Homicide Studies

# Changing patterns of domestic homicide during lockdown; interrupted time-series analysis in England and Wales



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| Abstract: | This study aimed to examine the effect of lockdown restrictions on domestic homicide incidents in England and Wales. We analyzed data on 1,104 domestic homicides recorded by the Home Office Homicide Index between January 2014 and March 2021 using interrupted time-series analysis. Findings showed an immediate drop in ex-partner homicides following the first lockdown and higher than expected levels of parent and child homicides at different points during the first, second and third lockdowns. Our results suggest a change in the composition of domestic homicide during lockdown and contribute to a more detailed understanding of the short-, mid- and long-term effects of lockdown measures on domestic homicide. |

## Literature Review

### Introduction

The COVID-19 pandemic forced government responses in the form of stay-at-home orders, lockdown or quarantine as a measure of protection against the virus spread for approximately a third of the world population (Bradbury-Jones & Isham, 2020). Actions such as exhorting individuals to adopt "social distancing", mandating school and business closures, and imposing travel restrictions has, for many, resulted in the seclusion inside a home that is not always safe (Kofman & Garfin, 2020). According to Liem & Koenraadt (2018), an important factor underlying the high vulnerability for the occurrence of family violence is that the longer time that family members are in contact with each other, and are dependent on one another, increases the risk of conflict. Home confinement measures imposed to prevent the spread of COVID-19 have had unintended consequences on domestic violence (DV) victimization (WHO, 2020).

Most studies investigating changes on domestic abuse (DA) during COVID-19 have reported a rise in cases across countries (Kourti et al., 2021). In the UK, an article by Warburton and Raniolo (2020) stated the Mankind Initiative reported a 35% increase in call volumes during lockdown compared to pre-lockdown period. A range of studies from North America and the UK reported a correlation between COVID-19 and DV incidents (Frank et al., 2020; Halford et al., 2020; Leslie & Wilson, 2020). Conversely, data on child maltreatment and abuse cases has shown a decline during lockdown measures, possibly due to school closures and the disruption of child welfare services (Caron et al., 2021; Katz & Fallon, 2022). Many victims were in 'lockdown' at home with their abusers; facilitating continued surveillance and limiting the opportunities for victims to report abuse. Lockdown measures have acted as an aggravating factor to existing DA resulting in major implications for those living with someone who is abusive or controlling.

Prior DV has been shown to be a significant predictive risk factor for domestic homicide (DH) (Campbell et al., 2009). Despite the reported rise of DA levels following restrictions, there is mixed

evidence relating to the impact on homicide numbers. A global study on the impact of COVID-19 stay-at-home restrictions on crime across 23 countries reported small reductions in the number of daily homicides following the implementation of stay-at-home restrictions (Nivette et al., 2021). Yet, a more detailed review of data from the UK's Office for National Statistics (2022) revealed the 12% reduction of homicide in the year ending March 2021 masked different trends according to sex; with male victims decreasing by 16% and female victims remaining the same as last year. Some studies have reported a rise in femicide cases during COVID-19 (Weil, 2020), whilst others reported no changes in femicide numbers compared to previous years (Aebi et al., 2021). Notably, a recent innovative study looking at the impact of COVID-19 lockdown in DA cases in Greater London suggested that it is changes in the type of relationship the abuse occurs within that may explain differences in DA estimates across studies (Ivandić, Kirchmaier & Linton, 2020). Still, it is unclear whether the differences on domestic abuse victimization patterns reported in previous research extend to differences in patterns of DH during the COVID-19 lockdown.

This study explores the effect of the three COVID-19 national lockdowns on domestic homicide in England and Wales. Building on findings reporting a shift in the composition of DA cases recorded during lockdown (Ivandić et al., 2020), we examine likely changes in the components of DH offences with respect to types of victim-offender relationship. This research presents a more detailed account of the nature of domestic homicide offences during lockdown measures in the context of possible hypotheses grounded in both routine activity (Cohen & Felson, 1979) and strain theory (Agnew, 1992).

**Domestic Violence During the COVID-19 pandemic**

Domestic violence (DV), often used interchangeably with Domestic Abuse (DA), includes emotional, physical, or sexual abuse by a current or former intimate partner or by a family member (Elkin, 2018). So far, there is mixed evidence on the effects of the COVID-19 and its responses on DV levels across countries. A review looking at DV reports in Western and Southern European countries in the

first weeks of COVID-19 measures reported a drop in Italy and Portugal and no change in The Netherlands and Switzerland (Brink et al., 2021). In contrast, studies from the UK and North America reported increased DV incidents during stay-at-home orders (Leslie & Wilson, 2020; Usher et al., 2020) and quarantine measures (Wagers, 2020). Another multinational study reported an increase in DV cases during the COVID-19 pandemic outbreak across the world; ranging from 12% in Spain and Brazil, to 25% in Argentina and Mexico, and 75% in Chile (Huber, 2020). According to Ivandić et al. (2020) differences in estimates of the effects of lockdown on DA reported across studies may be explained by changing patterns of the type of relationship the abuse occurs within. The authors looked at DA levels during lockdown in Greater London and revealed abuse by current partners and family members increased on average by 8.1% and 17.1% respectively, whilst abuse by ex-partners declined by 11.4%. Other studies reporting on child abuse during lockdown showed a decrease in vulnerable child offence police reports in the UK (Halford et al., 2020), and reports of child abuse or neglect in the US (Campbell, 2020). However, this is arguably the result of school closures distancing children from their teachers, whom are the professionals who tend to submit reports about abuse (Kourti et al., 2021).

Unemployment, reduced income, stress, and situations of social and economic tensions are known risk factors for DV (Capaldi et al., 2012). Previous studies have consistently reported higher rates of intimate partner violence (IPV), child, and elderly abuse during periods of crisis due to economic instability and stressful environments (Curtis et al., 2000; Parkinson & Zara, 2013; Schneider et al., 2016). Yet, the risk of DV during COVID-19, compared to previous crises, could be higher as vulnerabilities of some at-risk populations have been magnified. For example, it is likely that unemployment and economic instability caused by the pandemic acted as a barrier for financial autonomy in women or men that were economically dependent on their abusers, which has been found to elevate the risk of intimate partner violence (IPV) (Anderberg et al., 2016). In addition to economic effects, recent statistics show more than one third of families have reported feeling very or extremely anxious about family stress resulting from COVID-19 (Statistics Canada, 2020). This

means known risk factors for family violence have been aggravated by the COVID-19 pandemic, further exacerbating the size of the abuse.

