Journal of Family Violence
https://doi.org/10.1007/s10896-023-00613-8

ORIGINAL ARTICLE

Trends in Domestic Violence and Firearm Domestic Violence During COVID-19 in Five US Cities

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Accepted: 21 July 2023

Abstract

Purpose The COVID-19 pandemic and resulting social and economic disruptions may be associated with increased risk for reported domestic violence (DV) and firearm-involved DV (FDV). This study examines trends in DV, FDV, and the proportion of DV incidents that involved firearms (FDV/DV) in five large US cities before and during the coronavirus pandemic.

Method We examined monthly trends in DV and FDV during January 1, 2018 through December 31, 2020, which included the early part of the pandemic, using Poisson or negative binomial regressions. We used binomial regressions to assess trends in FDV/DV. We considered the onset of the pandemic to be March 2020.

Results Findings varied across outcomes and cities. DV decreased in three cities: Kansas City (Incidence Rate Ratio (IRR), 0.88; 95% confidence interval (CI), 0.86–0.90), Los Angeles (IRR, 0.99; 95% CI, 0.99–1.00), and Nashville (IRR, 0.99; 95% CI, 0.99–1.00) relative to trends pre-pandemic. FDV increased in three cities: Chicago (IRR, 1.05; 95% CI, 1.02–1.08), Los Angeles (IRR, 1.08; 95% CI, 1.06–1.10), and Nashville (IRR, 1.03; 95% CI, 1.01–1.05) and decreased in one: Kansas City (IRR, 0.89; 95% CI, 0.87–0.90). FDV/DV increased in three cities: Chicago (Risk Ratio (RR), 1.04; 95% CI, 1.02–1.06), Los Angeles (RR, 1.09; 95% CI, 1.07–1.11), and Nashville (RR, 1.04; 95% CI, 1.02–1.06).

Conclusions We found variation among cities in trends in reported DV, FDV, and FDV/DV during the first months of the coronavirus pandemic. Variation may be due to a number of factors, including differences in baseline DV and FDV rates; economic strain and unemployment; compliance with social distancing; firearm ownership and purchasing; the availability of DV services; delays in court processing and the early release of prisoners; and community-law enforcement relations.

Keywords Domestic violence · Firearms · COVID-19 · Violent offending

Introduction

The COVID-19 pandemic and consequent social and economic disruptions may be related to increased risk of domestic violence (DV), or violence between intimates and family members (Leslie & Wilson, 2020; McCrary & Sanga, 2021; Piquero et al., 2021; Richards et al., 2021), resulting in the United Nations labelling DV as a "shadow pandemic" (UN Women, 2020). Increases in DV have been observed in previous pandemics, including Ebola and Zika (International Rescue Committee, 2019; Meinhart et al., 2021).

The pandemic may have impacted DV in a number of ways. During the pandemic, the unemployment rate reached 13% in the second quarter of 2020 (Bureau of Labor Statistics, 2021), 2,772 million work hours were lost due to economic reasons during the first year (Asfaw, 2022), 18% of employed Americans reported primarily working remotely (US Census Bureau, 2022), and in 2020, 77% of K-12 students and 44% of university students were taking classes remotely (National Center for Education Statistics 2022a, b). These changes may have intensified stress and time spent at home. Increases in unemployment have been associated with increases in firearm violence and homicide during the COVID-19 pandemic (Schleimer et al., 2022). The conditions imposed by stay-at-home orders may have provided motivated offenders increased access to potential victims due to heightened contact at home (Bullinger et al., 2020),

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Published online: 30 October 2023

without the presence of suitable guardians to intervene, in line with routine activities theory. This could provide enhanced opportunity for one of primary tactics wielded by domestic abusers—social isolation of the victim (James et al., 2004; Stark, 2007). A meta-analysis of the association between COVID-19 stay-at-home orders and reported DV incidents in the US found an 8.1% increase on average, but estimates varied across cities (Piquero et al., 2021). However, studies with a longer time frame indicate that levels of DV stabilized after initial spikes in 911 calls for service during the pandemic (Leslie & Wilson, 2020; McCray & Sanga, 2021).

General strain theory (Agnew, 1992) may also inform our understanding of the pandemic's impact on DV, as the strains imposed by the pandemic may have increased individuals' propensity towards violence. Such strains include financial precarity (Center on Budget & Policy Priorities, 2021), difficulties at work (Gallup, 2021), unemployment (US Bureau of Labor Statistics, 2021), underemployment (Asfaw, 2022), and parental stress (Brown et al., 2020), due in part to the challenges of balancing work with supervision of remote schooling (Chu et al., 2021). These strains, and resulting maladaptive reactions, such as increased alcohol consumption (Barbosa et al., 2021), contribute to risk for DV (Caetano et al., 2001; Jasinski et al., 1997; Morgan & Boxall, 2022; Schneider et al., 2016; Taylor et al., 2009; Wathen et al., 2007).

