The COVID-19 Pandemic, Domestic Violence and the Riskiness of Alcohol Consumption*

Aaron Chalfin[1], Shooshan Danagoulian[2], and Monica Deza[3]

[1]Department of Criminology, University of Pennsylvania
[2]Department of Economics, Wayne State University
[3]Department of Economics, City University of New York – Hunter College

April 3, 2021

Abstract

Research Summary: A large body of evidence documents a link between alcohol consumption and family violence. Recent scholarship suggests that since the onset of the COVID-19 pandemic and subsequent stay-at-home orders, there has been a marked increase in domestic violence. This research considers an important mechanism behind the increase in domestic violence: an increase in the *riskiness* of alcohol consumption. We combine 911 call data with newly-available high-resolution microdata on visits to bars and liquor stores in Detroit, MI. We regress the daily number of violent incidents in a community on the number of visits to two different types of alcohol outlets — bars and liquor stores — net of a set of granular interacted fixed effects. The strength of the relationship between visits to alcohol outlets and domestic violence more than doubles starting in March 2020. On the other hand, we find considerably more limited evidence with respect to non-domestic assaults.

Policy Implications: Beyond providing novel evidence for the transmission of family violence during the COVID-19 pandemic, these results support a more enduring conclusion — that it is not alcohol consumption per se but alcohol consumption at home that is a principal driver of domestic violence. An implication of this research is that while regulations that raise the cost of outdoor drinking may lead to net declines in violence, they may yield unintended consequences for family violence to the extent that they push drinking indoors.

Keywords: Alcohol consumption, domestic violence

*Correspondence: Shooshan Danagoulian, Department of Economics, Wayne State University, Detroit, MI 48202. E-Mail: fr4523@wayne.edu.

1 Introduction

The statistics on domestic violence are grim: 1 in every 4 women in the United States will experience violence at the hands of an intimate partner during her lifetime (Alhabib et al., 2010). The consequences of domestic violence include not only the shorter-term physical injuries (Le et al., 2001; Plichta, 2004; Sheridan and Nash, 2007; Ellsberg et al., 2008) and mental harms (Roberts et al., 1998; Tolman and Rosen, 2001; Humphreys and Thiara, 2003) that are the immediate consequences of abuse, but also longer-term medical issues such as chronic pain (Wuest et al., 2008), depression (Dienemann et al., 2000), sexually-transmitted diseases (Martin et al., 1999), and post-traumatic stress disorder (Jones et al., 2001). Given that approximately half of all domestic violence occurs in households where children under the age of 12 are present (Fantuzzo and Fusco, 2007), domestic violence imposes a terrible burden, not only on the victim of the abuse, but also on children who witness it (Holt et al., 2008; Bair-Merritt et al., 2010). Given the psychosocial malleability of children, domestic violence has profound implications for their cognitive and social development (Huth-Bocks et al., 2001; Koenen et al., 2003; Ybarra et al., 2007; Enlow et al., 2012). Sadly, this burden compounds itself generation after generation, becoming an engine for the intergenerational transmission of violence (Simons et al., 1995; Simons and Johnson, 1998; Ehrensaft et al., 2003; Currie et al., 2018).

Alcohol use is implicated in approximately 50 percent of all violent crimes and sexual assaults in industrialized nations (Heinz et al., 2011). It is therefore unsurprising that a large literature in criminology, public health and economics establishes a correlational and, more recently, a causal link between problematic drinking and violence. Research shows that both the perpetration of violence (Kypri et al., 2014; Carpenter and Dobkin, 2015; Gatley

et al., 2017) and victimization (Chalfin et al., 2019) increase discretely at age 21, the age at which individuals can legally drink in the United States. There is likewise evidence that policy levers such as Sunday liquor laws (Heaton, 2012; Han et al., 2016), "wet laws" that expand the footprint of drinking establishments (Anderson et al., 2017), underage driving laws (Carpenter, 2007), and alcohol excise taxes (Markowitz and Grossman, 1998, 2000; Cook and Durrance, 2013) can have important impact on public safety as well as morbidity (Carpenter and Dobkin, 2017) and mortality rates (Carpenter and Dobkin, 2009). The relationship between alcohol consumption and violence seems to be driven particularly by "extreme" drinking (Carpenter et al., 2016), including drinking that is fueled by "college party culture" (Lindo et al., 2018).

Owing to its effects on aggression (Bushman, 2002; Heinz et al., 2011) and the ease with which it can change the nature of routine activities among members of the same household (Livingston, 2010; Roman and Reid, 2012), alcohol consumption has been linked, in particular, to violence between family members (Markowitz and Grossman, 1998, 2000), especially intimate partners (Foran and O'Leary, 2008; Caetano et al., 2001; Thompson and Kingree, 2006). Given the large volume of alcohol consumed by the heaviest drinkers (Watts, 2020) and the frequency of contact between intimate partners, even a modest relationship between alcohol consumption and aggression can lead alcohol to be among the primary drivers of domestic violence.

The COVID-19 pandemic and its many accompanying disruptions to economic and social life have changed the world both unexpectedly and dramatically. Consistent with the expectations of many observers (Taub, 2020), recent scholarship has documented a notable increase in domestic violence since March 2020 in the United States (Boserup et al., 2020;

Leslie and Wilson, 2020; Piquero et al., 2020) and in other countries including Uganda (Mahmud and Riley, Mahmud and Riley), Peru (Aguero, 2020), Mexico (Silverio-Murillo and De La Miyar, 2020), and India (Ravindran and Shah, 2020). Scholars have proposed numerous mechanisms for this increase, including the stress brought about by job loss and material deprivation, as well as the dramatic increase in opportunities for violence given that lockdowns have caused individuals to spend more time at home together. Beyond the direct effects of the pandemic, the recent literature has noted that the pandemic and its associated stay-at-home-orders could increase exposure to violence for those who are not safe at home through a number of mechanisms (Peterman et al., 2019).

Alcohol consumption is another mechanism through which changing household conditions can affect domestic violence. Stay-at-home orders have dramatically reduced the degree to which people drink in bars or restaurants, thus pushing alcohol consumption into residential settings (Usher et al., 2020). The majority of recent studies suggest that alcohol consumption has increased since March 2020 (Biddle et al., 2020; Brenmer, 2020; Lechner et al., 2020; Pollard et al., 2020; Rodriguez et al., 2020; Usher et al., 2020), though there is no definitive empirical evidence of such a trend (Chodkiewicz et al., 2020; Kim et al., 2020; Rehm et al., 2020). To the extent that residential and non-residential alcohol consumption are differentially conducive to violence — especially domestic violence — the COVID-19 pandemic provides an unfortunate but unique opportunity to better understand the extent to which *venue* of alcohol consumption differentially affects violence. While the stressful conditions of living during a global pandemic may exert an independent effect on community violence, by disambiguating between the effects of alcohol consumption on domestic violence and other types of violence, we are able to net out the more general effects of the

pandemic.

