these findings are consistent with hypotheses for the manifestation of co-occurrence within the same household (Jouriles et al., 2008).

4.2. Effects of exposure to parental DVA

To date, evidence regarding the effects of exposure to parental DVA has been conflicting, with the lack of prospective studies central to this issue. Cross-sectional evidence suggests that parental DVA exposure alone is correlated with increased risk-taking behaviours (alcohol abuse, illegal drug use and risky sexual activity) (Bair-Merritt et al., 2006). Conversely, studies have indicated that parental exposure itself may not be predictive of adverse outcomes, with co-occurring CM accounting for the observed effects.

Our study supports the latter finding, in so far as little evidence of adverse effects (alcohol misuse) from parental DVA alone, is seen. However, when the sample is narrowed to children who specifically report awareness of parental DVA, a wider range of observed effects is seen – drug use, risky sexual activity, and most notably the risk of the child going on to perpetrate IPV themselves. The question remains however, whether this is principally the effect associated with a child’s awareness of DVA in the household, or whether it is symptomatic of trauma induced by witnessing a more extreme form of abuse.

4.3. Effects of co-occurring CM and parental DVA

Given evidence for dose-response effects from overlapping exposures (Wood & Sommers, 2011), co-occurrence scenarios of interest were

analysed. Point estimates for marginal effects of the most highly correlated co-occurrence scenario (emotional abuse with parental DVA), and the most highly correlated CM exposures (emotional abuse and physical abuse) were higher for marginal effects on outcomes in the co-occurrence scenarios compared to the CM-only scenarios. These differences could not however, be confirmed by our statistical tests – due to wide variation observed around the marginal effect point estimates. This is most likely a consequence of smaller sample sizes for the given scenarios, coupled with heterogeneity in resilience to adversity amongst the exposed populations (Howarth et al., 2016). Despite the richness of the longitudinal ALSPAC data this is a further indication of the difficulty of disentangling the effects of different exposure combinations.

#### 4.4. Effects of exposure to CM and/or parental DVA

It could be argued that the study group exposed to any form of CM and/or parental DVA, with their varied combinations of individual and co-occurring exposures, may have similar aggregate characteristics and outcomes to the child population who enter child and social services with roles in dealing with family violence. Being able to accurately model the exposure and outcome risks for such a heterogeneous group would have value in evaluating the effectiveness of interventions. As a group, their outlook is poorer across mental health outcomes, risk-taking behaviours, IPV perpetration, and all economic outcomes measured (NEET status, social welfare use, and monthly earnings). This overall impact is greater than is observed for individual exposures, and is likely underpinned by cases of polyvictimisation within the group (Radford et al., 2013).

A key focus for researchers of childhood adversity is the extent to which intergenerational cycle of family violence may be perpetuated. Drivers for recurring patterns of abuse and neglect are multifactorial, emanating from the interplay of both “nurture” (e.g., parental behaviours, social environment) and “nature” (i.e., biology), and the timing of exposure child encounters growing up (Van Wert et al., 2019). Here we provide evidence that children entering young adulthood, who were exposed to physical abuse, emotional abuse or report awareness of parental DVA, are at greater risk of exhibiting IPV towards their own romantic partners. This increased risk is consistent with evidence for survivors not only being more likely to perpetrate abuse against their own children (Gilbert & Lacey, 2021), but becoming trapped in a cycle of abusive relationships in adulthood (James, 2020; Lünemann et al., 2019).

#### 4.5. Implications for treatment of CM and DVA

A lack of high-quality evidence on the complexities of CM and parental DVA exposures restricts the ability of service providers to accurately assess the risks of individual or co-occurring exposures. Failure to adequately account for the relative impacts of co-occurring CM and parental DVA, may lead to researchers and practitioners underestimating the overall risk of problems later in life among exposed children and young people. The information shortage also places a limitation on the understanding family violence intervention effectiveness, making professional contacts – particularly primary health care clinicians – reluctant to make referrals as a result, (Gilbert, Kemp, et al., 2009). This factor is particularly important in the context of evidence showing that interventions used in child abuse prevention, can have their effectiveness limited by co-occurring exposure to DVA (Jouriles et al., 2008). Given that family violence is underreported, particularly in primary care (Feder et al., 2011), many opportunities for timely intervention are being missed and it is vital therefore, that with the help of these findings this evidence gap is closed.