Alternately, the pandemic may have contributed to decreases in DV and DV reporting. For example, while separation constitutes a major risk factor for DV homicide (Campbell et al., 2003), some data indicate that divorce has declined during the pandemic (Manning, & Payne, 2021). In addition, strains on DV shelter resources and fears over COVID-19 infection may have limited opportunities for survivors cohabitating with their abusers to exit or temporarily separate from their abusive relationships. Only about 56% of DV offenses were reported to police pre-pandemic (Reaves, 2017). Survivors describe a number of barriers to reporting, including access challenges, apprehension that they will not be believed or that the police response will be insufficient, and fears of the consequences of reporting, including retaliation from the perpetrator, lack of childcare, and financial or housing insecurity due to the loss of access to the perpetrator's resources (Robinson et al., 2020). The pandemic may have exacerbated such barriers. For example, in an effort to socially distance, almost three-quarters of law enforcement agencies in North America restricted custodial arrests for minor offenses (Lum et al., 2020), and a survey of law enforcement agencies in Illinois found that 78% reduced enforcement activities (Alexander & Ekici, 2020). Heightened economic precarity due to job losses or reduced work hours may have increased reliance on abusive partners for financial stability. Moreover, confinement with one's perpetrator may have reduced reporting to law enforcement due to the perpetrator's increased ability to monitor survivor communications. However, some subtypes of DV, such as FDV, may be less sensitive to pandemic-related forces impacting reporting, as among violent crimes, aggravated assault is the most likely to be reported to law enforcement (Gramlich, 2020).

Increases in firearm purchasing during the pandemic cause concern, as firearm access is associated with a fivefold increase in the odds of intimate partner femicide (Campbell et al., 2003). Perpetrators in over half of all intimate partner homicides and homicide-suicides use a firearm(Sivaraman et al., 2019). Non-fatal firearm use in DV is also a common tactic; in one sample, 47% of women living in DV shelters reported experiencing either firearm threats or abuse over the prior 12 months (Lynch et al., 2021). Firearm violence increased dramatically during the pandemic in the United States. One study, which examined the time period of March 2020 through February 2021, found 8,138 excess firearm-related incidents, 10,222 excess non-fatal firearm-related injuries, and 4,381 excess firearm-related deaths (Sun et al., 2022). Research specifically on firearm-involved DV during the pandemic remains limited. One exception includes Schleimer et al. (2021), who found an association between excess state-level firearm purchases and firearm DV injuries in April and May of 2020. In addition, a recent national survey found that pandemic firearm purchasers reported higher rates of occasionally/frequently punching or hitting their most recent intimate partner (56%) than did non-owners (2%) and pre-pandemic firearm owners (3%) (Hicks et al., 2022). Concerns over an abusive partner's intent to purchase a firearm also emerged as a theme in a qualitative thematic analysis of discussion forum posts written by survivors of DV during the pandemic (Lyons & Brewer, 2021).

The current study examines trends in police-reported incidents of DV, firearm-involved DV (FDV), and the proportion of DV incidents that involved firearms (FDV/DV) in five large US cities before and during the first months of the coronavirus pandemic, considering March 2020 as the onset of the pandemic in each city.

Methods

Data

Cities were included if they made data on police-reported DV and FDV incidents during our study period publicly available through open data portals. We identified cities for potential inclusion by reviewing public information sources and government websites. After reviewing 22 city

data portals, we identified five cities with sufficient information to identify DV and FDV incidents and meet inclusion criteria. We obtained police-reported crime incident data with DV and firearm information from publicly available data portals for Chicago, IL; Cincinnati, OH; Kansas City, MO; Los Angeles, CA; and Nashville, TN from January 1, 2018 through December 31, 2020, covering the first 10 months of the pandemic, largely prior to the availability of vaccines.

Measures

Procedures for identifying DV and FDV incidents were city specific. For the DV variables, in four cities there were variables flagging DV incidents, and in the fifth city, we used crime codes associated with each incident to identify DV incidents. For the FDV variables, there was one city that had a variable flagging firearm-related incidents, and for the remaining four cities, we used crime descriptions or weapons variables and coded DV incidents involving firearms as FDV incidents (See Supplementary Online Resource for additional information).

Analysis

We conducted a single-series interrupted time series analysis (Bernal et al., 2017). We examined 3 outcomes: number of reported DV incidents, number of reported FDV incidents, and FDV as a proportion of DV, and aggregated all outcomes to a monthly time series from January 1, 2018 to December 31, 2020. Models included an indicator for the start of the pandemic (i.e., March 2020), an overall linear time trend, sine–cosine functions for monthly and seasonal cycles (Ramanathan et al., 2020), and an interaction between the pandemic indicator and time.