We merge public microdata on 911 calls for police service in Detroit, MI, with newly available–and remarkably detailed–geo-location data that allows us to measure daily visits to bars and liquor stores. Collapsing the data to the zip code-by-day level allows us to observe relationships between community violence and visits to establishments that sell alcohol across space and time. Though we use natural variation in visits to alcohol outlets to identify a treatment effect, by using a series of highly granular fixed effects, our analysis allows us to account for a broad array of potentially confounding variables such as time-invariant neighborhood characteristics, daily shocks to the crime environment that differ between high- and low-crime zip codes, adverse economic impacts of the pandemic at the city and zip code level, and changing adherence to stay-at-home orders and associated day-to-day routines. We likewise condition on visits to restaurants and food stores both as a key falsification check and in order to account for broader trends in economic activity and the use of public space.

Consistent with prior research, during the pre-pandemic period, we observe a positive relationship between visits to both bars and liquor stores and general violence. After the onset of the COVID-19 pandemic and the subsequent stay-at-home order issued by Michigan Governor Gretchen Whitmer, there is evidence that the relationship between alcohol consumption and violence — and especially domestic violence — strengthens considerably. This effect is especially large for visits to liquor stores which accounts for the majority of alcohol purchases in the post-pandemic period and is even stronger when we flexibly account for temporal spillovers from alcohol purchases. We find considerably more limited evidence for a change in the relationship between alcohol purchases and non-domestic assaults, which

is consistent with the idea that alcohol consumption at home has a particularly close nexus to domestic violence. Importantly, we do not observe effects of visits to restaurants or grocery stores indicating that the effects are unlikely to be driven by daily changes in social or economic life as the effects of the pandemic have ebbed and flowed. With respect to public policy, the present study suggests that regulations such as "wet laws" which raise the cost of drinking outside the home might ultimately have unintended consequences for domestic violence.

The remainder of the paper is organized as follows. In Section 2 we present our data and empirical models. Section 3 presents our findings and Section 4 concludes.

2 Data and Methods

2.1 Data

2.1.1 Customer Visit Data

We measure the number of visits to establishments that sell alcohol using data from SafeGraph's *Patterns* platform, which organizes location data for points of interest (POIs) relevant to business. The SafeGraph data, generously made available at no cost to researchers, consists of high-resolution cellular device location data that link tracked devices to specific commercial establishments in space and time. The data combine information on more than 4 million points of interest in the United States with visit patterns by cellular device holders collected by SafeGraph using location tracking apps. The data contain information on POI location name, address, North American Industry Classification System (NAICS) code, brand association, and business descriptor categories as well as the volume of daily visits to each establishment. We restrict the data to visits to points of interest

within Detroit determined by zip code. Using NAICS codes, we further restrict the data to visits to venues of sale or service of alcohol: bars and restaurants with an explicit focus on alcoholic beverages (NAICS 722410, 722511)[1]; and beer, wine, and liquor stores (NAICS 445310, henceforth liquor stores). We also include grocery stores (NAICS 445110, 445120, 445210, 445220, 445230, 44591, 445292)[2] and full service restaurants excluding bars (NAICS 722511) as venues capturing larger economic activity, but which also sell or serve alcohol.

While the data allow us to identify foot traffic to alcohol outlets with remarkable granularity, they are subject to three limitations. First, the data do not enables us to track every cellular phone in the United States. Since companies like SafeGraph collect location information from cellular device users using a variety of downloaded apps, this could potentially lead to selection bias. On this point, we note that SafeGraph has explored the potential selection bias of tracked users by comparing their geography, education, and household income to census data, finding a high correlation, implying that the sample of users is representative of the population at the census block group level.[3] Second, and related, these data neither constitute a comprehensive count of visits to a particular POI, as they are not based on the universe of cellular devices, nor do they capture visits by individuals without cellular devices. To address this limitation, our analysis focuses on *changes* in the volume of visits, rather than the number of visits. Third, visits to alcohol outlets do not allow us to observe the amount of alcohol purchased or when it was consumed, which makes them an imperfect proxy for alcohol consumption. While this is a notable limitation, our estimates

[1]Because NAICS 722410 only includes establishments that serve alcohol but no food, we extended the definition of bars to include full-line restaurants with the following terms in their business descriptor categories: "Bar or Pub", "Cocktail", "Sports Bar", "Dive Bar", "Brewery".

[2]Full-line grocery stores in Michigan may be licensed to sell all alcohol. Our definition of grocery extends beyond full-line grocery stores, including specialty stores that may carry alcohol as well.

[3]More detail on SafeGraph analysis can be found at:
https://www.safegraph.com/blog/what-about-bias-in-the-safegraph-dataset.

— which relate violence to the number of visits to alcohol outlets — nevertheless constitute *prima facie* evidence that violence is sensitive to the timing and location of alcohol purchases.

Finally, we note that even if there is imperfect correspondence between the visit data and alcohol consumption, and as long as errors in the data are uncorrelated with community violence conditional on fixed effects, this generates a conservative bias in our estimates.[4] Under the assumption of conditionally random errors in the Safegraph data, our estimates can be thought of as a reduced form effect where we study the relationship between visits to alcohol outlets and violence understanding that the effect of alcohol *consumption* will be proportionately larger than the estimates we report, depending on the relationship between visits and consumption. In an additional analysis we empirically account for the possibility of consumption spillovers to subsequent days and find modest evidence that visits to alcohol outlets have a lagged effect on violence.

2.1.2 911 Call Data

We measure violence known to law enforcement using 911 call data from the City of Detroit Open Data Portal, which was launched as an initiative to increase transparency between the city government and the people it serves. The 911 calls for service dataset compiles all 911 calls requiring law enforcement response as well as officer-initiated calls for service in the City of Detroit. Between January 1, 2019 and July 4, 2020 there were 1,471,211 calls for emergency service. The dataset includes two types of calls: (1) emergency response calls, which result from people requesting police services by calling 911 directly, and (2) officer-initiated calls, which document policing activities such as traffic stops, street investigations,

[4] As has long been appreciated, random errors in a right-hand side variable decrease the signal-to-noise ratio, which attenuates the resulting regression coefficient toward zero (Fuller, 2009).

and other situations where a police officer initiates the response.

For each call, we observe the responding agency, zip code of incident, information about the agency (precinct, responding unit), date of incident, information about response to the incident (time on scene, total response time, total time, travel time, intake time), and information regarding the nature of the call (call code number, call description). We use a combination of call code numbers and call descriptions to identify which assault calls can be attributed to domestic violence and which cannot. We define non-domestic assault as either felonious assault [5] or assault and battery [6]. We define domestic violence as calls concerning inter-partner and intra-household violence, including child or adult abuse with or without a weapon, with or without a report.[7] We sum domestic violence calls and assaults to the uniquely identified zip code, year, month, and day. Our analysis is based on 26 zip codes tracked across 552 days, totalling 14,256 zip code observations per day.

