# Understanding domestic abuse

## 1   Introduction

Domestic abuse is a complex phenomenon affecting people from all walks of life. It is increasingly recognised as a major public policy concern in many countries, including the UK (Prpic & Rosamund, 2018). While anyone can become a victim of domestic abuse, women are disproportionately affected, with more than 25% of women, and 15% of men in England and Wales reported to have experienced some form of domestic abuse since the age of 16 (Office for National Statistics, 2018). In the most extreme cases, domestic abuse can culminate in domestic homicide: in the period between April, 2017 and March, 2018, 70 people in England and Wales were killed by their current or former partner, and 90% of these victims were women (Office for National Statistics, 2019a). Domestic abuse has substantial mental health implications, which are not limited to the direct target of abuse (Ferrari et al., 2014), but can have a profound effect on the lives of children witnessing domestic abuse at home (Callaghan, Alexander, Sixsmith, & Fellin, 2018). Reflecting the severity of the problem, the economic cost of domestic abuse in England and Wales between April, 2016 and March, 2017 was estimated to be as high as £66 billion, which includes the cost of missed workdays, health care costs, and the reduced quality of life for survivors (Rhys, Barnaby, Stephen, & Wlasny, 2019).

This research programme consists of four research topics aiming to deepen our understanding of domestic abuse victimisation, by exploiting the rich information contained in the CSEW, and combine it with insights from other data sources. First, we will explore the demographic and socio-economic characteristics of victims of domestic abuse, and the predictors of suffering serious harm. Second, we will examine the reasons behind not just under-reporting from victims, but also police mis-recording of domestic abuse cases, and victim's perception of the police after reporting an incident. Third, we will attempt to quantify the long-term effects of being a victim of domestic abuse, and witnessing domestic abuse at home as a child. Finally, we explore the association between exogenous, time-varying factors, such as changes in alcohol consumption and financial resilience, and the prevalence of domestic abuse.

## 2   Data sources

The research projects detailed below draw on various data sources. All of the projects rely on the CSEW, an annual, cross-sectional representative survey collecting information on victims of crime across England and Wales, including 30,000–40,000 households every year (Office for National Statistics, 2019b). The survey has a self-completion module containing questions about the respondent's experiences of domestic abuse throughout their life (since the age of 16), and in the past 12 months in particular. Given the serious problem of underreporting, one of the unique characteristic of domestic abuse, the CSEW is the most reliable source of information on the prevalence of domestic abuse in England and Wales. We have access to this dataset via the UK Data Service.

Some of the projects also benefit from an anonymised crime dataset provided by the West Midlands Police (WMP; the third largest police force in England, serving a population of 2.9 million; Home Office, 2018b), which includes all crimes and incidents recorded by the police force between 2010 and 2018, of which about 31% are domestic abuse-related. For each record in this dataset, we know the exact location, time, the gender, age, ethnicity and address of those involved, and the severity of the injury. Each person has a person identifier, allowing us to follow people over time. Access to this dataset is highly sensitive and strictly controlled. All researchers on this project have already been vetted by WMP and have been granted access to the required data fields. The PI, as data controller for the project is vetted to level 3, and the CoI's to level 2.

These two datasets have different merits. The CSEW provides us with rich demographic and socio-economic information on the respondent, and to investigate the casual effects of domestic abuse victimisation, we can construct a control group from those individuals who have not experienced domestic abuse. However, it does not contain any information on the perpetrators, and has limited longitudinal information.

In contrast, the WMP dataset has information on both the victim and the offender, and records all reported incidents for the same victim-offender pair, allowing us to analyse temporal patterns, and identify high-risk times of the year. We will not link the individuals in these datasets at any time.

One proposed project relies on a dataset containing credit card and current account spending of 20 million customers across the UK. We have access to this data as part of a data sharing agreement with one of the "Big 4" UK banks. As we know which neighbourhood (LSOA) the card owners live in, this data will allow us to construct a neighbourhood-level measure of spending on alcohol, gambling, and benefit payments throughout time. At no point will individual data be used, only geographic, LSOA level, aggregates. In addition, for analyses that rely on neighbourhood-level characteristics, we will use the Indices of Multiple Deprivation (IMD; HM Government, 2015). The IMD ranks all 32,844 LSOAs in the UK based on their relative deprivation on various domains, including income, employment, education, health, crime, housing and living environment, providing us with a complex descriptor of the socio-economic characteristics of each neighbourhood in the country.