We modeled DV and FDV with Poisson regression, or negative binomial regression in cases of over dispersion, stratifying by city and including an offset for the log of the population. The model was as follows:

$$log(Y_t) = \beta_0 + \beta_1 * time_t + \beta_2 * March2020_t + \beta_3 * time_t * March2020_t + \sin + cos + log(pop_t)$$

where β_0 = the base level of the outcome prior to March 2020, β_1 = the base trend over time prior to March 2020, β_2 = the change in intercept post- vs. pre-March 2020, β_3 = the change in trend post- vs. pre-March 2020, sin and cos = sine–cosine functions for monthly and seasonal cycles, and log(pop_t) = the log of the population included as an offset. Time was centered at the start of the intervention, March 2020 (Bernal et al., 2021).

For the proportion of DV incidents involving firearms, we used city-stratified binomial regressions for aggregate data with the number of trials as the total count of DV incidents. The model was as follows, with P_t representing the probability of the outcome at time *t,* and other terms defined as above:

$$log\left(\frac{P_t}{1-P_t}\right) = \beta_0 + \beta_1 * time_t + \beta_2 * March2020_t + \beta_3 * time_t * March2020_t + \sin + \cos$$

Coefficients were exponentiated and interpreted as incidence rate ratios (IRR) for the DV and FDV outcomes and as risk ratios (RR) for the firearm FDV as a proportion of DV outcomes. RRs should not be interpreted as the absolute risk of FDV. All models employed Newey-West standard errors to correct for heteroskedasticity and/or autocorrelation.

We present estimates for the level shift associated with the pandemic, the pre-pandemic trend, and the change in trend associated with the pandemic. We generated plots of the analytic models after adjusting for seasonality. To assess the sensitivity of the models to different interruption points, we also conducted sensitivity analyses to examine earlier, pre-pandemic interruption dates of January and February 2020.

Analyses were conducted using Stata 15 (College Station, TX: StataCorp LP). The institutional review board at the University of California Davis approved this study.

Table 1 Association of the pandemic onset and domestic violence

	IRR	95% CI Lower Bound	95% CI Upper Bound
Chicago			
Pandemic	0.90	0.17	4.73
Time	1.00	0.95	1.05
Pandemic x Time	1.01	0.78	1.30
Cincinnati			
Pandemic	0.81**	0.71	0.92
Time	1.01***	1.01	1.01
Pandemic x Time	0.99	0.97	1.01
Kansas City			
Pandemic	0.96	0.80	1.15
Time	1.03***	1.02	1.04
Pandemic x Time	0.88***	0.86	0.90
Los Angeles			
Pandemic	0.92**	0.88	0.97
Time	1.00†	1.00	1.00
Pandemic x Time	0.99*	0.99	1.00
Nashville			
Pandemic	1.07***	1.03	1.12
Time	1.00***	0.99	1.00
Pandemic x Time	0.99**	0.99	1.00

***=$p \leq .001$, **=$p \leq .01$ *=$p \leq .05$, †=$p \leq .10$. Time scale is in months. The pandemic onset is March 2020

Results

We observed an immediate increase in reported DV in Nashville (IRR, 1.07; 95% confidence interval (CI), 1.03–1.12) and decreases in Cincinnati (IRR, 0.81; 95% CI, 0.71–0.92) and Los Angeles (IRR, 0.92; 95% CI, 0.88–0.97) associated with the start of the pandemic (Table 1; Fig. 1a–e). After the onset of the pandemic, DV trends (i.e., the post-interruption slope compared to the pre-interruption slope) decreased in Kansas City (IRR, 0.88; 95% CI, 0.86–0.90), Los Angeles (IRR, 0.99; 95% CI, 0.99–1.00), and Nashville (IRR, 0.99; 95% CI, 0.99–1.00) compared with trends prior to the pandemic.

Pandemic onset was associated with an immediate increase in reported FDV in Chicago (IRR, 1.33; 95% CI, 1.08–1.63), Cincinnati (IRR, 1.40; 95% CI, 1.13–1.74), Kansas City (IRR, 1.35; 95% CI, 1.12–1.64), and Nashville (IRR, 1.30; 95% CI, 1.08–1.57), and a decrease in Los Angeles (IRR, 0.62; 95% CI, 0.56–0.69) (Table 2; Fig. 2a–e). We observed a relative increase in the trend of FDV following the onset of the pandemic compared with trends prior to the pandemic in Chicago (IRR, 1.05; 95% CI, 1.02–1.08), Los Angeles (IRR, 1.08; 95% CI, 1.06–1.10), and Nashville (IRR, 1.03; 95% CI, 1.01–1.05), and a relative decrease in Kansas City (IRR, 0.89; 95% CI, 0.87–0.90).