2.1.3 Descriptive Analysis

Figure 1 presents unadjusted trends in domestic assault (Panel A) and non-domestic assault (Panel B), compared to the liquor store share of visits to outlets that sell alcohol. The dashed line represents the share of visits to liquor stores; the black solid lines represent the average daily count of reported domestic violence and non-domestic assault incidents per zip code. Both panels provide evidence of substantial seasonal variation in violence, with both domestic and non-domestic assaults peaking in the summer months and reaching their lowest points between November and March. While non-domestic assaults increased in summer 2020 to levels comparable to those in summer 2019, domestic assaults are noticeably

[5] Call code numbers 343010, 343020, 343040
[6] Call code numbers 347010, 347020, 347021, 347040
[7] Call code numbers 393010, 393030, 395010, 395030, 396010, 396030, 397010, 397030.

higher in summer 2020. In accordance with emerging literature on this topic (Aguero, 2020; Boserup et al., 2020; Leslie and Wilson, 2020; Mahmud and Riley, Mahmud and Riley; Ravindran and Shah, 2020; Silverio-Murillo and De La Miyar, 2020), the figure thus provides suggestive evidence that, unlike non-domestic assault, domestic violence has increased during the pandemic, even after taking seasonal trends into account.

While violence typically exhibits a great deal of seasonal variation, prior to the onset of the COVID-19 pandemic the relative share of visits to liquor stores was remarkably stable at approximately 30%. As stay-at-home orders closed bars and restaurants, liquor stores became the main venue of alcohol sales. For this reason, it is not surprising that the pandemic has led to a large and discrete shift in patterns of alcohol consumption. By May 2020, liquor stores accounted for over 70% of all visits to alcohol outlets. Taken together, the two series suggest that domestic violence is particularly sensitive to venue of alcohol consumption.

Next, we present summary statistics for our zip-code-by-date analytic dataset. **Table 1** summarizes the visit data. We report descriptive statistics for the entire city (Panel A) as well as for zip codes with a higher than median number of 911 calls for violence (Panel B) and a lower than median number of 911 calls for violence (Panel C). As there are 26 zip codes in the city, each of the latter two groups comprises 13 zip codes. We report summary statistics separately for the pre- and post-pandemic periods.

With respect to pre-pandemic visits, we observe 235 daily visits to restaurants, 99 daily visits to food stores, 90 daily visits to bars, and 35 daily visits to liquor stores in an average zip code. As the SafeGraph data allow us to observe only a fraction of all visits, these numbers do not have a direct interpretation. However, ratios and trends are highly

instructive. In the pre-pandemic period, there were 2.5 visits to bars for every visit to a liquor store. Likewise, there were 6.3 visits to a restaurant for every visit to a liquor store. Since the onset of the pandemic, the ratios have reversed. There are now 1.5 visits to liquor stores for every visit to a bar. In the post-March 2020 period, there has been a notable decline in the number of visits to alcohol outlets. However, while visits to bars have declined by more than 80 percent, visits to liquor stores have declined by around one third. These declines are consistent with an overall decline in consumer activity, as evidenced from large declines in the number of customer visits to restaurants and food outlets. Throughout our subsequent analyses, we control for visits to restaurants and food outlets in order to account for the large secular decline in economic activity that has been brought about by the pandemic.

Panels B and C demonstrate that these patterns differ remarkably in high- and low-crime communities. Several patterns are worth highlighting. First, there are considerably fewer visits to restaurants in high-crime zip codes than in low-crime zip codes, which is consistent with the idea that wealthier residents have more disposable income to spend on meals outside the home. Second, the ratio of visits to bars versus liquor stores differs dramatically across communities. In low-crime zip codes, pre-pandemic there were more than 7 visits to bars for every visit to a liquor store; in high-crime zip codes this ratio is 0.5, indicating that visits to liquor stores are, in fact, more common than visits to bars. Hence, we might expect the pandemic to have a larger impact on patterns of alcohol consumption in low-crime zip codes. Third, the pandemic has been more disruptive to economic activity in low-crime zip codes than in high-crime zip codes. For each of the four types of establishments we study, the declines in visits are larger in percentage terms in the low-crime zip codes. Finally, total

visits to alcohol outlets are higher in low-crime zip codes. While this may be surprising to some observers, there is, in fact, a great deal of evidence that alcohol consumption rises with income (Strand and Steiro, 2003; Galea et al., 2007; Keyes and Hasin, 2008).

2.2 Empirical Methods

We study the effect of community-level alcohol sales on violence using natural variation in the measured number of visits to alcohol outlets. We focus, in particular, on two types of alcohol outlets: bars and liquor stores. We likewise focus on two types of violence: domestic violence involving an assault where the perpetrator is either an intimate partner or a family member of the victim, and assaults that are not of a domestic nature. In order to estimate the proportional change in violence with respect to visits to alcohol outlets, we estimate Poisson regression models in which the count of 911 calls made in a zip code on a date is Y_{it}.[8] Here, $Y_{it} \sim \text{Poisson}(\gamma_{it})$, is regressed on the number of measured visits to each type of alcohol establishment. In order to account for changing behavior introduced by stay-at-home orders, we interact the number of measured visits for each type of alcohol establishment with an indicator for the post-March 10 period. We define the post-COVID period flexibly, dividing it into a March 10-May 25 period, when the stay-at-home was in effect, and a May 26-July 4 period, when the order was lifted. In practice, our empirical

[8] As a robustness check, we also estimate models via ordinary least squares.

estimates focus on the stay-at-home period.

$$log(\gamma_{it}) = \alpha + \sum_{j=1}^{4} \xi^j [ln(VISITS)^j_{it}] + \\ + \sum_{j=1}^{4} \beta^j [ln(VISITS)^j_{it} \times POST_{it}] + \\ + \rho X_{it-1} + \lambda_i + \delta_t \tag{1}$$

In (1), $VISITS^j_{it}$ is the daily number of measured visits in a given zip code to an establishment of type j: bars, liquor stores, restaurants, and grocery stores. The post March 2020 period is identified using $POST_it$ indicator and interacted with the visit terms separated by establishment type. In estimates, we separate post-pandemic into two periods, $POST1_{it}$ and $POST2_{it}$, which are equal to one for the time periods between March 10-May 25 and May 26-July 4, and zero for pre-pandemic time periods. Accordingly, e^{ξ^j} are the incidence rate ratios for the pre-pandemic period. Similarly, e^{β^j} are the incidence rate ratios for the post-pandemic period of interest, namely the stay-at-home period. These coefficients provide an estimate of the elasticity of violence with respect to visits to each type of establishment. In auxiliary models, we allow for temporal spillovers in the effect of alcohol consumption by including various lags for each of the visit variables.

In all models, we condition on X_{it-1}, which is the number of shootings in a given zip code in the previous day, a proxy for serious community violence experienced recently. We include zip code fixed effects, λ_i, in order to absorb time-invariant characteristics across zip codes in Detroit. We also include day-by-month fixed effects and year fixed effects, δ_t, in order to account for daily variation in citywide crime trends. In practice, we utilize an additional innovation, allowing δ_t to vary according to whether a zip code's baseline crime rate is

above or below the median in the data. We thus allow for daily changes in 911 calls to have different effects in different types of communities in Detroit. These interacted fixed effects serve an important purpose — by allowing shocks to alcohol consumption and violence differ across high- and low-crime areas of Detroit, we control for any factors that vary on a daily basis and have different effects on high- versus low-crime communities. Together the interacted fixed effects account for a number of challenges to causal identification, including fixed neighborhood characteristics and daily shocks to citywide crime rates due to weather variation or other time-varying characteristics of the urban environment. Any remaining confounding variables would need to be correlated with both visits to alcohol outlets and crime within specific communities rather than in high-crime neighborhoods as a whole.