Together with the increase in risk factors for child abuse (Katz et al., 2021) and family violence (Usher et al., 2020), one of the most concerning correlates of the response to the COVID-19 pandemic is the reduction in opportunities for detection and support. Evidence suggests that victims living with perpetrators during lockdown were under constant surveillance, making accessing telephone and even virtual support particularly difficult (Ivandić et al., 2020). Lack of face-to-face contact has also resulted in a reduced ability in the identification of red flags and completion of risk assessments by service providers (Imkaan, 2020). For example, the presence of children and adolescents at home due to school closures may have magnified the exposure of young individuals to DV (Cluver et al., 2020); and cut off from normal support services translated into missed opportunities for clinicians to detect and prevent maltreatment (Humphreys et al., 2020). Indeed, a decrease in cases investigated by a Child Advocacy Center (Massiot et al., 2022); cases reported to youth welfare agencies (Jentsch & Schnock, 2020); and to child maltreatment hotlines (Kim, 2021), has been linked to the disruption of child welfare services leading to a lack of screening rather than a decrease in actual abuse (Caron et al., 2021; Katz & Fallon, 2022). Thus, lockdown measures have likely furthered the impact of the abuse, resulting in major implications for those living with someone who is abusive or controlling.

**Research on Homicide and Domestic Homicide During the COVID-19 Pandemic**

Domestic violence covers a wide range of criminal behaviour, where homicide may be considered as the lethal outcome at the extreme end of a continuum of violence (Liem & Koenraadt, 2018). Evidence has shown DV history is a significant factor in both domestic violence and general homicide incidents (Iratzoqui & McCutcheon, 2018). Whilst DV levels during stay-at-home orders have reportedly increased in most countries (Brink et al., 2021; Huber, 2020), it is still unclear whether this rise has contributed to an increase of homicide incidents. Findings from a study looking at the

effect of stay-at-home orders on homicide rates across 10 U.S. cities suggest an initial increase following the imposition of restrictions, followed by a slight decrease in five out of ten cities (Murray & Davies, 2022). Further findings suggest that homicide rates may have increased in eight cities following the lifting of stay-at-home orders. In contrast, a study looking at the impact on crime levels following the implementation of restrictions across 23 countries reported a marginal decline in homicides compared to reductions in other crimes, including statistically significant reductions in three cities (Lima, Cali and Rio de Janeiro) (Nivette et al., 2021).

Differences in magnitudes across studies reporting on homicide rates following restrictions may be explained by three main factors. First, homicide recording systems vary considerably across countries. Second, figures may include countries with different proportions of homicide rates associated with crime (mainly organized crime) and homicide rates relating to intimate partner and family homicides (i.e., DHs). Third, the impact of restrictions may differ by the nature of the homicide. For example, in England and Wales, data published by the Office of National Statistics (ONS) (2022) showed an overall decrease in homicide rates of 12% in the year ending March 2021 (covering certain time periods where COVID-19 restrictions were in place). Yet, data also showed the number of victims who were killed in a residential setting increased by 5%. This suggests reporting the average change of homicide during COVID-19 restrictions may mask important information about changing trends and highlights the importance of looking at the effect of restrictions across differing types of homicide.

Global statistics show that despite changes in the overall homicide rate, the rate of domestic homicide tends to remain stable over time (UNODC, 2019). Domestic homicide (DH) refers to the killing of a (current or former) intimate partner, son or daughter, parent, sibling, or another family member (Liem & Koenraadt, 2018). Domestic homicide accounts for approximately 18% of homicides at the global level, with rates varying by region (e.g., 39% in Oceania and 24% in both Asia and Europe) (UNODC, 2019). Despite the recent decrease in overall homicide rates in England and

Wales, data from the ONS (2022) for the year ending March 2021, showed that the number of DHs where the victim was aged 16 or over remained similar to the previous year. Note that the definition of DH used by the ONS only includes victims aged 16 years or over (House of Commons, 2020). However, the direct effect of imposed lockdown restrictions on DHs is still unclear. Further, as mentioned above, reporting the average change of DH during COVID-19 restrictions may mask information about changing patterns according to the nature of the offence. For example, child homicides were reported to have increased to 59 victims aged under 16 years of age compared with 45 in the previous year, with the most common suspect being a parent or step-parent in 42% of the cases (ONS, 2022). Further, a recent report revealed a sizeable increase in intimate partner homicide (IPH) victims aged 65 years or older between March 2020 and March 2021, and a decrease in victims of IPH aged 16 to 24 years during the same period (Hoeger et al., 2022). Thus, in this situation of seemingly no change, the risk of DH during restrictions seems to differ according to the victim type, highlighting the importance of viewing DH in terms of its components as opposed to as a whole.

**Theoretical Explanations for Expected Changes in Domestic Homicide Patterns during the COVID-19 Pandemic**

Studies focusing on the impact of stay-at-home orders on crime have mainly referred to theories of routine activity and strain to explain the effect of the COVID-19 pandemic and its responses on crime levels (Murray & Davies, 2022). Routine activity theory suggests opportunities for crime are defined by the routine activities of the offender and the victim (Cohen & Felson, 1979). The nationwide lockdowns resulted in dramatic changes in people's mobility and consequently their routine activities (Ivandić et al., 2020). Stay-at-home orders triggered by the COVID-19 pandemic translated into reduced opportunities for the convergence of motivated offenders and suitable victims in public spaces and increased opportunities for interaction in a domestic context. This has likely resulted in a decrease in homicides committed in public spaces and an increase in homicides committed in residential locations. Most non-family homicides are committed in public places, whilst DHs are

more likely to occur within a residential setting (ONS, 2022). Thus, we would expect a decrease in non-family homicide and an increase in DH during lockdown restrictions.

At a more granular level, the effect of lockdown restrictions on DH is likely to vary by the relationship between victim and perpetrator. For example, estrangement or post-separation is known to be a period of heightened risk of IPH (Campbell et al., 2009; Desai et al., 2022). Decreased mobility during the lockdown period and social isolation measures may reduce ex-partner homicides due to the inability to reach victims in cases where the perpetrator resides in a separate residence (Bradbury-Jones & Isham, 2020). Indeed, a recent study looking at the effect of COVID-19 curfew measures on femicides in Turkey found that the probability that a woman is killed by an intimate partner declined by 83% during curfews compared to the same period between 2014 and 2019 (Asik & Ozen, 2021). Thus, we would expect a decrease in homicides against a former intimate partner and an increase in homicides against a current intimate partner or family member living in the same residence during lockdown.