There was an immediate increase in the proportion of DV incidents that involved firearms in Chicago (RR, 1.48; 95% CI, 1.22–1.80), Cincinnati (RR, 1.70; 95% CI, 1.39–2.08), Kansas City (RR, 1.39; 95% CI, 1.20–1.60), and Nashville (RR, 1.21; 95% CI, 1.00–1.46), and a decrease in Los Angeles (RR, 0.68; 95% CI, 0.61–0.74) associated with the start of the pandemic (Table 3; Fig. 3a–e). Relative to trends prior to the pandemic, trends in the proportion of DV incidents that involved firearms increased after the onset of the pandemic in Chicago (RR, 1.04; 95% CI, 1.02–1.06), Los Angeles (RR, 1.09; 95% CI, 1.07–1.11), and Nashville (RR, 1.04; 95% CI, 1.02–1.06).

As a sensitivity analysis, we examined earlier interruption dates of January 2020 (See Supplementary Online Tables 3–5; Supplementary Online Figs. 1a–e, 2a–e, 3a–e) and February 2020 (See Supplementary Online Tables 6–8; Supplementary Online Figs. 4a–e, 5a–e, 6a–e). Sensitivity analyses revealed fewer changes in DV and FDV after a January and February 2020 interruption than a March 2020 interruption. While changes in trends in DV and FDV were observed in three and four cities after the March 2020 interruption respectively, there was only a change in trend for DV in one city and a change