In all models, standard errors are clustered at the zip code level to account for both heteroskedasticity and arbitrary serial correlation in the error terms for observations in the same geographic unit measured at different time periods (Bertrand et al., 2004).

3 Results

Our principal estimates on the effect of visits to alcohol outlets on community violence are presented in **Table 2**. In each row, we report estimates from equation (1) for the entirety of Detroit (Panel A) as well as for zip codes with higher than median 911 violent call volumes (Panel B) and lower than median 911 violent call volumes (Panel C). In each panel, we present estimates separately for domestic and non-domestic assaults. We likewise present estimates separately for both the pre-pandemic period (the ξ^j terms in equation 1) and the first part of the post-pandemic period (the β^j terms in equation 1) for each of the four types of establishment: bars, liquor stores, restaurants, and grocery stores.

With respect to domestic assaults, estimates for the entire city offer little evidence that domestic violence is related to either bar or liquor store visits prior to the COVID-19 pandemic. However, there is evidence that domestic violence calls rise with the number of visits to both bars and liquor stores in the post-pandemic period. In particular, the elasticity of domestic violence calls with respect to visits increases by approximately 0.049 for bars and 0.063 for liquor stores. While these level changes are modest, we note that they are reduced forms and do not account for temporal spillovers in alcohol consumption. The sub-city analysis indicates that the relationship between liquor store visits and domestic violence is particularly strong in low-crime zip codes, while the relationship between bar visits and domestic violence is particularly strong in high-crime zip codes.

In contrast to domestic assaults, non-domestic assaults increase with visits to both bars and liquor stores only in the pre-pandemic period; this effect does not strengthen significantly in the post-pandemic period. That the post-pandemic effects are smaller for non-domestic than domestic assaults is consistent with the idea that stay-at-home orders are leading people to do more drinking at home and less drinking around individuals with whom they do not live. As such, even though alcohol consumption may interact positively with pandemic-induced stress, this has not led to an increase in alcohol-induced violence more generally.

While we condition on a granular set of fixed effects as well as linear time trends, concerns about omitted variable bias may remain. In order to test for the possibility that the effects we observe are part and parcel of broader trends in economic activity and the movement of people in a community, we consider whether domestic violence is impacted by visits to restaurants and food stores. As expected, we do not find evidence of a relationship

between restaurants or food outlets and violence, whether residential or non residential, pre- or post-pandemic.[9]

Because alcohol purchased at a liquor store can be consumed for a period of time after its purchase, we next consider the lagged effect of alcohol purchases. Failure to capture temporal spillovers arising from lagged alcohol consumption would mean that the estimates reported in Table 2 are too small. To address this concern, we run an auxiliary model in which we augment equation (1) to include the first and second lags of visits to each type of establishment in the time period studied. These terms allow us to observe dynamic correlations between violence and alcohol purchases made in the prior two days. We present these results in **Table 3**. In the table, we present the cumulative effect of three consecutive days of visits by summing coefficients on concurrent and two lagged effects for bars and liquor stores only. In order to perform inference on this cumulative estimate that folds in temporal spillovers we turn to an F-test, which tests the joint significance of the summed terms. For bars, the estimates presented in Table 3 are twice as large as those in Table 2, offering evidence in favor of temporal spillovers. On the other hand, for liquor stores, the estimates in Table 3 are approximately 50 percent larger than those in Table 2, indicating that the elasticities reported in Table 2 are conservative estimates of the effect of alcohol consumption on domestic violence.

[9]There is some evidence that visits to food outlets are associated with a *decline* in domestic violence calls in high-crime zip codes in the pre-pandemic period. This negative coefficient may be, in part, due to the incapacitative effect of being outside the home to pick up food or, in part, due to the protective effect that outside meals may have on domestic violence. Critically, there is no evidence that visits to food stores or restaurants changed in the post-pandemic period.

4 Policy Implications

In this research we use data from Detroit, MI to show that the relationship between visits to alcohol outlets and domestic violence — but not other forms of violence — has grown considerably stronger since March 2020. As such, we provide evidence that, regardless of the overall level of alcohol consumption, the COVID-19 pandemic has made alcohol consumption riskier with respect to domestic violence. Our conclusions are based on newly-available data provided by SafeGraph that allow us to estimate daily changes to the number of visitors to establishments selling alcohol. Due to the remarkable resolution of the data, we are able to construct a daily proxy for alcohol consumption in each community, a measure that researchers have long wished to use but which has, until recently, been impossible to collect due to technological limitations.

Why has alcohol consumption become riskier during the pandemic? We offer three reasons. First, the location of alcohol consumption appears to have changed markedly since stay-at-home orders took effect. Whereas liquor stores accounted for only 28 percent of visits to alcohol outlets in the pre-pandemic period, since March 2020 this proportion has more than doubled to nearly 60 percent. Second, as has been noted by many others, the COVID-19 pandemic has led to job loss, economic hardship, and a great deal of stress as families struggle to cope with considerable disruptions to their daily lives. While it is easy to imagine that these factors have led to an increase in violence in the absence of alcohol, it also stands to reason that they have made alcohol consumption riskier. Finally, stay-at-home orders have mechanically increased the amount of time that people are spending at home (Peterman et al., 2019). As such, the opportunity for problematic drinking to lead to family violence has increased. At the same time, we observe little evidence that the

relationship between alcohol and other types of violence has changed since the COVID-19 pandemic. As such it appears as though the pandemic has caused a substitution of violence away from acquaintances and strangers and toward family members.

Beyond developing a deeper understanding of the effects of the COVID-19 pandemic, this research contributes to the large literature that studies geo-spatial correlations between the location of alcohol outlets and violence (Gruenewald et al., 2006; Franklin et al., 2010; Grubesic and Pridemore, 2011; Roman and Reid, 2012; Kearns et al., 2015). By leveraging highly granular visit data and exploiting changes in the density of visits over time, we are able to draw stronger causal inferences about the relationship between alcohol outlets and community violence. Our estimates suggest that regardless of the COVID-19 pandemic, visits to bars and liquor stores lead to increased violence, providing more credible evidence that prior evidence is not merely correlational.

This research likewise helps to deepen our understanding of the nature of domestic violence, suggesting that the venue of alcohol consumption, rather than merely the volume of alcohol consumed may be a principal driver of household violence. The idea that venue may be an important characteristic of alcohol consumption features speculatively in research on the minimum legal drinking age (Chalfin et al., 2019) and is likewise implicated in research that suggests that family violence is triggered by frustration such as that which is generated by an unexpected football loss (Card and Dahl, 2011). However, thus far, this has been mostly a topic of speculation and has been subject to little empirical testing. Our principle finding — that the relationship between alcohol purchases and domestic violence but not other forms of violence — has grown considerably stronger since the pandemic, is among the most direct evidence, to date, that venue matters.