#### 4.6. Strengths and limitations

The key strength of this study, is in the use of an exceptionally rich

source of longitudinal data for both exposures and outcomes, measured across multiple time points, and incorporating retrospective and contemporaneous reports from both children and adults. Where available, preference was given to outcome measures previously assessed for their validity and reliability in the detection of, or association with adverse outcomes. The study is further strengthened by the rationalised approach to regression model specification across multiple interrelated socioeconomic factors, minimising the potential for residual bias in estimation of exposure-outcome associations, and for underestimation of the same associations, through regression model over-specification.

We note a number of limitations however. More affluent groups, and those of White British ethnicity are over-represented in the ALSPAC child cohort meeting the eligibility criteria, relative to the national population. The findings in this study therefore, may not be generalisable for areas of the UK with differing socioeconomic profiles. Whilst the ALSPAC study is extremely rich in terms of scope and detail, the available data are also restricted to progression of survivors through to early adulthood. This limits the inferences that can be drawn on the duration of effects from childhood exposure, and it is thus not possible to determine whether additional adverse outcomes manifest in later years. As data for the outcomes of interest were typically collected at more than one time point during the study period, an “ever reported” approach was taken. Whilst this simplifies interpretation of the analysis, it does however require the assumption that single or multiple reports for a given exposure or outcome, or those of differing degrees of severity across the study period, carry the same weight. Where self-report measures were used, a potential for underreporting exists – particularly with regards to CM and parental DVA exposures or specific outcomes (e.g., illegal drug use, criminal and antisocial behaviour, perpetration of IPV as a YP), due to a reluctance to divulge or associated stigma.

To address missingness within the data, we adopted a transparent, pragmatic methodology for regression modelling, particularly in relation to potential colliders in what is a complex causal pathway network. Whilst the aim was to optimise models to derive robust estimates of the marginal effects on outcomes, there remains, the potential for residual bias. It is further recognised that survivors of CM and parental DVA exposure may yet experience outcomes beyond those included in this study. CM and parental DVA also tend to be secretive by their nature, and so accurate reporting may be affected by the issue of social stigma. In this study, we have identified outcomes for children reporting knowledge of parental violence in the home over and above that for parental-reported DVA. It should be noted however, that this exposure was based upon a single retrospective (“ever during childhood”), G1 child-reported question, and thus will be unable to resolve different severities of exposure, and may be subject to recall bias.

#### 4.7. Future work

The findings of this study provide a broad base for the future development of models for effectiveness evaluations of current and new interventions for abuse prevention and treatment. The ALSPAC study has provided a wealth of data for the G1 cohort entering young adulthood. Going forward, there is potential for work to track longer-term life outcomes for them and their children (the G2 generation), revealing more about the intergenerational nature of abuse, the duration of effects from exposure, as well as the development of those that occur in later life.

## 5. Conclusions

This study gives a detailed analysis of the extent to which children are exposed to CM and parental DVA, both separately and where they co-occur, together with an insight into the incremental effects that co-occurrence has on the life outcomes of those exposed. Our analysis provides extensive quantitative examination (from both aetiological, and child service provision viewpoints) of the effects of childhood

exposures to maltreatment, across outcomes covering physical and mental health, social, economic and criminal justice domains. Children exposed to CM and/or parental DVA experienced poorer physical and mental health, social, economic and criminal justice outcomes, than their unexposed peers, and in scenarios including awareness of parental violence children experienced poorer outcomes over and above parent-reported DVA. Notably, exposed children were more likely to progress to IPV perpetration in relationships of their own, highlighting the need for targeted early intervention plans for at-risk families and child survivors, to head off the intergenerational transmission of abuse. At all levels of the child protection system, policies sensitive to the patterns and effects of CM and parental DVA co-occurrence are required to improve the detection and treatment of exposure, whilst being mindful of the need to avoid the inherent risk of systemic discrimination against vulnerable groups.

#### Author statement

All authors contributed to the study across the ICMJE requirements 1–3, and all agree accountability as per requirement 4.

#### Funding

The UK Medical Research Council and Wellcome (Grant ref: 217065/Z/19/Z) and the University of Bristol provide core support for ALSPAC. A comprehensive list of grants funding is available on the ALSPAC website (<http://www.bristol.ac.uk/alspac/external/documents/grant-a-cknowledgements.pdf>). This study is funded by the National Institute for Health and Care Research (NIHR) Policy Research Programme through the Children and Families Policy Research Unit (funder reference: PR-PRU-1217-21301; UCL award code: 177763). The views expressed are those of the authors and not necessarily those of the NIHR or the Department of Health and Social Care.

This publication is the work of the authors, who will serve as guarantors for the contents of this paper. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

#### Ethics policies

Ethical approval for the study was obtained from the ALSPAC Ethics and Law Committee and the Local Research Ethics Committees (<http://www.bristol.ac.uk/alspac/research-%20ers/research-ethics/>). Informed consent for the use of data collected via questionnaires and clinics was obtained from participants following the recommendations of the ALSPAC Ethics and Law Committee at the time.