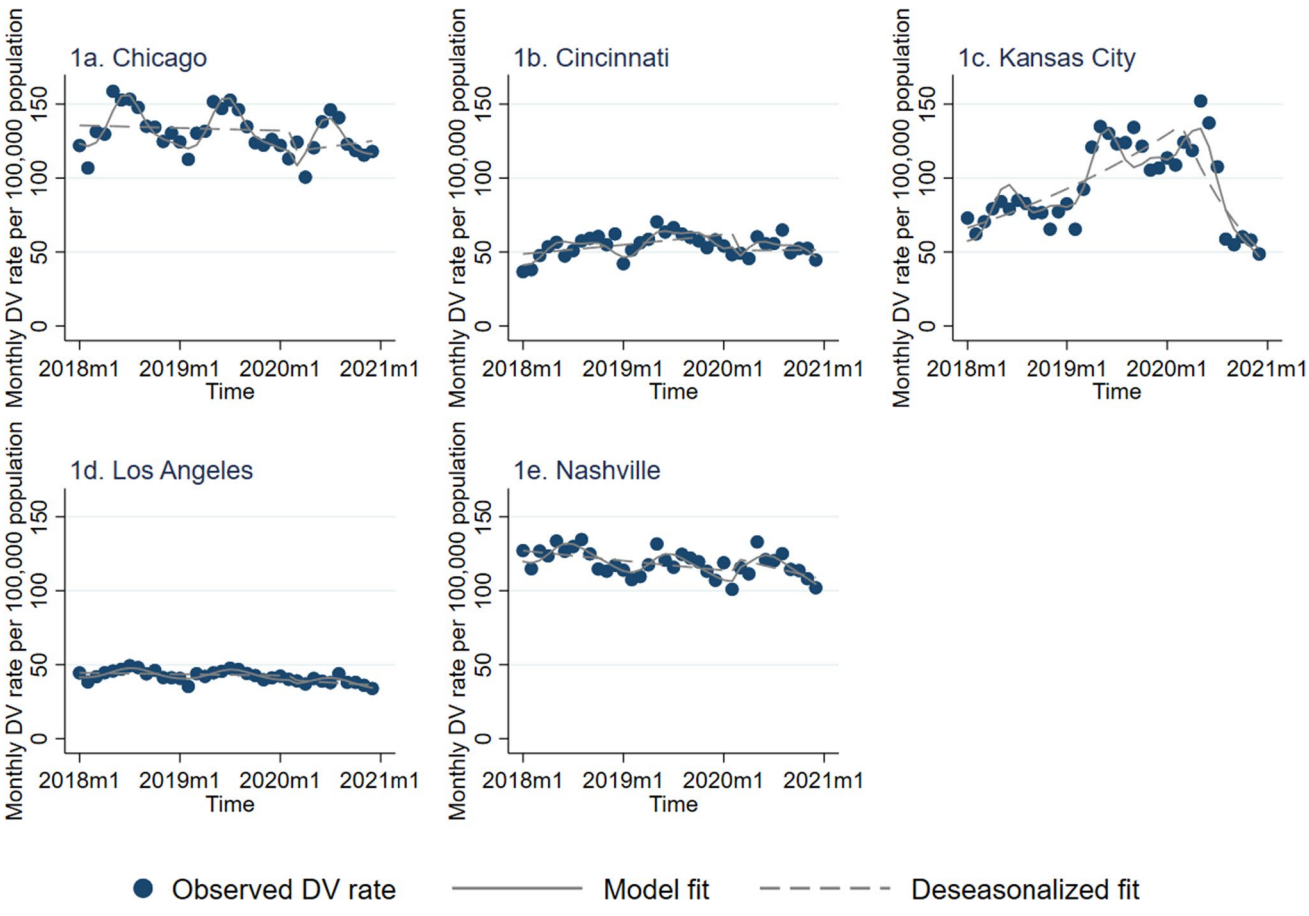

Fig. 1 **a–e** Monthly DV rate per 100,000 in 2018–2020. Note: Domestic violence (DV)

Table 2 Association of the pandemic onset and firearm domestic violence

	IRR	95% CI Lower Bound	95% CI Upper Bound
Chicago			
Pandemic	1.33**	1.08	1.63
Time	0.99	0.99	1.00
Pandemic x Time	1.05**	1.02	1.08
Cincinnati			
Pandemic	1.40**	1.13	1.74
Time	1.00	1.00	1.01
Pandemic x Time	1.00	0.97	1.03
Kansas City			
Pandemic	1.35**	1.12	1.64
Time	1.02***	1.02	1.03
Pandemic x Time	0.89***	0.87	0.90
Los Angeles			
Pandemic	0.62***	0.56	0.69
Time	1.01***	1.01	1.02
Pandemic x Time	1.08***	1.06	1.10
Nashville			
Pandemic	1.30**	1.08	1.57
Time	1.00	0.99	1.01
Pandemic x Time	1.03**	1.01	1.05

***=$p \leq .001$, **=$p \leq .01$*=$p \leq .05$, †=$p \leq .10$. Time scale is in months. The pandemic onset is March 2020

in trend for FDV in two cities after the January and February interruptions. Changes in trends in the proportion of DV incidents that involved firearms were observed in three cities after the onset of the pandemic, and in two and four cities following the January and February interruptions, respectively. The cities with observed changes varied between models.

Discussion

In this study, we found variation among five cities in the associations between the onset of the COVID-19 pandemic and reported DV, FDV, and the proportion of DV incidents that involved firearms. Compared to pre-pandemic trends, trends in reported DV decreased in three and did not change in two cities. Trends in reported FDV increased in three cities, decreased in one, and did not change in one city. Trends in the proportion of DV incidents that involved firearms increased in three cities and did not change in two cities. Notably, Los Angeles and Nashville observed a decreasing trend in DV subsequent to the onset of the pandemic but increasing trends in FDV and the proportion of DV incidents that involved firearms. Overall, associations were generally small. Sensitivity analyses indicated that a March 2020