# 3 Research Programme

This research programme addresses four overarching topics, exploring different aspects of domestic abuse. Drawing on the extensive, rich respondent information in the CSEW, and the unique, temporal nature of the WMP data, this research complements, extends and deepens our understanding of domestic abuse. In outlining the analysis plan for each of these research topics, we will specify a set of statistical analyses we plan to conduct. We will preregister all of our analysis plans and complement all analyses with robustness checks, and further exploratory regressions as the data allows (see, for an example of this approach in some of our prior work on domestic abuse).

### 1. Exploring the characteristics of survivors and the predictors of serious harm

In this research topic, we will first use the CSEW to investigate the demographic and socio-economic characteristics of survivors of domestic abuse. Understanding the risk factors of domestic abuse victimisation is key for designing effectively targeted policy measures. Previous research has identified a number of risk factors predicting domestic abuse victimisation (e.g., being female, young, unemployed, separated or divorced, living in single parent household, earning in the lowest income bracket, having a long-term disability), based on descriptive statistics derived from the CSEW data (Office for National Statistics, 2018). However, the CSEW provides a much broader range of information on the characteristics of the respondent, including number of children, ethnicity, education, benefit history, physical and mental health, house and car ownership, self-reported well-being, substance abuse, and frequency of going out.

Investigating the explanatory power of a broader set of victim characteristics within one (logistic) regression model will provide us with a deeper understanding of the relative importance of these factors in predicting domestic abuse victimisation, compared to a purely descriptive statistics approach. We are also interested in how the predictive power of victim characteristics vary with the type of abuse suffered (physical abuse, threats, sexual abuse).

In addition, given the complex nature of domestic abuse, it is likely that there are important interactions between various victim characteristics in predicting the risk of domestic abuse victimisation (e.g., it is possible that not having stable employment is a more significant risk factor of domestic abuse victimisation for those with young children). To uncover the structure of these interactions without having to a priori specify them – as is required in a logistic regression model – we will also use a random forest classification algorithm, a machine learning method that has the ability to detect non-linear relationships between variables in predicting categorical outcomes (e.g., domestic abuse victimisation), allowing us to identify particularly vulnerable subgroups of the population (Denisko & Hoffman, 2018). Insights from both methods will provide us with the first extensive characterisation of the risk factors predicting domestic abuse victimisation in England and Wales, using a national-level, large representative sample like the CSEW.

We will also explore the victim and offender characteristics that predict serious harm. Previous studies investigating the risk factors of serious harm in the context of domestic abuse mostly relied on police data, and focused on identifying high-risk offenders (Thornton, 2017). Using a multinomial logistic approach, we will use the CSEW to investigate how victim characteristics predict the level of harm suffered, including

Table 1: Exploring the characteristics of survivors, and understanding the police response to reported cases, analysis plan

| Research question | Dataset | Unit of analysis | Outcome variables | Explanatory variables | Model |
|---|---|---|---|---|---|
| What are the characteristics of domestic abuse victims? | CSEW | Individual | Domestic abuse victimisation; Victimisation by type (physical, sexual abuse, threats) | demographic and socio-economic characteristics | Logistic regression/random forest |
| What victim characteristics predict serious harm? | CSEW | Individual | Level of harm resulting from domestic abuse victimisation (no physical harm, minor, serious) | financial resources, mental health, dependence, social isolation, separation, feeling scared | Multinomial logistic regression |
| What perpetrator characteristics predict serious harm? | WMP | Perpetrator-victim pairs | Violent offences resulting in injury | previous self-harm and suicide attempts, violent and drug offences, breach of court orders, separation | Logistic regression with perpetrator-victim FE |

financial independence and resilience (income bracket, employment stability), mental health (self-reported well-being), drug and alcohol dependence (frequency of usage), social isolation (self-reported frequency of going out, living alone or with the perpetrator, family disputes), recent separation, and feeling frightened (increased home security, reporting feeling scared).

Using the WMP data, we will also explore the risk factors of serious harm associated with the perpetrator. The strength of the WMP data is that it has a temporal dimension, and we can follow the same perpetrator-victim pair over time. Using a logistic regression approach with perpetrator-victim fixed effects (FE), we will examine whether acts of serous harm can be predicted by previous self-harm and suicide attempts (which required police attendance), previous violent and drug offences, breaches of court orders, co-habitation with, and separation from the victim. Insights from these analyses will help the police to assess the validity of their current risk assessment model, and can inform decisions about the optimal timing and target audience for domestic abuse awareness campaigns to protect victims.

The findings from this work will result in high impact journal papers focussing upon the socio-economic risk factors of domestic abuse victimisation and the social and interpersonal relationship patterns predicting serious harm. The target journals for these works are the Journal of Personality and Social Psychology, Social Psychological and Personality Sciences, Journal of Research in Crime and Delinquency, and Personality and Social Psychology Bulletin.