#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Data availability

The authors do not have permission to share data.

#### Acknowledgements

The authors would like to acknowledge the contributions of Abigail Fraser and Annie Herbert for their invaluable guidance on the ALSPAC dataset. We are extremely grateful to all the families who took part in this study, the midwives for their help in recruiting them, and the whole ALSPAC team, which includes interviewers, computer and laboratory technicians, clerical workers, research scientists, volunteers, managers, receptionists and nurses.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2023.101555>.

## References

- Austin, A. E., Desrosiers, T. A., & Shanahan, M. E. (2019). Directed acyclic graphs: An under-utilized tool for child maltreatment research. *Child Abuse & Neglect*, 91, 78–87. <https://doi.org/10.1016/j.chiabu.2019.02.011>
- Babor, T., Higgins-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). *The alcohol use disorders identification test: Guidelines for use in primary care*. Geneva: World Health Organization.
- Bair-Merritt, M. H., Blackstone, M., & Feudtner, C. (2006). Physical health outcomes of childhood exposure to intimate partner violence: A systematic review. In *Pediatrics*. <https://doi.org/10.1542/peds.2005-1473>
- Bellis, M. A., Hughes, K., Ford, K., Ramos Rodriguez, G., Sethi, D., & Passmore, J. (2019). Life course health consequences and associated annual costs of adverse childhood experiences across Europe and North America: A systematic review and meta-analysis. *The Lancet Public Health*, 4(10), e517–e528. [https://doi.org/10.1016/S2468-2667\(19\)30145-8](https://doi.org/10.1016/S2468-2667(19)30145-8)
- Bellis, M. A., Lowey, H., Leckenby, N., Hughes, K., & Harrison, D. (2014). Adverse childhood experiences: Retrospective study to determine their impact on adult health behaviours and health outcomes in a UK population. *Journal of Public Health*, 36(1), 81–91. <https://doi.org/10.1093/pubmed/ftd038>
- Bohn, M. J., Babor, T. F., & Kranzler, H. R. (1995). The alcohol use disorders identification test (AUDIT): Validation of a screening instrument for use in medical settings. *Journal of Studies on Alcohol*, 56(4), 423–432. <https://doi.org/10.15288/jsa.1995.56.423>
- Boyd, A., Golding, J., Macleod, J., Lawlor, D. A., Fraser, A., Henderson, J., Molloy, L., Ness, A., Ring, S., & Davey Smith, G. (2013). Cohort profile: The 'children of the 90s'—the index offspring of the avon longitudinal study of parents and children. *International Journal of Epidemiology*, 42(1), 111–127. <https://doi.org/10.1093/ije/dys064>
- Capron, L. E., Glover, V., Pearson, R. M., Evans, J., O'Connor, T. G., Stein, A., Murphy, S. E., & Ramchandani, P. G. (2015). Associations of maternal and paternal antenatal mood with offspring anxiety disorder at age 18 years. *Journal of Affective Disorders*, 187, 20–26. <https://doi.org/10.1016/j.jad.2015.08.012>
- Conti, G., Morris, S., Melnychuk, M., & Pizzo, E. (2017). *The economic cost of child maltreatment in the UK: A preliminary study*. NSPCC.