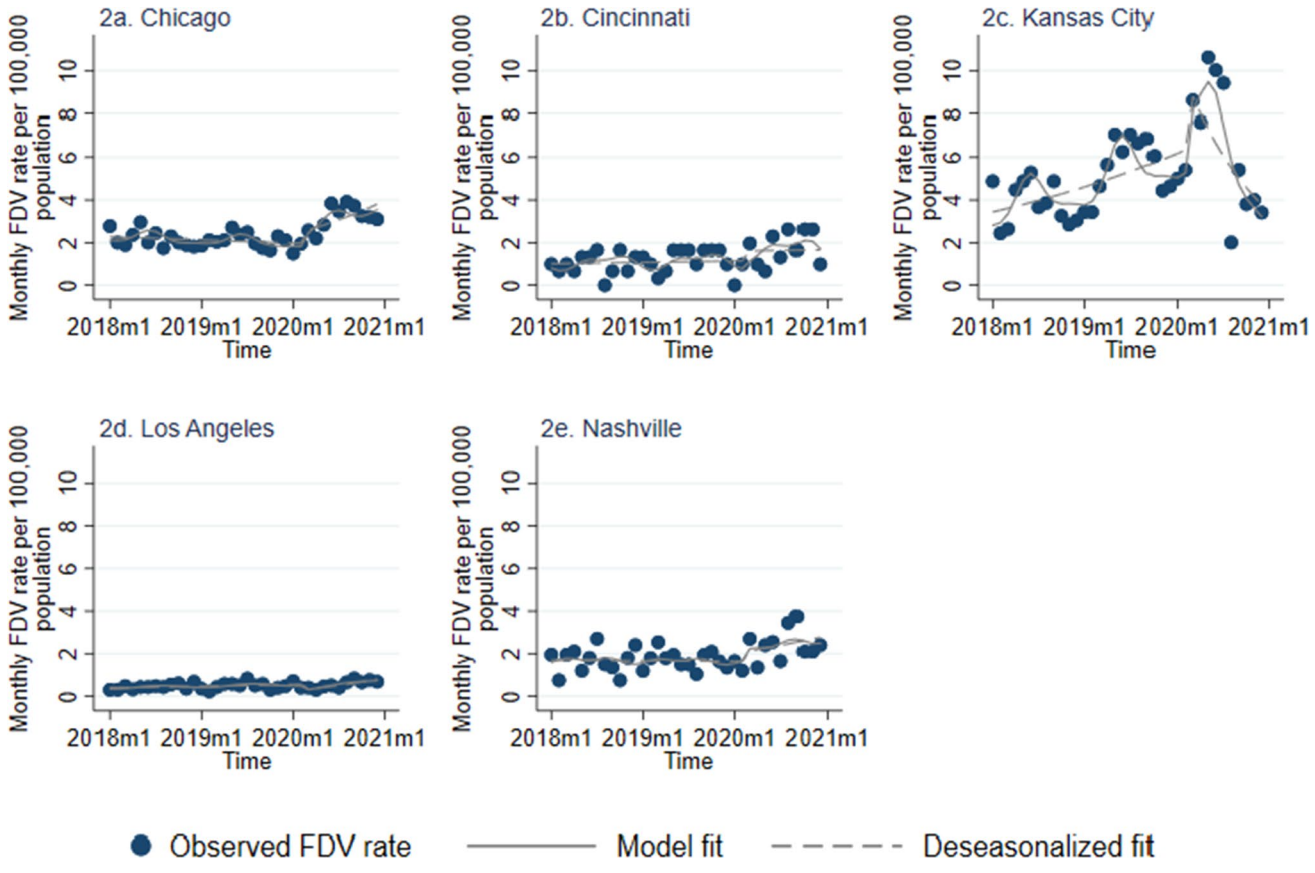

Fig. 2 **a**–**e** Monthly FDV rate per 100,000 in 2018–2020. Note: Firearm domestic violence (FDV)

Table 3 Association of the pandemic onset and firearm domestic violence as a proportion of domestic violence

	RR	95% CI Lower Bound	95% CI Upper Bound
Chicago			
Pandemic	1.48***	1.22	1.80
Time	1.00	0.99	1.00
Pandemic x Time	1.04***	1.02	1.06
Cincinnati			
Pandemic	1.70***	1.39	2.08
Time	1.00	0.99	1.00
Pandemic x Time	1.01	0.98	1.04
Kansas City			
Pandemic	1.39***	1.20	1.60
Time	1.00	0.99	1.01
Pandemic x Time	1.01	0.99	1.04
Los Angeles			
Pandemic	0.68***	0.61	0.74
Time	1.02***	1.01	1.02
Pandemic x Time	1.09***	1.07	1.11
Nashville			
Pandemic	1.21***	1.00	1.46
Time	1.00	1.00	1.01
Pandemic x Time	1.04***	1.02	1.06

***=$p \leq .001$, **=$p \leq .01$*=$p \leq .05$, †=$p \leq .10$. Time scale is in months. The pandemic onset is March 2020

interruption point was more uniformly associated with the outcomes of interest than earlier interruption points.

The observed decrease in reported DV contrasts with the increases in reported FDV, with the exception of one city. These results may reflect a decrease in reporting of DV relative to FDV. Research on family conflict and violence during the pandemic has found that youth reported difficulties contacting others and disclosing their experiences and often experienced restricted contact with safe places and persons (Sinko et al., 2022). Likewise, adults indicated that they were less likely to contact law enforcement if the time spent at home with their abuser had increased (Morgan et al., 2022). However, non-firearm DV may be more sensitive to risk-benefits calculations of reporting during a stay-at-home order when an abuser is present compared to the more serious threat of FDV. These results align with other research documenting increases in firearm violence during the pandemic (Sun et al., 2022). Moreover, while Gosangi et al. (2020) found an overall decrease in the number of DV survivors seeking hospital care during the pandemic, the incidence of physical DV and high-risk abuse, including incidents involving the use of weapons, increased, as did the severity of injuries, suggesting that survivors may have delayed seeking help during the pandemic until experiencing more serious DV. Likewise, our findings for FDV and for FDV as a proportion of DV are consistent with those of Schleimer et al. (2021), who observed an increase in the average statewide monthly rate of DV-related firearm injuries from 0.05 per 10,000 population in January 2018 through February 2020 to 0.07 per 100,000 in March through July 2020. The increase in FDV and FDV as a proportion of DV compared to pre-pandemic trends is concerning, as abuser firearm access is a risk factor for lethality (Campbell et al., 2003). Interventions that prohibit firearm access, such as domestic violence restraining orders and extreme risk protective orders, as well as prohibitions associated with misdemeanor DV convictions, may prove valuable to address the potential increase in risk of FDV during the pandemic.