With respect to public policy, we note that while prior research suggests that Sunday liquor laws which restrict weekend liquor sales can reduce overall violence (Han et al., 2016), these laws do not appear to affect domestic crimes specifically (Heaton, 2012). Likewise, while "wet laws" which legalize the sale of alcohol to the general public for on-premises consumption appear to be a driver of overall violence (Anderson et al., 2017), prior research does not disambiguate between domestic and non-domestic assault. The present study suggests that while wet laws may, on net, be violence-creating, by pushing drinking outside of the home, it remains possible that such laws might ultimately have a protective effect on domestic violence. Given the lack of specificity in the prior literature, our principal finding — that the domestic violence is sensitive, in particular, to the venue of alcohol consumption — suggests that policymakers should consider the possibility that efforts to reduce drinking outdoors might have the unintended consequence of driving up indoor violence.

References

Aguero, J. (2020). Covid-19 and the rise of intimate partner violence. *Unpublished manuscript*.

Alhabib, S., U. Nur, and R. Jones (2010). Domestic violence against women: Systematic review of prevalence studies. *Journal of Family Violence 25*(4), 369–382.

Anderson, D. M., B. Crost, and D. I. Rees (2017). Wet laws, drinking establishments and violent crime. *Economic Journal 128*(611), 1333–1366.

Bair-Merritt, M. H., S. Shea Crowne, D. A. Thompson, E. Sibinga, M. Trent, and J. Campbell (2010). Why do women use intimate partner violence? a systematic review of women's motivations. *Trauma, Violence, & Abuse 11*(4), 178–189.

Bertrand, M., E. Duflo, and S. Mullainathan (2004). How much should we trust differences-in-differences estimates? *The Quarterly Journal of Economics 119*(1), 249–275.

Biddle, N., B. Edwards, M. Gray, and K. Sollis (2020). Alcohol consumption during the covid-19 period: May 2020. *COVID-19 Briefing Paper*.

Boserup, B., M. McKenney, and A. Elkbuli (2020). Alarming trends in us domestic violence during the covid-19 pandemic. *The American Journal of Emergency Medicine*.

Brenmer, J. (2020). Alcohol sales increase 55 percent in one week amid coronavirus pandemic.

Bushman, B. J. (2002). Effects of alcohol on human aggression. In *Recent Developments in Alcoholism*, pp. 227–243. Springer.

Caetano, R., J. Schafer, and C. B. Cunradi (2001). Alcohol-related intimate partner violence among white, black, and hispanic couples in the united states. *Alcohol Research & Health 25*(1), 58.

Card, D. and G. B. Dahl (2011). Family violence and football: The effect of unexpected emotional cues on violent behavior. *The Quarterly Journal of Economics 126*(1), 103–143.

Carpenter, C. (2007). Heavy alcohol use and crime: evidence from underage drunk-driving laws. *The Journal of Law and Economics 50*(3), 539–557.

Carpenter, C. and C. Dobkin (2009). The effect of alcohol consumption on mortality: regression discontinuity evidence from the minimum drinking age. *American Economic Journal: Applied Economics 1*(1), 164–82.

Carpenter, C. and C. Dobkin (2015). The minimum legal drinking age and crime. *The Review of Economics and Statistics 97*(2), 521–524.

Carpenter, C. and C. Dobkin (2017). The minimum legal drinking age and morbidity in the united states. *The Review of Economics and Statistics 99*(1), 95–104.

Carpenter, C. S., C. Dobkin, and C. Warman (2016). The mechanisms of alcohol control. *Journal of Human Resources 51*(2), 328–356.

Chalfin, A., B. Hansen, and R. Ryley (2019). The minimum legal drinking age and crime victimization. Technical report, National Bureau of Economic Research.

Chodkiewicz, J., M. Talarowska, J. Miniszewska, N. Nawrocka, and P. Bilinski (2020). Alcohol consumption reported during the covid-19 pandemic: The initial stage. *International Journal of Environmental Research and Public Health 17*(13), 4677.

Cook, P. J. and C. P. Durrance (2013). The virtuous tax: lifesaving and crime-prevention effects of the 1991 federal alcohol-tax increase. *Journal of Health Economics 32*(1), 261–267.

Currie, J., M. Mueller-Smith, and M. Rossin-Slater (2018). Violence while in utero: The impact of assaults during pregnancy on birth outcomes. Technical report, National Bureau of Economic Research.

Dienemann, J., E. Boyle, D. Baker, W. Resnick, N. Wiederhorn, and J. Campbell (2000). Intimate partner abuse among women diagnosed with depression. *Issues in Mental Health Nursing 21*(5), 499–513.

Ehrensaft, M. K., P. Cohen, J. Brown, E. Smailes, H. Chen, and J. G. Johnson (2003). Intergenerational transmission of partner violence: a 20-year prospective study. *Journal of Consulting and Clinical Psychology 71*(4), 741.

Ellsberg, M., H. A. Jansen, L. Heise, C. H. Watts, C. Garcia-Moreno, et al. (2008). Intimate partner violence and women's physical and mental health in the who multi-country study on women's health and domestic violence: an observational study. *The Lancet 371*(9619), 1165–1172.

Enlow, M. B., B. Egeland, E. A. Blood, R. O. Wright, and R. J. Wright (2012). Interpersonal trauma exposure and cognitive development in children to age 8 years: a longitudinal study. *Journal of Epidemiology & Community Health 66*(11), 1005–1010.

Fantuzzo, J. W. and R. A. Fusco (2007). Children's direct exposure to types of domestic violence crime: A population-based investigation. *Journal of Family Violence 22*(7), 543–552.

Foran, H. M. and K. D. O'Leary (2008). Alcohol and intimate partner violence: A meta-analytic review. *Clinical Psychology Review 28*(7), 1222–1234.

Franklin, F. A., T. A. L. II, D. W. Webster, and W. K. Pan (2010). Alcohol outlets and violent crime in washington dc. *Western Journal of Emergency Medicine 11*(3), 283.

Fuller, W. A. (2009). *Measurement error models*, Volume 305. John Wiley & Sons.

Galea, S., J. Ahern, M. Tracy, and D. Vlahov (2007). Neighborhood income and income distribution and the use of cigarettes, alcohol, and marijuana. *American Journal of Preventive Medicine 32*(6), S195–S202.

Gatley, J. M., M. Sanches, C. Benny, S. Wells, and R. C. Callaghan (2017). The impact of drinking age laws on perpetration of sexual assault crimes in canada, 2009–2013. *Journal of Adolescent Health 61*(1), 24–31.

Grubesic, T. and W. Pridemore (2011). Alcohol outlets and clusters of violence. *International Journal of Health Geographics 10*(30).

Gruenewald, P. J., B. Freisthler, L. Remer, E. A. LaScala, and A. Treno (2006). Ecological models of alcohol outlets and violent assaults: crime potentials and geospatial analysis. *Addiction 101*(5), 666–677.

Han, S., C. C. Branas, and J. M. MacDonald (2016). The effect of a sunday liquor-sales ban repeal on crime: a triple-difference analysis. *Alcoholism: Clinical and Experimental Research 40*(5), 1111–1121.

Heaton, P. (2012). Sunday liquor laws and crime. *Journal of Public Economics 96*(1-2), 42–52.

Heinz, A. J., A. Beck, A. Meyer-Lindenberg, P. Sterzer, and A. Heinz (2011). Cognitive and neurobiological mechanisms of alcohol-related aggression. *Nature Reviews Neuroscience 12*(7), 400–413.