## 2. Understanding the decision to report and police mis-recording of domestic abuse

In this research topic, we will first explore the factors influencing victim's decision to report the abuse. Even though improving willingness to report is key to effectively tackle domestic abuse, we are not aware of previous research exploring this question in depth. Using the CSEW and logistic regression approach, we will investigate how the decision to report (or seek external help) depends on the individual-level, time-invariant characteristics of the survivor, including trust in the justice system, social ties (living with family, time living in the area, member of Neighbourhood Watch), financial independence (own income, employment status, car ownership), number of children, mental health, and alcohol and drug dependency.

We will complement this analysis with the exploration of time-varying factors affecting the decision to

report ongoing abuse using the WMP. We are interested in whether these reports are more likely to occur after certain days of the year (e.g., birthday of the victim or perpetrator, Christmas, New Years, Valentine's Day etc.). This is particularly important knowledge for police, so that they can efficiently target awareness campaigns to further encourage reporting.

We will also use the CSEW to explore the police's response to reported cases of domestic abuse. Increasing victim's trust in the Criminal Justice System (CJS) through improving law enforcement response to reported incidents is key for improving willingness to report. Mis-recording of domestic abuse is a serious problem across police forces, for example, a recent inspection reported that WMP have failed to record 25% of reported crimes that were domestic abuse-related (Her Majesty's Inspectorate of Constabulary and Fires & Rescue Services, 2019). In this research topic, we will explore whether the extent of crime mis-recording depends on victim characteristics. Using the CSEW, we will be able to tell whether the type of domestic abuse reported by the respondent is likely to amount to a crime according to the list of notifiable offences (Home Office, 2018a). A multinomial regression approach will allow us to examine the extent to which police mis-reporting is different across broad crime types (sexual, physical violence, harassment and stalking), and depends upon the socio-economic characteristics of the victim and police forces (e.g., funding per police officer, deprivation). Complementing this analysis with a random forest approach will reveal the role of interactions between individual and police force characteristics. Lastly, these analyses can also be applied to examine the effect upon victim satisfaction with the police, and their perception of their personal security after reporting a crime.

We envisage two journal articles as a result of this work. One will focus upon the existing academic literature on decision making, and behaviour change, as this research will give unique insight into the process and factors that lead an individual to report. The target journals will be Nature Human Behaviour, and Psychological Science. The other paper will be more specifically focussed on the implications for policing, and this will be targeted towards the Journal of Research in Crime and Delinquency, and Criminology.

Table 2: Understanding the decision to report and police mis-recording of domestic abuse, analysis plan

| Research question | Dataset | Unit of analysis | Outcome variables | Explanatory variables | Model |
|---|---|---|---|---|---|
| What victim characteristics predict the decision to report? | CSEW | Individual | Reported abuse to the police | type of abuse, trust in CJS, social ties, financial status, children, health, dependencies | Logistic regression |
| What time-varying factors predict the decision to report? | WMP | Perpetrator-victim pairs | Reported ongoing abuse to the police | time of year, holidays, length of abuse, severity of last occurrence | Logistic regression |
| How does the police response depend on victim characteristics? | CSEW | Individual | Police action (no action, warning, arrest, charge) | socio-economic characteristics of victim and police force | Multinomial logistic regression/ random forest |
| What predicts victims' trust in the police? | CSEW | Individual | Satisfaction with police action, perception of security | police action, socio-economic characteristics of victim and police force | Multinomial logistic regression/ random forest |

## 3. The long-lasting effects of domestic abuse

Domestic abuse has long-lasting adverse effects on victims and children witnessing the abuse. In this research topic, our is aim to explore some of these consequences. The 2016 CSEW included a module

asking respondents about whether they witnessed domestic abuse at home as a child. Descriptive statistics of this dataset revealed that those who reported to have witnessed abuse as a child were significantly more likely to report long-term health problems, and live in a single parent household as an adult (Office for National Statistics, 2016). First, we will consolidate and extend these findings using propensity score matching, a statistical approach that allows for causal inferences to be drawn about the effect of witnessing abuse, whilst also controlling for a range of confounds, such as economic deprivation.

Second, we will explore how children's behavioural problems are affected by witnessing domestic abuse at home. The CSEW questionnaire for 10-15 year old's records information about experiences with bullying, carrying knives, gang membership, school truancy, learning difficulties and health outcomes, including drug use and drinking behaviour. By applying propensity score matching, we will explore the causal effect of living in an abusive household on these outcomes.