Strain theory suggests that crime is the result of negative emotions caused by negative events in people's lives (Agnew, 1992). The adverse health impacts, economic disruption and uncertainty brough by the COVID-19 pandemic resulted in negative strain for many (Murray & Davies, 2022). So far, most studies reporting on changes in general crime trends during lockdown have showed that, at least in the short-term, it was the change in routine activities rather than the increase in social and psychological strain that was the dominating mechanism affecting change in overall crime levels (Nivette et al., 2021). However, this may differ for DH as the risk will probably grow as the strains of the crisis accrue (Eisner & Nivette, 2020). In England and Wales, ONS (2021) reported that, between October and December 2020, an estimated 1.74 million people were unemployed, up 454,000 on the same period the previous year; reflecting the largest annual increase since September to November 2009. This suggests financial strain became more prevalent in households as the crisis progressed, exacerbating existing conflicts within families. Moreover, the potential for DH may be

greater in the context of other pandemic-related stressors (e.g., health anxiety, loneliness) (Joiner et al., 2020). Research found Individuals with low socio-economic position and those with psychosocial and health-related risk factors were found to be most vulnerable to experience moderate or severe depressive symptoms during the COVID-19 lockdown (Frank et al., 2020). Male depression has been identified as one of the main risk factors associated with DH (Cheng & Jaffe, 2021). Extended time at home and social isolation is likely to have increased family and parental stress. Difficulties in managing parental stress may lead to a possible increase of DH or murder-suicide (Mazza et al., 2020). Other relevant factors such as gun and alcohol sales, intimate partner violence (IPV) and child abuse have also been reported to increase during the COVID-19 pandemic (Joiner et al., 2020). Following strain theory, we would expect a gradual, rather than an immediate, increase in DH as the strains brought by the pandemic built up, as well as an exacerbated effect during lockdown restrictions resulting in additional homicide against a current intimate partner or a family member.

**The Present Research**

The impact of the COVID-19 pandemic in relation to the prevalence and nature of DH is still unclear. This study aims to explore the extent to which the COVID-19 imposed lockdowns impacted on DHs in England and Wales. The study is unique in three main ways. First, the study uses split categories relating to victim-offender relationship to provide a detailed account of the changing nature of DH during lockdown. Second, the study identifies variations in the nature of DH using homicide data extending to March 2021 to analyze the short-, medium- and potential long-term effects of each lockdown on DH. Third, the study uses data relating to the date in which the homicide occurred, rather than the date in which the homicide was recorded and includes DHs of victims younger than 16 years of age, in contrast with published reports from official national statistics.

**Timeline of lockdown measures in the England and Wales**

The first official UK COVID-19 case was recorded in England on 30 January 2020. The UK Chief Medical Officers advised an increase in the UK risk level from low to moderate. On 11 March, the

World Health Organisation declared COVID-19 a global pandemic. On 16 March, the UK Government published updated advice that all non-essential contact and unnecessary travel should stop, and people should start to work from home where possible. Two days later, on 18 March regulations come into force in Wales which provide the imposition of proportionate restrictions on individuals where it is suspected that they may have coronavirus. On 20 March, the government announces the closure of cafes, pubs, restaurants, bars, nightclubs, theatres, cinemas, gyms, and leisure centers.

On 23 March, with 11, 141 confirmed cases in England and 668 cases in Wales, the UK Prime Minister announces that all people are now required to stay at home except for very limited purposes. Three days later, on 26 March new lockdown regulations come into force giving the police powers to enforce social distancing in England and Wales. Lockdown rules required people to stay at home at all times except for essential activities, restricted to shopping for basic necessities, one form of exercise a day, any medical need and travelling for work purposes when work from home is not possible (Cabinet Office, 2020). People not complying with the regulations can be issued with a fixed penalty notice. The first national lockdown was lifted on 15 June 2020. Table 1 illustrates the timeline for each of the three national lockdowns.

**Methodology**

**Data**

The analysis is based on 6.3 years of homicide records extracted from the Home Office Homicide Index. The dataset includes information on all homicide victims from January 1st, 2014 to March 31st, 2021. The closing month of the sample allows the analysis of the impact of the three periods of national lockdown on domestic homicide. The analyses focus on the split of categories by type of victim-offender relationship aggregated by month. The dataset also contains information about the date of the homicide, the relationship between the victim and the perpetrator, previous history of domestic violence by the victim and/or perpetrator, and various demographic and offence variables. The central advantage of the data is the long time series, allowing for a comprehensive analysis of

the periods before and after the onset of the first lockdown (i.e., pre- and post-March 2020); before and after the onset of the second lockdown (i.e., pre- and post- November 2020); and before and after the onset of the third lockdown (i.e., pre- and post- January 2021).

The dataset includes victim data on 4,105 homicides, including 1104 (27%) domestic homicides (DHs) in total. Homicides are recorded to be "domestic" when the relationship between the victim and the perpetrator falls into one of the following categories: spouse, common-law spouse, cohabiting partner, boyfriend or girlfriend, ex-spouse, ex-cohabiting partner or ex-boyfriend or girlfriend, adulterous relationship, son or daughter (including step and adopted relationships), parent (including step and adopted relationships), brother or sister, other relatives. In this study, the victim-perpetrator relationship is classified in the following six categories: Son/Daughter (4.5%), Parent (3.5%), Partner (11.9%), Ex-Partner (2.6%) Other Family (3%), Other Non-Family (45%), and Unknown (24.5%). The study focuses on the first four categories and analyses the differences in their evolution since the beginning of lockdown in the UK on March 26th, 2020 in order to explore if they were affected in different ways by the mobility restrictions of the three lockdowns.

There were 154 DHs for the year ending March 2021; 20% had a history of violence against the victim and 6% had a history of violence against the suspect (compared to 20% and 10% respectively in the previous year). Out of 154 DHs for the year ending March 2021, 41% were recorded to be linked to the mental state of the suspect, an increase from 34% seen in the previous year.