Holt, S., H. Buckley, and S. Whelan (2008). The impact of exposure to domestic violence on children and young people: A review of the literature. *Child abuse & Neglect 32*(8), 797–810.

Humphreys, C. and R. Thiara (2003). Mental health and domestic violence:'i call it symptoms of abuse'. *The British Journal of Social Work 33*(2), 209–226.

Huth-Bocks, A. C., A. A. Levendosky, and M. A. Semel (2001). The direct and indirect effects of domestic violence on young children's intellectual functioning. *Journal of Family Violence 16*(3), 269–290.

Jones, L., M. Hughes, and U. Unterstaller (2001). Post-traumatic stress disorder (ptsd) in victims of domestic violence: A review of the research. *Trauma, Violence, & Abuse 2*(2), 99–119.

Kearns, M. C., D. E. Reidy, and L. A. Valle (2015). The role of alcohol policies in preventing intimate partner violence: A review of the literature. *Journal of Studies on Alcohol and Drugs 76*(1), 21–30.

Keyes, K. M. and D. S. Hasin (2008). Socio-economic status and problem alcohol use: the positive relationship between income and the dsm-iv alcohol abuse diagnosis. *Addiction 103*(7), 1120–1130.

Kim, J. U., A. Majid, R. Judge, P. Crook, R. Nathwani, N. Selvapatt, J. Lovendoski, P. Manousou, M. Thursz, A. Dhar, et al. (2020). Effect of covid-19 lockdown on alcohol consumption in patients with pre-existing alcohol use disorder. *The Lancet Gastroenterology & Hepatology 5*(10), 886–887.

Koenen, K. C., T. E. Moffitt, A. Caspi, A. Taylor, and S. Purcell (2003). Domestic violence is associated with environmental suppression of iq in young children. *Development and Psychopathology 15*(2), 297–311.

Kypri, K., G. Davie, P. McElduff, J. Connor, and J. Langley (2014). Effects of lowering the minimum alcohol purchasing age on weekend assaults resulting in hospitalization in new zealand. *American Journal of Public Health 104*(8), 1396–1401.

Le, B. T., E. J. Dierks, B. A. Ueeck, L. D. Homer, and B. F. Potter (2001). Maxillofacial injuries associated with domestic violence. *Journal of Oral and Maxillofacial Surgery 59*(11), 1277–1283.

Lechner, W. V., K. R. Laurene, S. Patel, M. Anderson, C. Grega, and D. R. Kenne (2020). Changes in alcohol use as a function of psychological distress and social support following covid-19 related university closings. *Addictive Behaviors 110*, 106527.

Leslie, E. and R. Wilson (2020). Sheltering in place and domestic violence: Evidence from calls for service during covid-19. *Available at SSRN 3600646*.

Lindo, J. M., P. Siminski, and I. D. Swensen (2018). College party culture and sexual assault. *American Economic Journal: Applied Economics 10*(1), 236–65.

Livingston, M. (2010). The ecology of domestic violence: the role of alcohol outlet density. *Geospatial Health 5*(1), 139–149.

Mahmud, M. and E. Riley. Household response to an extreme shock: Evidence on the immediate impact of the covid-19 lockdown on economic outcomes and well-being in rural uganda. *Working Paper*.

Markowitz, S. and M. Grossman (1998). Alcohol regulation and domestic violence towards children. *Contemporary Economic Policy 16*(3), 309–320.

Markowitz, S. and M. Grossman (2000). The effects of beer taxes on physical child abuse. *Journal of Health Economics 19*(2), 271–282.

Martin, S. L., L. S. Matza, L. L. Kupper, J. C. Thomas, M. Daly, and S. Cloutier (1999). Domestic violence and sexually transmitted diseases: the experience of prenatal care patients. *Public Health Reports 114*(3), 262.

Peterman, A., A. Potts, M. O'Donnell, K. Thompson, N. Shah, S. Oertelt-Prigione, and N. van Gelder (2019). Pandemics and violence against women and children. *Center for Global Development Working Paper*(528).

Piquero, A. R., J. R. Riddell, S. A. Bishopp, C. Narvey, J. A. Reid, and N. L. Piquero (2020). Staying home, staying safe? a short-term analysis of covid-19 on dallas domestic violence. *American Journal of Criminal Justice 45*(4), 601–635.

Plichta, S. B. (2004). Intimate partner violence and physical health consequences: Policy and practice implications. *Journal of Interpersonal Violence 19*(11), 1296–1323.

Pollard, M. S., J. S. Tucker, and H. D. Green (2020). Changes in adult alcohol use and consequences during the covid-19 pandemic in the us. *JAMA Network Open 3*(9), e2022942–e2022942.

Ravindran, S. and M. Shah (2020). Unintended consequences of lockdowns: Covid-19 and the shadow pandemic. Technical report, National Bureau of Economic Research.

Rehm, J., C. Kilian, C. Ferreira-Borges, D. Jernigan, M. Monteiro, C. D. Parry, Z. M. Sanchez, and J. Manthey (2020). Alcohol use in times of the covid 19: Implications for monitoring and policy. *Drug and Alcohol Review*.

Roberts, G. L., J. M. Lawrence, G. M. Williams, and B. Raphael (1998). The impact of domestic violence on women's mental health. *Australian and New Zealand Journal of Public Health 22*(7), 796–801.

Rodriguez, L. M., D. M. Litt, and S. H. Stewart (2020). Drinking to cope with the pandemic: The unique associations of covid-19-related perceived threat and psychological distress to drinking behaviors in american men and women. *Addictive Behaviors 110*, 106532.

Roman, C. G. and S. E. Reid (2012). Assessing the relationship between alcohol outlets and domestic violence: routine activities and the neighborhood environment. *Violence and Victims 27*(5), 811–828.

Sheridan, D. J. and K. R. Nash (2007). Acute injury patterns of intimate partner violence victims. *Trauma, Violence, & Abuse 8*(3), 281–289.

Silverio-Murillo, A. and B. De La Miyar, Jr. (2020). Covid-19, domestic violence, and alcohol consumption. Technical report, Working Paper.

Simons, R. L. and C. Johnson (1998). An examination of competing explanations for the intergenerational transmission of domestic violence. In *International Handbook of Multigenerational Legacies of Trauma*, pp. 553–570. Springer.

Simons, R. L., C.-i. Wu, C. Johnson, and R. D. Conger (1995). A test of various perspectives on the intergenerational transmission of domestic violence. *Criminology 33*(1), 141–172.

Strand, B. H. and A. Steiro (2003). Alcohol consumption, income and education in norway, 1993-2000. *Tidsskrift for den Norske laegeforening: tidsskrift for praktisk medicin, ny raekke 123*(20), 2849–2853.

Taub, A. (2020). A new covid-19 crisis: Domestic abuse rises worldwide. *The New York Times*.

Thompson, M. P. and J. B. Kingree (2006). The roles of victim and perpetrator alcohol use in intimate partner violence outcomes. *Journal of Interpersonal Violence 21*(2), 163–177.