Prior work examining averages across cities largely documents increases in reported DV associated with the pandemic and related restrictions (Leslie & Wilson, 2020; McCrary & Sanga, 2021; Piquero et al., 2021; Richards et al., 2021), but has found local variation consistent with our findings (Nix & Richards, 2021; Piquero et al., 2021; Richards et al., 2021). Such variation may result from differences in baseline DV and FDV rates; economic strain and unemployment; compliance with social distancing recommendations; firearm ownership and pandemic-related firearm purchasing; the availability of DV hotlines, shelters, and other victim services; delays in court processing and early release of prisoners; and community law enforcement relations. For instance, according to the COVID-19 Google Global Mobility Report, as of April 15, 2020, the percent change from the baseline (January and February 2020) for time spent at home ranged from 16% for Jackson County (Kansas City, MO) to 25% for Cook County (Chicago, IL).

Given the multitude of DV risk factors associated with the impacts of the pandemic, risk assessment, such as the use of a screening tool to ascertain risk of lethality (which screens for risk factors such as firearm access) (Campbell et al., 2003), risk management, and safety planning may be particularly relevant under the present conditions (Moffitt et al., 2020). Risk management involves collaboration with perpetrators to develop methods of mitigating the risk of DV, and safety planning consists of the development of strategies for survivors to manage (Davies, 2019) and escape from the violence. Both may require attention to mental health, addiction, financial and housing security, employment, and childcare challenges.

Financial support may play a role in reducing DV, as Leslie and Wilson (2020) found that after an initial increase in DV calls to 911 following the onset of the pandemic, rates decreased concurrent with the release of CARES Act checks. The pandemic's effects on unemployment particularly affected women, with women losing almost one million more jobs than men (The Center for American Progress, 2021) and two times as many women as men reporting becoming unemployed during the COVID-19 pandemic due to a lack of childcare (Modestino, 2020). Women of color, who experience higher risk of DV (Smith et al., 2017), were