**Analytical Approach**

In order to analyze the immediate effect of each COVID-19 lockdown on domestic homicide, but also the medium-term changes in crime after each lockdown, we use an interrupted time series (ITS) design. An ITS design evaluates the change in the outcome in the time period following an 'interruption' or intervention and assumes that without the interruption there would be no change in trends (Kontopantelis et al., 2015). The outcomes measured in our analyses are the number of

domestic homicide events per month. As such, we estimate Poisson generalized linear models using a logit-link function:

$$\log(\square)=\square 0+\square 1\square 1+\square 2\square 1+\square 3\square 2+\square 4\square 2+\square 5\square 3+\square 6\square 3+\square 7\square+\square 8\square$$

We follow Buil-Gil et al. (2021) in designing our modelling strategy, in which we capture average changes in the number of crimes for each lockdown, as well as linear trends within lockdown periods. In the above equation, y is the number of domestic homicides that occurred in a given month, B0 represents the intercept, T represents a linear time trend starting at the beginning of the time series, parameters D1, D2, and D3 are dummy variables that reflect the time period (in months) during the first, second, and third lockdown. P1, P2, and P3 reflect the time since the start of the respective lockdown (first, second, and third) in months. The D parameters represent the average difference in number of crimes during that particular lockdown period compared to non-lockdown periods. The P parameters provides an estimate as to whether and what extent any linear changes in trends during a given lockdown period. S is a dummy variable for seasonality. While research is mixed regarding the seasonality of domestic homicide, some studies suggest that incidence rates are higher during holiday periods, such as Easter, Summer and Christmas (Bates et al., 2021; Briški & Plesničar, 2022). Our seasonal dummy variable is therefore coded as 1 for the months April, June, July, August, and December.

In addition, we use pre-COVID-19 trends in domestic homicide to predict the counterfactual or expected trend that one would observe if the lockdowns had not taken place. In this way, we are able to assess how the observed trend deviates from the predicted trend. The 'counterfactual' trend is predicted based on the following equation:

$$\log(\square)=\square 0+\square 1\square+\square 2\square$$

This approach is commonly applied within epidemiology, economics, and more recently research on COVID-19 crime trends (Buil-Gil, Zeng & Kemp, 2021). All models were calculated using robust standard errors (Cameron & Trivedi, 2009). One methodological issue related to ITS is autocorrelation, or the similarity between two observations. In time series analyses, two subsequent time points may be highly correlated, which can violate the assumption of independence (Shin, 2017). In order to assess whether problems of autocorrelation were present in the models, we inspected the partial autocorrelation and autocorrelation function plots. Through this process, we did not detect any substantial issues with autocorrelation for domestic homicide or sub-categories of domestic homicide. We did detect some autoregressive processes in the non-family homicide models, which was addressed by including a lagged dependent variable (Shin, 2017). We should note that for some cases, the number of homicides was low, which may result in unstable coefficients. In addition, the time span within and between the second and third lockdowns was short, which as a result reduces the precision and power to estimate changes. Full results for all models are provided in the Appendix. All analyses were conducted in R (R Core Team, 2021). Due to confidentiality and data protection conditions, data is only available upon direct request to the Home Office Homicide Index.

**Results**

This section presents the results of the ITS analysis. Figure 1 shows the crime trend seen before COVID-19 (dark blue line), the predicted crime trend since March 2020 if COVID-19 had not taken place (i.e., the 'counterfactual', visualized with a dashed light blue line), and the actual trend observed after each lockdown (red lines). The same visualization strategy will be used for each victim-offender relationship type in the following sections. It is important to note that while we include the interpretation of visual changes, all results for the Poisson Regression analyses showed no significant changes. The results of the ITS models are presented in Table 2.

Overall, recorded domestic homicides show an immediate slight increase during March 2020 (but still within expected levels), it then follows the gradual declining trend seen before COVID-19, and continues declining to remain below pre-COVID levels during the months of the first lockdown and first post-lockdown period. There is a similar but less evident effect after the second lockdown and a return to pre-COVID levels during the months of the third lockdown. However, as described in the literature review, this is likely to mask substantial differences across victim-offender relationship types.

**Domestic homicides by victim-offender relationship type**

Disaggregating domestic homicide offences by the relationship characteristics between the victim and perpetrator reveals an important change in the patterns of domestic homicide when interpreting overall trends in domestic homicide. Figure 2 visualizes the monthly trends in domestic homicides by relationship type of the victim to the offender. Five main observations become apparent. First, domestic homicides against current and former partners showed notably different trends that are not apparent when reporting on general DH trends. On one side, the results of the ITS models for domestic homicides against a current partner followed the trend seen before COVID-19 at the time of the first lockdown, the trend then declined in the following months up to October 2020 and immediately increased to slightly lower expected levels during the second lockdown. Numbers then reached slightly higher pre-COVID levels at the start of the third lockdown and decreased to expected levels by March 2021. In contrast, domestic homicides against a former partner reflected lower pre-COVID levels after the first, second and third lockdowns, arguably a result of the physical inability of ex-partners to reach victims due to isolation measures. The trend remained steadily low in the months following the first lockdown and suffered a marked decrease following the second lockdown. However, the observed effect of the third lockdown was different to the first two showing a return to pre-COVID levels from February to March 2021.

Second, domestic homicides against parent and child (i.e., son or daughter) also showed notably different trends that are not apparent when reporting on general domestic homicide trends (Figure 2). The trend of domestic homicide against a parent during the first lockdown showed an immediate but minor increase after the first lockdown, and then steadily declined to lower pre-COVID levels between April and October 2020. This pattern continued during the second lockdown, albeit reaching its highest level in November 2020, then returning to expected levels following the onset of the third lockdown and again increasing to higher pre-COVID levels during March 2021. In contrast, domestic homicides against a child immediately increased to higher pre-COVID levels after the first lockdown and then gradually declined to expected levels until November 2020. In contrast, the second and third lockdown reflected similar trends showing an increase from lower to slightly higher expected levels.

Third, domestic homicides against a parent and child showed opposite trends during the second lockdown; with the former declining to expected levels and the latter rising to higher pre-COVID levels from November to December 2020 (Figure 2). Fourth, all four relationship types reflected the same trend during the third lockdown; a return to expected or higher pre-COVID levels by March 2021, except for partner homicides which declined from expected levels to lower pre-COVID levels in the same period (Figure 2). Finally, the results of the ITS analysis for all non-family homicides showed a marked and immediate decrease after the first, second and third COVID-19 lockdowns. The first and third lockdown reflected similar trends with levels gradually decreasing to lower pre-COVID levels, falling to their lowest number in March 2021 (Figure 3).