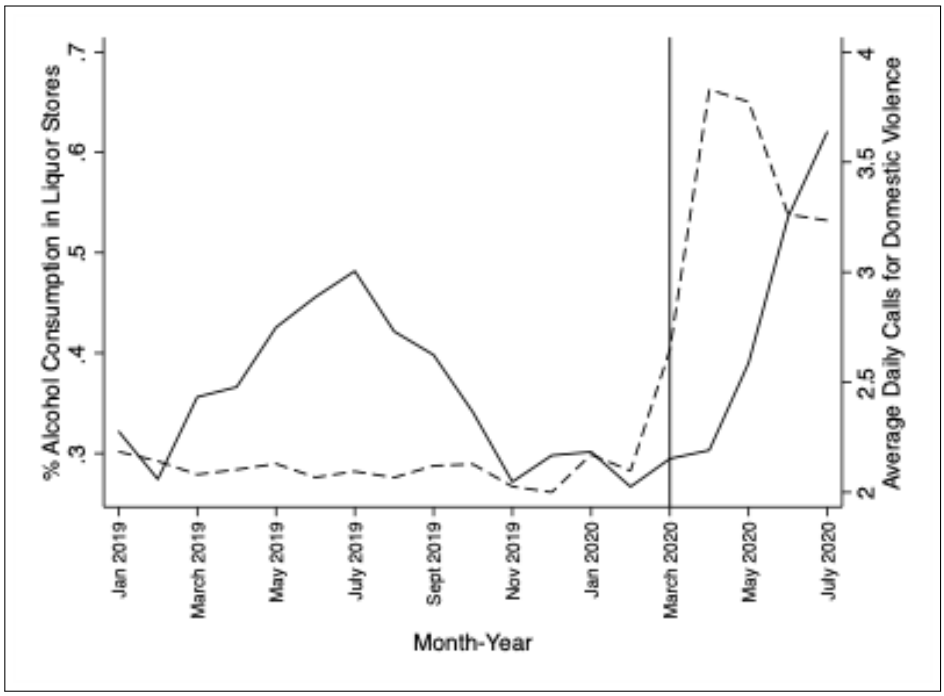
Tolman, R. M. and D. Rosen (2001). Domestic violence in the lives of women receiving welfare: Mental health, substance dependence, and economic well-being. *Violence against Women 7*(2), 141–158.

Usher, K., N. Bhullar, J. Durkin, N. Gyamfi, and D. Jackson (2020). Family violence and covid-19: Increased vulnerability and reduced options for support. *International Journal of Mental Health Nursing*.

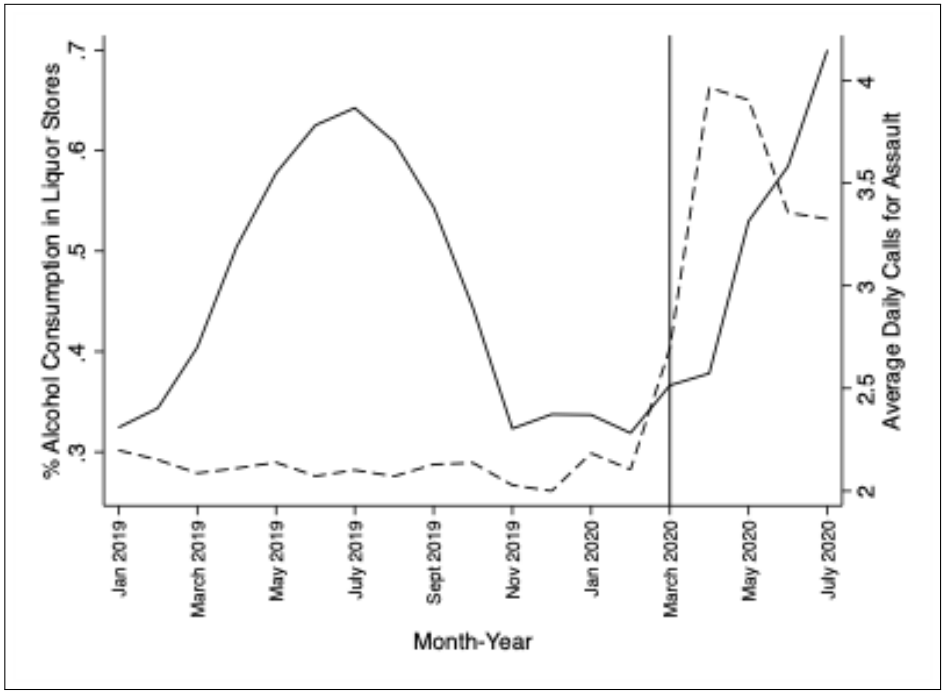
Watts, M. (2020). America's heaviest drinkers consume almost 60% of all alcohol sold. *Newsweek*.

Wuest, J., M. Merritt-Gray, M. Ford-Gilboe, B. Lent, C. Varcoe, and J. C. Campbell (2008). Chronic pain in women survivors of intimate partner violence. *The Journal of Pain 9*(11), 1049–1057.

Ybarra, G. J., S. L. Wilkens, and A. F. Lieberman (2007). The influence of domestic violence on preschooler behavior and functioning. *Journal of Family Violence 22*(1), 33–42.



(a) Domestic Violence



(b) Assault

Figure 1: Liquor store share of visits to alcohol outlets and violence

Note: Figure plots the time-path of the liquor store share of visits to alcohol outlets (the dotted lines) against the daily number of emergency calls for domestic assaults (Panel a) and other assaults (Panel b). Source: SafeGraph Patterns Data, 2019-2020. City of Detroit Open Data Portal 911 Calls for Service, 2019-2020. 14,256 observations of 26 zip codes.

Table 1: Summary Statistics

	Pre-Pandemic		Post-Pandemic		
	Mean	St. Dev.	Mean	St. Dev.	Diff.
A. Entire City					
Bars	89.63	(244.66)	17.49	(44.95)	–72.140***
Liquor Stores	35.46	(28.10)	23.81	(19.77)	–11.64***
Restaurants	235.05	(329.71)	97.52	(106.48)	–137.52***
Food Outlets	99.41	(208.52)	58.90	(59.83)	–40.51***
B. High-Crime Zip Codes					
Bars	23.01	(29.10)	9.33	(13.06)	–13.67***
Liquor Stores	49.82	(22.26)	37.58	(17.65)	–12.24***
Restaurants	170.49	(199.69)	110.29	(117.64)	–60.19***
Food Outlets	113.35	(277.19)	72.23	(56.22)	–41.11***
A. Low-Crime Zip Codes					
Bars	156.25	(331.66)	25.65	(61.14)	–130.61***
Liquor Stores	21.11	(25.91)	10.05	(9.58)	–11.05***
Restaurants	299.61	(411.36)	84.75	(92.29)	–214.85***
Food Outlets	85.47	(98.72)	45.56	(60.37)	–39.91***

Source: SafeGraph Patterns Data, 2019-2020. City of Detroit Open Data Portal 911 Calls for Service, 2019-2020. 14,256 observations of 26 zip codes.
Significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: Main Estimates, Domestic and Non-Domestic Assaults