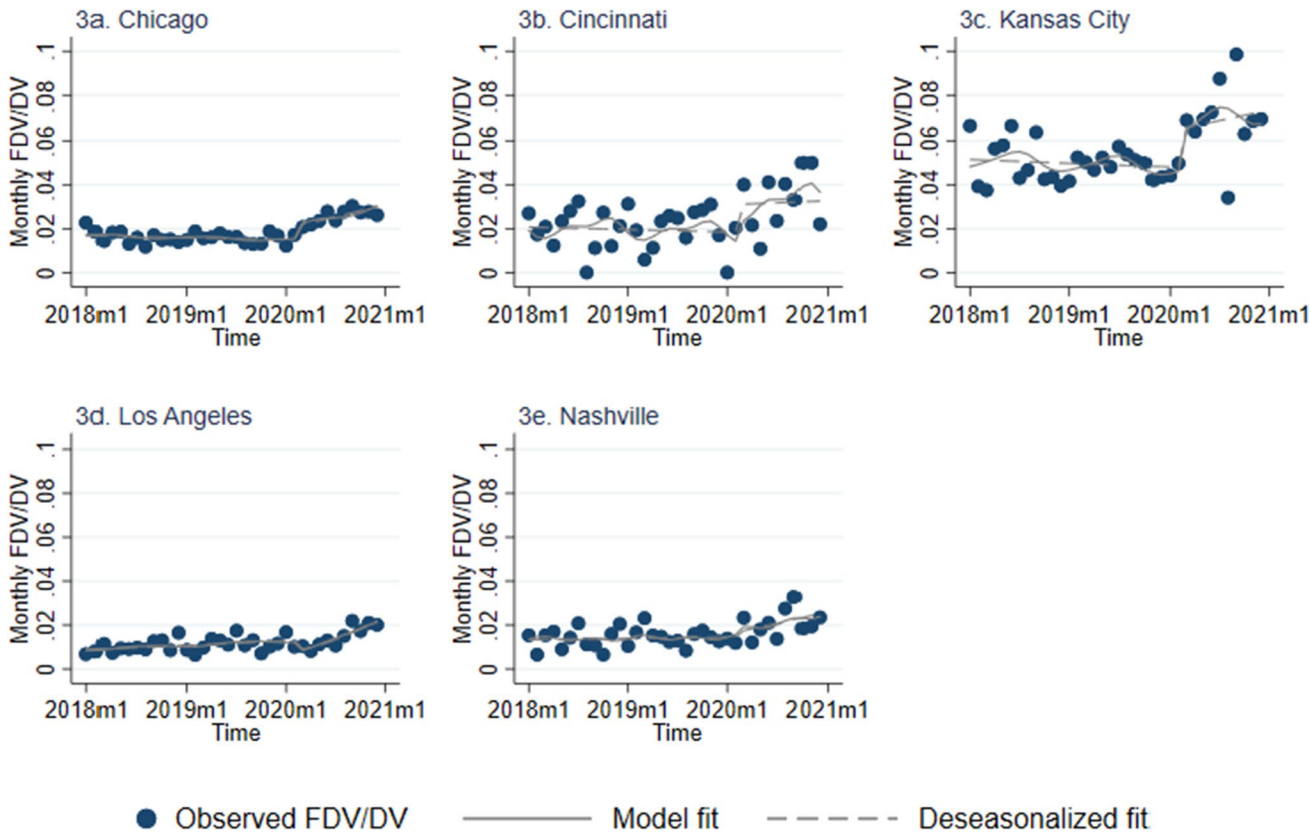

Fig. 3 **a**–**e** Monthly proportion of DV incidents that involved firearms in 2018–2020. Note: Domestic violence (DV), the proportion of DV incidents that involved firearms (FDV/DV)

disproportionately impacted by unemployment (Bureau of Labor Statistics, 2023). In one study, survivors of DV during the pandemic identified financial strains as a risk factor for DV and reported financial dependence on their partner; however, survivors who received government support reported greater confidence in the likelihood of leaving their abuser (Lyons & Brewer, 2021).

Increasing access to shelters and alternative housing may be an additional target for intervention. During the pandemic, the CARES Act provided $2 million for the National Domestic Violence Hotline and $45 million for family violence shelter grants. Nonetheless, the capacity of shelters became strained during the pandemic, indicating additional need for resources (Emezue, 2020). Technological innovations to communicate with survivors are of particular importance during a pandemic, such as phone, chat, text, video, and web-based communication and online safety planning apps, as face-to-face interactions with survivors become a danger to DV service providers (Moffitt et al., 2020). Targeting risk factors at the institutional, community, and societal levels is also important. This may include strengthening emergency response capacities, and increasing access to support services, affordable housing or shelters, safety planning, legal assistance, and health care systems (Dutton et al., 2015), in a manner that is responsive to demographic differences and disparities in the burden of DV and FDV.

Limitations

This study is subject to limitations. Definitions and protocols regarding documentation of DV varied between jurisdictions. We used law enforcement data; however, survivors report just over half of all DV incidents to police (Reaves, 2017), and survivors' proximity to abusers during the pandemic may have depressed reporting, particularly since the overwhelming majority of DV suspects are not at the scene when police arrive (Campbell et al., 2020), potentially indicating that survivors wait until the abuser has left to contact law enforcement. Examining law enforcement data in combination with DV service provider and DV restraining order data may strengthen our understanding of trends in reported DV and FDV during the pandemic. Our results may not generalize to other cities as our data set was limited to those with sufficient information to identify DV and FDV incidents; these cities may differ from those who do not provide such data. Our sample was restricted to cities; results may differ in rural areas, where law enforcement response

time may be a barrier to reporting, as well as ownership of pets or livestock (Barrett et al., 2018). The Los Angeles data portal solely recorded DV for simple and aggravated assaults, excluding homicide. RRs should not be interpreted as the absolute risk of FDV.

Conclusion

The association between the onset of the COVID-19 pandemic and DV, FDV, and FDV as a proportion of DV varied across five US cities, with decreases in reported DV and increases in reported FDV and the proportion of DV incidents that involved firearms observed in three cities. Findings demonstrate the importance of examining crime rates jurisdictionally to avoid aggregation bias and studying FDV specifically. Moreover, rather than relying on information on statewide or national trends, policymakers, practitioners, and stakeholders should use community-based data to inform their understanding of local needs.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10896-023-00613-8.

Funding Support for this research was provided by grants SG-20–42400 from the Joyce Foundation, 2019–1728 from the Heising-Simons Foundation, and the California Firearm Violence Research Center. Sponsors had no role in study design; collection, analysis, and interpretation of data; writing the report; and the decision to submit the report for publication.

Declarations

Conflict of Interest The authors have no conflict of interest to declare.

Ethical approval The ethics approval reference number for this study is IRB ID #1609326.

Authors Contribution ET, JS, and GW conceptualized the study. ET, JS, and CM conceived of and designed the analysis. ET collected the data, performed the analysis, and drafted the manuscript. All authors contributed to the interpretation of the results, reviewed and revised the manuscript, and gave approval of the final manuscript.

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