**Discussion and Conclusions**

This research aimed to explore the extent to which the each of the three COVID-19 imposed lockdowns impacted on domestic homicide levels in England and Wales. More specifically, we investigated whether changes in the composition of DH would replicate previous findings relating to changing victim-offender relationship patterns of DA during lockdown (Ivandić et al., 2020). The

study adopted an ITS design to evaluate the change in the number of homicide incidents split by victim-offender relationship categories in the time period following each mandated lockdown and assumed that without the imposed restrictions there would be no change in trends. Overall, our findings highlight the complexity around measuring homicide and understanding its dynamics and evolution. It is clear that recent reports showing declines in general homicide and unaffected levels of domestic homicide mask important information on both fluctuations in levels of homicide subtypes, and changes in the composition of domestic homicide during the COVID-19 pandemic in England and Wales. Importantly, we note that none of the changes observed were found to be statistically significant according to the ITS model.

Following routine activity theory (Cohen & Felson, 1979), we expected a decrease in non-family homicide and an increase in DH during lockdown restrictions. At a more detailed level, we expected a decrease in non-family homicides and homicides against a former intimate partner and an increase in homicides against a current intimate partner or family member living in the same residence as the perpetrator during lockdown. In the context of strain theory (Agnew, 1992), we expected a gradual increase in DH as the strains brought by the pandemic accrued, together with an exacerbated effect during lockdown restrictions resulting in additional homicide against a current intimate partner or a family member.

We contribute to the criminological literature by providing a more detailed understanding on the short-, mid- and long-term effects of lockdown measures on domestic homicide in three main ways. First, our findings support previous research highlighting the importance of looking at variations in crime in terms of its components as opposed to as a whole (Ivandić et al., 2020). Previously reported declines in general crime rates, and even in overall homicide (Nivette et al., 2021), do not extend to domestic homicide incidents recorded during the pandemic in England and Wales. Our analyses showed DH numbers remained within expected levels after the first lockdown, masking information about a shift in the composition of domestic homicide incidents relating to the type of victim-

offender relationship. Indeed, although ITS analyses of overall domestic homicides suggest no change in levels after the introduction of the first lockdown, followed by a gradual decline from June to October 2020, analyses split by victim-offender relationship showed an immediate drop in ex-partner homicides to lower pre-COVID levels and an immediate increase in homicides against a parent or child to higher-than-expected levels following the onset of the first lockdown. The former may be explained by two main factors; the reduction in opportunities for ex-partners to physically reach victims living in a separate residence (Asik & Ozen, 2021) and reduced opportunities of separation during lockdown driven by the exhortation to 'stay at home'. Actual/pending separation has been well-documented as a risk factor for IPH (Dawson & Piscitelli, 2021). Moreover, although current partner homicide levels showed no change in numbers after the first lockdown and, at least initially, followed the trend seen in previous years; research by Hoeger and colleagues (2022), reported a large increase in the proportion IPH victims aged over 55 years compared to previous years, suggesting changes in the victim age profile during the pandemic. These findings are partially consistent with routine activity theory predicting a decrease in ex-partner homicides throughout the pandemic and an increase in homicides against a parent or child following the onset of the first lockdown.

Second, results suggest domestic homicide victimization risk during lockdown differed according to type of victim-offender relationship. Current partner homicides mostly followed expected levels and only saw a slight increase over expected levels immediately after the third lockdown. In contrast, ex-partner homicides experienced a dramatic drop at the beginning of the first, second and third lockdown and a return to expected levels by March 2021. Homicides against a parent experienced higher pre-COVID levels at different points during the first, second and third lockdowns, rising to the highest levels in November 2020 and March 2021. A similar effect was observed for child homicides, with March and December 2020 experiencing the highest numbers and a return to expected levels at the end of the first and third lockdowns. These findings suggest that the pandemic may have put parent and child victims at greater risk of domestic homicide. According to our data, there was a 7%

increase of cases linked to the mental state of the suspect in the year ending March 2021 compared to the previous year (41% vs 34%). This fits with research from Hoeger et al. (2022) on DH revealing contributing factors for adult family homicides during the pandemic included disrupted mental health or drug/alcohol support available to the suspect, or the suspect being discharged into the care of their family members, disproportionally affecting those who were already vulnerable. The increase seen in child homicide may be linked to reduced opportunities for detection and prevention of child maltreatment (Humphreys et al., 2020). It is important to note that although child homicides saw the largest increase compared to other groups immediately following the first lockdown, the trend for child homicide fluctuates considerably year to year because of the low number of victims in this age group (ONS, 2022). The results relating to parent homicide provide some support for our argument related to increased strain and not disrupted routine activities, as this was the only group that experienced higher numbers immediately after the second lockdown compared to the beginning of the first lockdown.

And third, long-term effects of lockdown restrictions on domestic homicide were similar across ex-partner, child and parent homicide. Indeed, most relationship types showed an upward trend during the third lockdown except for homicides against a current partner which experienced a decline in numbers whilst still remaining within slightly higher pre-COVID levels. This increase is mainly driven by March 2021 numbers; March 8th, 2021 brought into place the first of a four-step roadmap towards the lifting of restrictions in England. Changes included the allowance to leave home for recreation and exercise outdoors, and the return of children and students to face-to-face education, impacting the routine activities of potential victims and suspects. This may fit with findings revealing an increase in homicide rates in eight U.S. cities following the lifting of stay-at-home orders (Murray & Davies, 2022). In the case of general homicide, this increase may suggest greater support for arguments related to a return to routine activities than increased strain. However, for DHs, easing of restrictions translated into fewer opportunities to stay at home; meaning increased opportunities for ex-partner homicides but reduced opportunities for current partner and other family homicides.

It is unclear whether these long-term effect in domestic homicide levels reflect the return to expected levels nearing the end of the third lockdown in March 2021, or whether the observed increase is driven by the slower build-up of strains caused by the social and economic disruption experienced. It is also possible that the observed increase in family homicide may be driven by a perceived loss of control on the part of the perpetrator (Acosta, 2020). Notably, the upward trend observed during the third lockdown did not extend to non-family homicides, as would be expected given increased opportunities for interaction outside the home following the easing of restrictions. The above results provide mixed but suggestive support for arguments related to increased strain after the imposition of lockdowns and not disrupted routine activities.