We will further complement this analysis using WMP data, by identifying whether younger offenders' home addresses can be linked to a past domestic abuse incident. It is not possible to predict whether witnessing domestic abuse increases the chance of becoming a young offender, but we can examine whether it predicts the type of crime they engage in. For example, whether, after controlling for the socio-economic characteristics of the neighbourhood (using the IMD), such individuals are more likely to commit similarly violent acts than other young offenders.

These analyses will consist the first UK-based comprehensive quantitative exploration of the causal effect of domestic abuse and childhood abuse on socio-economic outcomes. The resulting paper will be targeted at The Lancet Public Health, and Social Science and Medicine.

Table 3: The long-lasting effects of domestic abuse, analysis plan

| Research question | Dataset | Unit of analysis | Outcome variables | Explanatory variables | Model |
|---|---|---|---|---|---|
| How does witnessing domestic abuse as a child affect socio-economic outcomes in adulthood? | CSEW | Individual | Education, employment, health, domestic abuse victimisation | Witnessing domestic abuse | Propensity score matching |
| How does experiences of past domestic abuse affect socio-economic outcomes in adulthood? | CSEW | Individual | Employment, health | Degree and type of domestic abuse suffered | Propensity score matching |
| How does living a household with domestic abuse affect behavioural outcomes in childhood? | CSEW | Individual | Bullying, gangs, school truancy, carrying knives, drugs and alcohol, learning difficulties, health | Degree and type of domestic abuse in household | Propensity score matching |
| Are young offenders from abusive households more violent? | WMP, IMD | Young offenders | Type of offence (property-related, public order offence, violent) | Neighbourhood socio-economic characteristics, abusive household | Multinomial logistic regression |

## 4. Environmental factors influencing the prevalence of domestic abuse

In this research topic, we will investigate some of the environmental predictors of domestic abuse. First, using the CSEW and a logistic regression approach, we will explore the neighbourhood predictors of domestic abuse victimisation and willingness to report, using information on the interviewer's perception of

the street (signs of rubbish, vandalism, general condition of houses etc.), and neighbourhood deprivation (measured by the IMD), whilst controlling for the socio-economic characteristics of the respondent.

These analyses will extend our understanding of the neighbourhood-level predictors of domestic abuse victimisation, and complement our individual-level approach outlined in the first project to provide a comprehensive exploration of the range of factors affecting domestic abuse victimisation and willingness to report.

We will also explore the extent to which changes in alcohol consumption and financial stability on the community level affects the prevalence of domestic abuse. To do so, we will use the transaction data to construct an LSOA-level spending profile for a given time period to investigate how temporal changes in this profile affect the number of reported domestic abuse cases in that area, using a spatial panel regression model. This statistical estimation approach will alleviate the problem of spatial dependency between neighbourhoods, and will allow us to derive a precise estimate of the effect of temporal changes in community-level alcohol consumption and financial health on the prevalence of domestic abuse in the neighbourhood.

We will identify external events that may affect alcohol consumption and spending on gambling (e.g., festivals, weather, bank holidays, sport tournaments), and how these affect the reported number of domestic abuse incidents in that area in a given time period. Previously, our research has identified a 60% increase in alcohol-related domestic abuse when the England national football team won.

In addition, drawing on previous findings about the link between financial stress and domestic abuse, we will explore what effect the roll-out of the Universal Credit (UC) across the West Midlands had on the reported number of domestic abuse cases. These reforms had been criticised widely, due to the temporal financial strain it imposes on the least financially resilient people in society. The fact that the exact date of the roll-out varied across the seven metropolitan boroughs within the county allows for a more precise estimation of the effect of UC on the reported number of domestic abuse incidents in the West Midlands. This analyses will constitute the first empirical investigation of the direct effect of welfare policy changes on domestic abuse victimisation.

Table 4: Environmental factors influencing the prevalence of domestic abuse, analysis plan

| Research question | Dataset | Unit of analysis | Outcome variables | Explanatory variables | Model |
|---|---|---|---|---|---|
| How do neighbourhood characteristics predict domestic abuse? | CSEW | Individual | domestic abuse victimisation/willingness to report | Perception of neighbourhood, socio-economic characteristics | Logistic regression |
| How do community-level temporal changes in alcohol consumption and income affect domestic abuse? | WMP, Transaction data | LSOA, day-, week-, month-level | Number of reported domestic abuse cases | Alcohol, gambling spending, benefits | Spatial panel Poisson/negative binomial regression |

We envisage two articles. One will be focussed upon general behavioural theory and the effect of the environment. This will be targeted towards Nature Human Behaviour, and Proceedings of the National Academy of Sciences. The other article will focus upon the implications for criminology and policing. The target journal will be Criminology.

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