- Conti, G., Pizzo, E., Morris, S., & Melnychuk, M. (2021). The economic costs of child maltreatment in UK. *Health Economics*, 30(12), 3087–3105. <https://doi.org/10.1002/hec.4409>
- Edleson, J. L. (1999). The overlap between child maltreatment and woman battering. *Violence Against Women*, 5(2), 134–154. <https://doi.org/10.1177/107780129952003>
- Emond, A., Griffiths, M. D., & Hollén, L. (2020). Problem gambling in early adulthood: A population-based study. *International Journal of Mental Health and Addiction*. <https://doi.org/10.1007/s11469-020-00401-1>
- Feder, G., Davies, R. A., Baird, K., Dunne, D., Eldridge, S., Griffiths, C., Gregory, A., Howell, A., Johnson, M., Ramsay, J., Rutterford, C., & Sharp, D. (2011). Identification and referral to improve safety (IRIS) of women experiencing domestic violence with a primary care training and support programme: A cluster randomised controlled trial. *The Lancet*, 378(9805), 1788–1795. [https://doi.org/10.1016/S0140-6736\(11\)61179-3](https://doi.org/10.1016/S0140-6736(11)61179-3)
- Fraser, A., Macdonald-wallis, C., Tilling, K., Boyd, A., Golding, J., Davey smith, G., Henderson, J., Macleod, J., Molloy, L., Ness, A., Ring, S., Nelson, S. M., & Lawlor, D. A. (2013). Cohort profile: The avon longitudinal study of parents and children: ALSPAC mothers cohort. *International Journal of Epidemiology*, 42, 97–110. <https://doi.org/10.1093/ije/dys066>
- Gilbert, R., Kemp, A., Thoburn, J., Sidebotham, P., Radford, L., Glaser, D., & MacMillan, H. L. (2009). Recognising and responding to child maltreatment. *The Lancet*, 373(9658), 167–180. [https://doi.org/10.1016/S0140-6736\(08\)61707-9](https://doi.org/10.1016/S0140-6736(08)61707-9)
- Gilbert, R., & Lacey, R. (2021). Intergenerational transmission of child maltreatment. *The Lancet Public Health*, 6(7), e435–e436. [https://doi.org/10.1016/S2468-2667\(21\)00076-1](https://doi.org/10.1016/S2468-2667(21)00076-1)
- Gilbert, R., Widom, C. S., Browne, K., Fergusson, D., Webb, E., & Janson, S. (2009). Burden and consequences of child maltreatment in high-income countries. *The Lancet*, 373(9657), 68–81. [https://doi.org/10.1016/S0140-6736\(08\)61706-7](https://doi.org/10.1016/S0140-6736(08)61706-7)
- Grasso, D. J., Stover, C. S., & Whitaker, D. J. (2021). Introduction to the special issue on the intersection of intimate partner violence and child maltreatment. *Child Maltreatment*, 26(4), 351–355. <https://doi.org/10.1177/10775595211036411>
- Hammerton, G., Murray, J., Maughan, B., Barros, F. C., Gonçalves, H., Menezes, A. M. B., Wehrmeister, F. C., Hickman, M., & Heron, J. (2019). Childhood behavioural problems and adverse outcomes in early adulthood: A comparison of Brazilian and British birth cohorts. *Journal of Developmental and Life-Course Criminology*, 5(4), 517–535. <https://doi.org/10.1007/s40865-019-00126-3>
- Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, 42(2), 377–381. <https://doi.org/10.1016/j.jbi.2008.08.010>
- Herrenkohl, T. L., Sousa, C., Tajima, E. A., Herrenkohl, R. C., & Moylan, C. A. (2008). Intersection of child abuse and children's exposure to domestic violence. *Trauma, Violence, & Abuse*, 9(2), 84–99. <https://doi.org/10.1177/1524838008314797>