Long-term effects of lockdown may also suggest an upward trend above pre-COVID levels on overall domestic homicide cases. General domestic homicides not only bounced back to pre-COVID levels, but by the third lockdown rates appeared to increase to higher levels seen before the pandemic. This is consistent with recent data from the main police recorded crime return recording 710 homicides in the year ending March 2022, a 5% increase compared with the pre-coronavirus year ending March 2020 (Elkin, 2021). Unfortunately, the proportion of domestic homicides within this figure is not known. Future research is needed to determine whether the rise in overall homicide to higher pre-COVID levels following the lifting of restrictions also reflects a rise in DH cases. Understanding the apparent increase in some domestic homicides following the easing and lifting of restrictions will require continued data collection to help determine the potential continuation and/or significance of this trend.

This study aimed to provide a more detailed understanding of the effects of multiple lockdowns on domestic homicide in the context of routine activity and strain theory. The effect of routine activities on domestic homicide when people are locked down in their homes is complicated given that not all potential victims and suspects are likely to share the same residence. Overall, changes observed in homicides against a former partner provide the greatest support for our routine activities argument

as levels remained low throughout lockdown restrictions and increased as restrictions were lifted. Our findings suggest mixed evidence on the impact of strain on domestic homicide by victim-offender relationship and lockdown period. It is possible that the observed increase in the numbers of parent homicide at the onset of the first and second lockdowns provides some support for our strain argument. Moreover, the upward trend observed for parent and child homicide during the third lockdown could suggest an effect of accrued strain. However, it is also clear that these numbers fluctuated from lower to higher pre-COVID levels throughout all lockdown periods and in-between, possible due to the low number of victims observed in these groups. Homicides against a current partner appeared the most unaffected by lockdown restrictions as their numbers remained the closest to expected levels, except during summer months. Still, recent reports revealing changes in the composition of IPH during lockdown (i.e., rise of older victims and decline of younger victims) may offer some support for strain theory due to the increased strain caused by disruption of specialist support services (Hoeger et al., 2022).

Finally, a number of limitations of this study are worth noting. First, it is important to be clear that our models do not identify any statistically significant changes; thus, our results should be interpreted with caution. Second, data from the Home Office Homicide Index is continually updated with revised information from the police as investigations progress and as cases are heard by the courts. However, the version used for our study does not capture updates made after it was extracted to ensure the data do not change during the analysis period. The data in this article refer to the position as of December 15th, 2021. Future research should analyze recent updates of data to explore any changes. Moreover, where several people are killed by the same suspect, the number of homicides counted is the total number of victims killed rather than the number of incidents. This is particularly relevant in cases of familicide, as these are counted as separate incidents rather than as single case of domestic homicide. Third, in some cases, the counts for homicide within each victim-offender relationship category in a given month were quite low. This, combined with short lockdown periods, results in less precision, power and potentially unstable coefficients. This has been

addressed through robustness checks presented in the Appendix. Fourth, though routine activity and strain theory provide a useful framework to understand the effect of multiple lockdowns on domestic homicide, changes in key aspects of routine activity theory and build-up of multiple stressors were not directly measured, but rather presumed given the dramatic increase in time spent at home during lockdown restrictions and the resulting and considerably wider societal costs. Finally, due to low numbers for this type of crime we analyze changes in homicide across months, which may mask internal heterogeneity across weeks and days. Future research should analyze smaller temporal units of analysis where possible.

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Table 1. National lockdown periods in England and Wales

| | |
|---|---|
| First lockdown | March 26th, 2020 – June 15th, 2020 |
| Second lockdown | November 5th, 2020 – December 2nd, 2020 |
| Third lockdown | January 6th, 2021 – April 12th, 2021 |

Table 2. Interrupted time series models of domestic and non-domestic homicides in England and Wales (January 2014-March 2021)

| | Model 1 (all DH) | Model 2 (child) | Model 3 (parent) | Model 4 (partner) | Model 5 (ex-partner) | Model 6 (non-family) |
|---|---|---|---|---|---|---|
| (Intercept) | 2.49 (0.07)*** | 1.00 (0.16)*** | 0.37 (0.20) | 1.76 (0.10)*** | -0.07 (0.24) | 2.73 (0.08)*** |
| Time | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) | 0.01 (0.00) | 0.01 (0.00)*** |
| First lockdown | 0.11 (0.23) | 0.61 (0.49) | 0.38 (0.57) | 0.06 (0.36) | -0.47 (0.80) | -0.09 (0.17) |
| Time since first lockdown | -0.05 (0.05) | -0.07 (0.10) | -0.11 (0.12) | -0.06 (0.07) | -0.03 (0.16) | -0.04 (0.03) |
| Second lockdown | 0.16 (0.66) | -1.70 (2.10) | 1.56 (1.26) | 0.12 (1.01) | 14.97 (1275.76) | -0.76 (0.60) |
| Time since second lockdown | -0.20 (0.42) | 1.11 (1.16) | -0.79 (0.88) | -0.19 (0.64) | -15.50 (1275.75) | 0.07 (0.37) |
| Third lockdown | -0.06 (0.44) | -3.52 (2.69) | -0.22 (1.09) | 0.28 (0.62) | -1.06 (1.53) | -0.46 (0.41) |
| Time since third lockdown | 0.04 (0.20) | 1.24 (0.98) | 0.21 (0.47) | -0.08 (0.29) | 0.38 (0.64) | -0.12 (0.19) |
| Seasonality | 0.11 (0.06) | 0.00 (0.15) | 0.10 (0.17) | 0.19 (0.09)* | 0.19 (0.19) | 0.03 (0.05) |
| lag(non-family homicide) | | | | | | 0.01 (0.00)** |
| N | 87 | 87 | 87 | 87 | 87 | 86 |
| AIC | 517.9 | 316.5 | 302.0 | 421.0 | 273.0 | |
| BIC | 540.0 | 338.7 | 324.2 | 443.2 | 295.2 | |
| RMSE | 3.85 | 1.44 | 1.33 | 2.41 | 1.22 | 7.35 |

Notes. All models are calculated using robust standard errors. DH=domestic homicide. *p<.05, **p<.01, ***p<.001