- Houtepen, L. C., Heron, J., Suderman, M. J., Tilling, K., & Howe, L. D. (2018). Adverse childhood experiences in the children of the avon longitudinal study of parents and children (ALSPAC). *Wellcome Open Research*, 3. <https://doi.org/10.12688/wellcomeopenres.14716.1>
- Howarth, E., Moore, T. H. M., Welton, N., Lewis, N., Stanley, N., Macmillan, H., Shaw, A., Hester, M., Bryden, P., & Feder, G. (2016). IMPROving outcomes for children exposed to domestic Violence (IMPROVE): An evidence synthesis. *Public Health Research*, 4(10). <https://doi.org/10.3310/phr04100>
- Howe, L. D., Tilling, K., Galobardes, B., & Lawlor, D. A. (2013). Loss to follow-up in cohort studies: Bias in estimates of socioeconomic inequalities. *Epidemiology*, 24(1). <https://doi.org/10.1093/epidem/kfs091>
- James, E. (2020). *Not just Collateral Damage: The hidden impact of domestic abuse on children*.
- Jouriles, E. N., McDonald, R., Smith Slep, A. M., Heyman, R. E., & Garrido, E. (2008). Child abuse in the context of domestic violence: Prevalence, explanations, and practice implications. In *Violence and victims*. <https://doi.org/10.1891/0886-6708.23.2.221>
- Kennedy, E., Heron, J., & Munafò, M. (2017). Substance use, criminal behaviour and psychiatric symptoms following childhood traumatic brain injury: Findings from the ALSPAC cohort. *European Child & Adolescent Psychiatry*. <https://doi.org/10.1007/s00787-017-0975-1>
- Korte, K. J., Capron, D. W., Zvolensky, M., & Schmidt, N. B. (2013). The Fagerström Test for Nicotine Dependence: Do revisions in the item scoring enhance the psychometric properties? *Addictive Behaviors*, 38(3), 1757–1763. <https://doi.org/10.1016/j.addbeh.2012.10.013>
- Kwong, A. (2019). *Examining the longitudinal nature of depressive symptoms in the Avon longitudinal study of parents and children (ALSPAC)*.
- Leung, J. P. K., Britton, A., & Bell, S. (2016). Adverse childhood experiences and alcohol consumption in midlife and early old-age. *Alcohol and Alcoholism*, 51(3), 331–338. <https://doi.org/10.1093/alcalc/agg125>
- Liveri, K., Dagla, M., Sarantaki, A., Orovou, E., & Antoniou, E. (2023). Abuse of girls during childhood and its impacts on the health of their adult lives: A systematic review. *Cureus*, 15(2), Article e34981. <https://doi.org/10.7759/cureus.34981>
- Lünnemann, M. K. M., Horst, F. C. P. Van der, Prinzie, P., Luijk, M. P. C. M., & Steketee, M. (2019). The intergenerational impact of trauma and family violence on parents and their children. *Child Abuse & Neglect*, 96, Article 104134. <https://doi.org/10.1016/j.chiabu.2019.104134>
- Mannes, Z. L., Shmulewitz, D., Livne, O., Stohl, M., & Hasin, D. S. (2021). Correlates of mild, moderate, and severe Alcohol Use Disorder among adults with problem substance use: Validity implications for DSM-5. *Alcoholism: Clinical and Experimental Research*, 45(10), 2118–2129. <https://doi.org/10.1111/acer.14701>
- Mersky, J. P., Janczewski, C. E., & Topitzes, J. (2016). Rethinking the measurement of adversity: Moving toward second-generation research on adverse childhood experiences. *Child Maltreatment*, 22(1), 58–68. <https://doi.org/10.1177/1077559516679513>
- National Institute for Health and Care Excellence. (2017). Child abuse and neglect. <https://www.nice.org.uk/guidance/ng76>.
- National Society. (2022). *For the prevention of cruelty to children. What is domestic abuse?* <https://www.nspcc.org.uk/what-is-child-abuse/types-of-abuse/domestic-abuse/>.
- Northstone, K., Lewcock, M., Groom, A., Boyd, A., Macleod, J., Timpon, N., & Wells, N. (2019). The avon longitudinal study of parents and children (ALSPAC): An update on the enrolled sample of index children in 2019 [version 1; peer review: 2 approved]. *Wellcome Open Research*, 4(51). <https://doi.org/10.12688/wellcomeopenres.15132.1>
- Office for National Statistics. (2020). *Child abuse in England and Wales: March 2020*.
- Oliver, R., Roe, S., Wlasny, M., & Alexander, B. (2019). *The economic and social costs of domestic abuse. Home Office Research Report (Vol. 107)*. London: Home Office, 2019.
- Peterson, C., Florence, C., & Klevens, J. (2018). The economic burden of child maltreatment in the United States, 2015. *Child Abuse & Neglect*, 86(March), 178–183. <https://doi.org/10.1016/j.chiabu.2018.09.018>
- Radford, L., Corral, S., Bradley, C., & Fisher, H. L. (2013). The prevalence and impact of child maltreatment and other types of victimization in the UK: Findings from a population survey of caregivers, children and young people and young adults. *Child Abuse & Neglect*, 37(10), 801–813. <https://doi.org/10.1016/j.chiabu.2013.02.004>
- Shields, M. E., Hovdestad, W. E., Pelletier, C., Dykxhoorn, J. L., O'Donnell, S. C., & Tonmyr, L. (2016). Childhood maltreatment as a risk factor for diabetes: Findings from a population-based survey of Canadian adults. *BMC Public Health*, 16(1), 879. <https://doi.org/10.1186/s12889-016-3491-1>
- Van Wert, M., Anreiter, I., Fallon, B. A., & Sokolowski, M. B. (2019). Intergenerational transmission of child abuse and neglect: A transdisciplinary analysis. *Gender and the Genome*, 3, 1–21.
- Walby, S. (2009). *The cost of domestic violence: Up-date 2009*.
- Walby, S., & Olive, P. (2014). *Estimating the costs of gender-based violence in the European Union*. <https://doi.org/10.2839/79629>
- White, I. R., Royston, P., & Wood, A. M. (2011). Multiple imputation using chained equations: Issues and guidance for practice. *Statistics in Medicine*, 30(4), 377–399. <https://doi.org/10.1002/sim.4067>
- Wood, S. L., & Sommers, M. S. (2011). Consequences of intimate partner violence on child witnesses: A systematic review of the literature. *Journal of Child and Adolescent Psychiatric Nursing*, 24(4), 223–236. <https://doi.org/10.1111/j.1744-6171.2011.00302.x>