Figure 1: Interrupted time series analysis of all domestic homicides

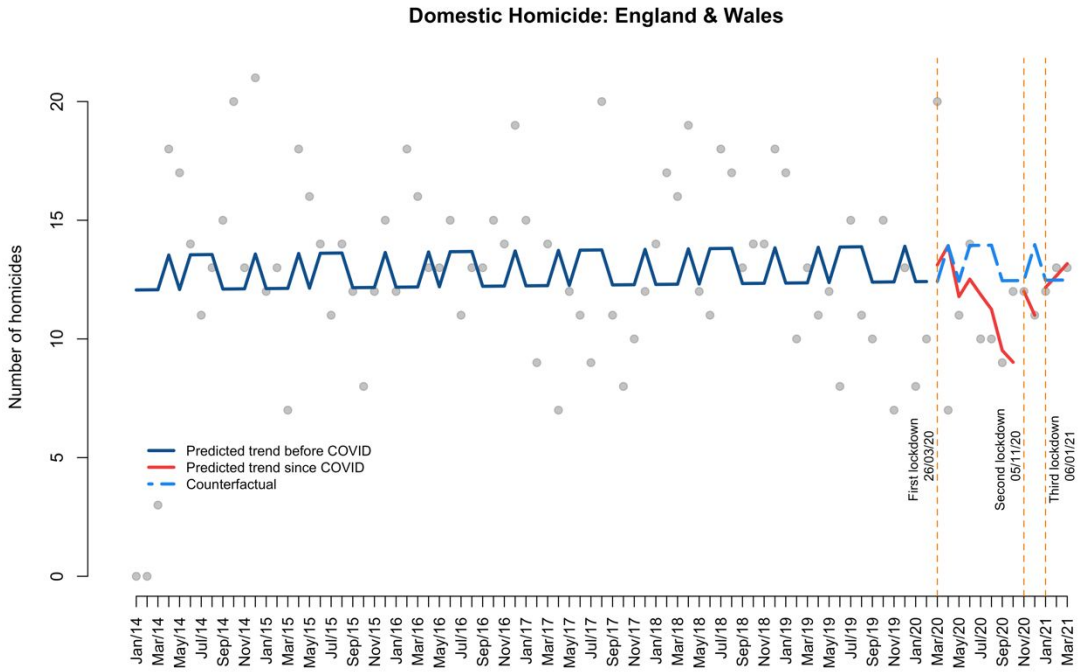


Figure 2: Interrupted time series analysis of domestic homicides by victim-offender relationship type

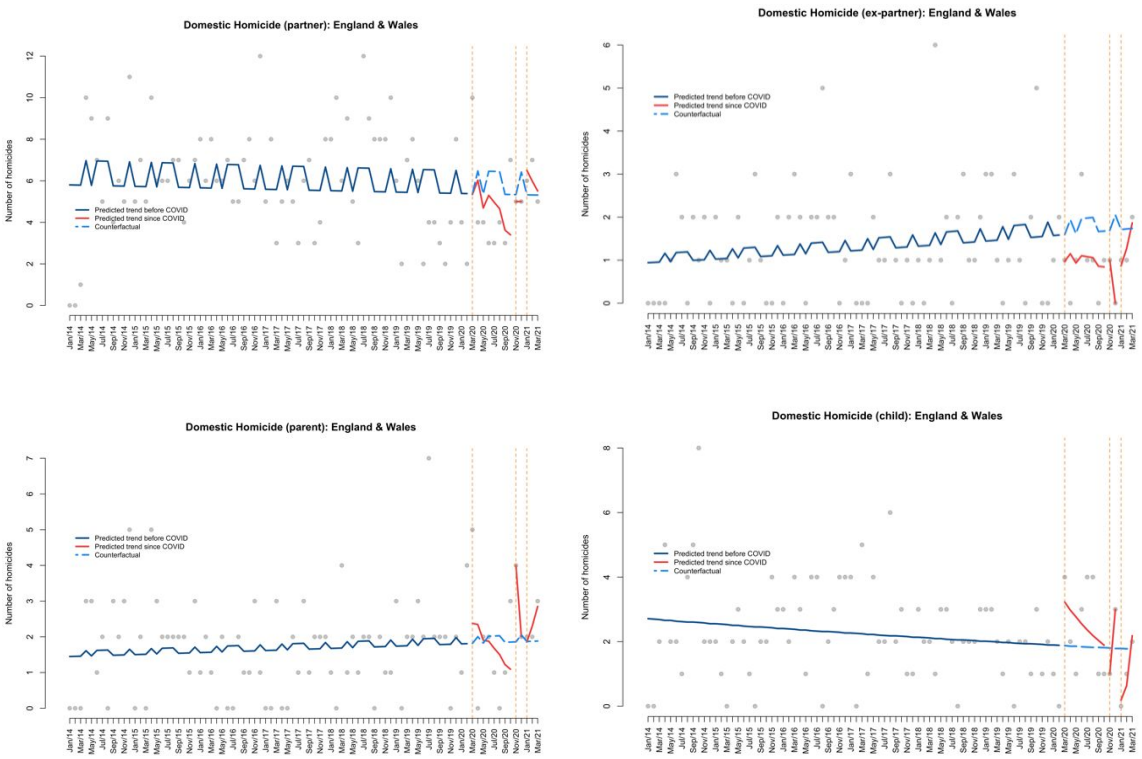
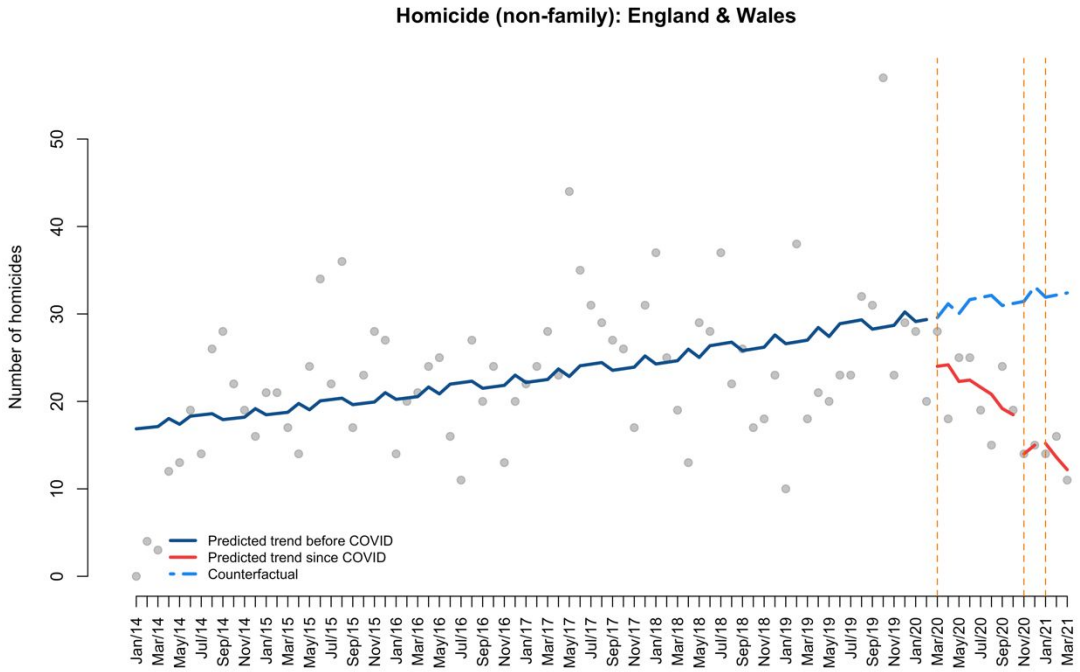


Figure 3: Interrupted time series analysis of all non-family homicides



## Appendix

**Table A1**. Poisson regression results for domestic and non-domestic homicides for England and Wales, excluding seasonal term (January 2014-March 2021)

| | Model 1 (all DH) | Model 2 (child) | Model 3 (parent) | Model 4 (partner) | Model 5 (ex-partner) | Model 6 (non-family) |
|---|---|---|---|---|---|---|
| (Intercept) | 2.54 (0.07)*** | 1.00 (0.15)*** | 0.41 (0.19)* | 1.84 (0.09)*** | 0.01 (0.22) | 2.75 (0.07)*** |
| Time | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) | 0.01 (0.00) | 0.01 (0.00)*** |
| First lockdown | 0.12 (0.23) | 0.61 (0.49) | 0.39 (0.57) | 0.08 (0.35) | -0.43 (0.79) | -0.09 (0.17) |
| Time since first lockdown | -0.05 (0.05) | -0.07 (0.10) | -0.11 (0.12) | -0.06 (0.07) | -0.03 (0.15) | -0.04 (0.03) |
| Second lockdown | 0.00 (0.66) | -1.69 (2.09) | 1.42 (1.24) | -0.14 (1.01) | 14.71 (1275.76) | -0.80 (0.60) |
| Time since second lockdown | -0.09 (0.42) | 1.10 (1.15) | -0.70 (0.87) | 0.00 (0.63) | -15.31 (1275.75) | 0.10 (0.37) |
| Third lockdown | -0.11 (0.44) | -3.52 (2.69) | -0.26 (1.09) | 0.20 (0.62) | -1.14 (1.53) | -0.47 (0.41) |
| Time since third lockdown | 0.04 (0.20) | 1.24 (0.98) | 0.21 (0.47) | -0.08 (0.29) | 0.38 (0.64) | -0.12 (0.19) |
| lag(non-family homicide) | | | | | | 0.01 (0.00)** |
| N | 87 | 87 | 87 | 87 | 87 | 86 |
| AIC | 519.2 | 314.5 | 300.3 | 423.2 | 271.9 | |
| BIC | 538.9 | 334.2 | 320.1 | 442.9 | 291.6 | |
| RMSE | 3.91 | 1.44 | 1.33 | 2.47 | 1.22 | 7.36 |

Notes. All models are calculated using robust standard errors. DH=domestic homicide. *p<.05, **p<.01, ***p<.001

**Table A2**. Poisson regression results for domestic and non-domestic homicides for England and Wales, including seasonality, first lockdown effects only (January 2014-March 2021)

| | Model 1 (all DH) | Model 2 (child) | Model 3 (parent) | Model 4 (partner) | Model 5 (ex-partner) | Model 6 (non-family) |
|---|---|---|---|---|---|---|
| (Intercept) | 2.49 (0.07)*** | 0.99 (0.16)*** | 0.38 (0.20) | 1.77 (0.10)*** | -0.05 (0.23) | 2.73 (0.08)*** |
| Time | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) | 0.01 (0.00) | 0.01 (0.00)*** |
| First lockdown | -0.09 (0.18) | 0.61 (0.40) | -0.05 (0.46) | -0.24 (0.28) | -0.66 (0.63) | -0.04 (0.14) |
| Time since first lockdown | 0.00 (0.02) | -0.07 (0.05) | 0.02 (0.05) | 0.02 (0.03) | 0.01 (0.08) | -0.05 (0.02)** |
| Seasonality | 0.10 (0.06) | 0.03 (0.15) | 0.06 (0.17) | 0.17 (0.09) | 0.15 (0.19) | 0.03 (0.05) |
| lag(non-family homicide) | | | | | | 0.01 (0.00)** |
| N | 87 | 87 | 87 | 87 | 87 | 86 |
| AIC | 512 | 312.7 | 297.1 | 415 | 268 | |
| BIC | 524.4 | 325 | 309.4 | 427.4 | 280.3 | |
| RMSE | 3.88 | 1.46 | 1.36 | 2.43 | 1.23 | 7.36 |

Notes. All models are calculated using robust standard errors. DH=domestic homicide. *p<.05, **p<.01, ***p<.001

**Table A3**. Poisson regression results for domestic and non-domestic homicides for England and Wales, excluding seasonality, first lockdown effects only (January 2014-March 2021)

| | Model 1 (all DH) | Model 2 (child) | Model 3 (parent) | Model 4 (partner) | Model 5 (ex-partner) | Model 6 (non-family) |
|---|---|---|---|---|---|---|
| (Intercept) | 2.54 (0.07)*** | 1.00 (0.15)*** | 0.41 (0.19)* | 1.84 (0.09)*** | 0.01 (0.22) | 2.75 (0.07)*** |
| Time | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) | 0.01 (0.00) | 0.01 (0.00)*** |
| First lockdown | -0.06 (0.18) | 0.62 (0.40) | -0.03 (0.45) | -0.18 (0.28) | -0.62 (0.63) | -0.03 (0.13) |
| Time since first lockdown | -0.01 (0.02) | -0.08 (0.05) | 0.02 (0.05) | 0.01 (0.03) | 0.00 (0.07) | -0.06 (0.02)** |
| lag(non-family homicide) | | | | | | 0.01 (0.00)** |
| N | 87 | 87 | 87 | 87 | 87 | 86 |
| AIC | 512.8 | 310.7 | 295.2 | 416.7 | 266.6 | |
| BIC | 522.7 | 320.6 | 305.1 | 426.6 | 276.4 | |
| RMSE | 3.94 | 1.46 | 1.36 | 2.49 | 1.23 | 7.37 |

Notes. All models are calculated using robust standard errors. DH=domestic homicide. *p<.05, **p<.01, ***p<.001