	Bars		Alcohol Outlets		Restaurants		Food Outlets	
	Main	Inter	Main	Inter	Main	Inter	Main	Inter
A. Entire City								
Domestic assaults	-0.0067	0.0491***	0.0222	0.0635**	-0.0064	-0.0742	-0.0057	-0.0257
	(0.0151)	(0.0135)	(0.0213)	(0.0292)	(0.0156)	(0.0328)	(0.0202)	(0.0256)
Other assaults	0.0343**	-0.0268	0.0675***	0.0390	0.0286	-0.0216	0.0071	-0.0054
	(0.0141)	(0.0206)	(0.0237)	(0.0290)	(0.0200)	(0.0424)	(0.0220)	(0.0380)
B. High-Crime Zip Codes								
Domestic assaults	-0.0067	0.0588***	0.0326	0.0426	-0.0034	-0.0755	-0.0295*	-0.0119
	(0.0197)	(0.0139)	(0.0239)	(0.0529)	(0.0155)	(0.0522)	(0.0176)	(0.0338)
Other assaults	0.0161	-0.0052	0.0866***	-0.0292	0.0066	0.0424	0.0045	-0.0249
	(0.0132)	(0.0125)	(0.0304)	(0.0324)	(0.0124)	(0.0367)	(0.0166)	(0.0274)
C. Low-Crime Zip Codes								
Domestic assaults	-0.0005	-0.0077	-0.0153	0.0808***	-0.0305	-0.0442	0.0374	-0.0380
	(0.0180)	(0.0382)	(0.0321)	(0.0292)	(0.0475)	(0.0394)	(0.0364)	(0.0393)
Other assaults	0.0656**	-0.0972**	0.0162	0.0399	0.0512	-0.0079	-0.0238	0.0034
	(0.0288)	(0.0531)	(0.0182)	(0.0504)	(0.0587)	(0.0639)	(0.0675)	(0.0626)

Source: SafeGraph Patterns Data, 2019-2020. City of Detroit Open Data Portal 911 Calls for Service, 2019-2020. 14,256 observations of 26 zip codes. Note: Estimates are from Poisson regressions of the daily count of 911 calls for assault in a zip code on the number of visits to bars, alcohol outlets, restaurants and food outlets in that zip code. Each model includes daily visits, visits interacted with indicator for March 10 - May 25 period, visits interacted with indicator for May 25 onward period. Only estimates for daily visits, visits interacted with indicator for March 10 - May 25 period are reported. Panel A includes data for all of Detroit during the January 2019-July 2020 period. Panel B includes zip codes where the number violence calls is above, and Panel C below, the median in the sample. In each model, we condition on zip code and year and month-day fixed effects; In Panel A, we allow the month-day fixed effects to vary according to whether a zip code is above or below median of violence calls. In all models, standard errors are clustered at the zip code level. Significance: * p <0.1, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Main Estimates, Domestic and Non-Domestic Assaults with Lagged Visits

	Bars	Alcohol Outlets
	$\beta_j + \beta_{Lj} + \beta_{L2j}$	$\beta_j + \beta_{Lj} + \beta_{L2j}$
	(se)	(se)
	p-value	p-value
A. Entire City		
Domestic Assaults	0.1022***	0.0948*
	(0.0304)	(0.0573)
	0.001	0.0980
Non-Domestic Assaults	0.0121	0.0498
	(0.0256)	(0.0453)
	0.635	0.271
B. High-Crime Zip Codes		
Domestic Assaults	0.1211***	0.0789
	(0.0378)	(0.0941)
	0.001	0.402
Non-Domestic Assaults	0.0368**	-0.0142
	(0.0162)	(0.0325)
	0.024	0.664
C. Low-Crime Zip Codes		
Domestic Assaults	0.0069	0.108
	(0.0669)	(0.0799)
	0.917	0.176
Non-Domestic Assaults	-0.0442	0.0802
	(0.0758)	(0.1036)
	0.56	0.439

Source: SafeGraph Patterns Data, 2019-2020. City of Detroit Open Data Portal 911 Calls for Service, 2019-2020. 14,206 observations of 26 zip codes. Note: Estimates are from Poisson regressions of the daily count of 911 calls for assault in a zip code on the number of visits to bars, alcohol outlets, restaurants and food outlets in that zip code. Each model includes daily visits, visits interacted with indicator for March 10 - May 25 period, visits interacted with indicator for May 25 onward period; one day lag for visits and post-interacted visits to bars and alcohol outlets; and two day lag for visits and post-interacted visits to bars and alcohol outlets. Reported are the sum of coefficients for the March 10 - May 25 period for contemporaneous, one day lag, and two day lag effects. Panel A includes data for all of Detroit during the January 2019-July 2020 period. Panel B includes zip codes where the number violence calls is above, and Panel C below, the median in the sample. In each model, we condition on zip code and year and month-day fixed effects; In Panel A, we allow the month-day fixed effects to vary according to whether a zip code is above or below median of violence calls. In all models, standard errors are clustered at the zip code level. Significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

ONLINE APPENDIX

Appendix Table 1: Robustness of Estimates: Alternate Specification

	Bars		Alcohol Outlets		Restaurants		Food Outlets	
	Main	Inter	Main	Inter	Main	Inter	Main	Inter
A. Domestic Assaults								
2WFE Poisson	-0.0028	0.0465***	0.0142	0.0669**	-0.0070	-0.0731	-0.0052	-0.0230
	(0.0144)	(0.0143)	(0.0226)	(0.0271)	(0.0145)	(0.0328)	(0.0215)	(0.0256)
2WFE OLS	-0.0050	0.0312***	0.0096	0.0171*	0.0168	-0.0194	0.0198	-0.0304**
	(0.0109)	(0.0110)	(0.0163)	(0.0096)	(0.0116)	(0.0120)	(0.0179)	(0.0110)
2WFE OLS	0.0086	0.0283**	0.0241	0.0143	0.0101	-0.0092	-0.0043	-0.0276**
+ Interactive FE	(0.0155)	(0.0120)	(0.0222)	(0.0099)	(0.0128)	(0.0099)	(0.0168)	(0.0123)
B. Non-Domestic Assaults								
2WFE Poisson	0.0390**	-0.0271	0.0609***	0.0479	0.0311	-0.0293	0.0040	-0.0022
	(0.0157)	(0.0217)	(0.0233)	(0.0298)	(0.0206)	(0.0438)	(0.0260)	(0.0397)
2WFE OLS	0.0393**	-0.0427*	0.0361**	0.0411**	0.0411***	-0.0039	0.0088	-0.0169
	(0.0155)	(0.0230)	(0.0172)	(0.0156)	(0.0137)	(0.0211)	(0.0248)	(0.0236)
2WFE OLS	0.0497*	-0.0437*	0.0661**	0.0346*	0.435*	0.0186	-0.0037	-0.0181
+ Interactive FE	(0.0250)	(0.0232)	(0.0291)	(0.0176)	(0.0247)	(0.0174)	(0.0344)	(0.0260)

Source: SafeGraph Patterns Data, 2019-2020. City of Detroit Open Data Portal 911 Calls for Service, 2019-2020. 14,256 observations of 26 zip codes. Note: Estimates are from regressions of the daily count of 911 calls for assault in a zip code on the number of visits to bars, alcohol outlets, restaurants and food outlets in that zip code. Each model includes daily visits, visits interacted with indicator for March 10 - May 25 period, visits interacted with indicator for May 25 onward period. Only estimates for daily visits, visits interacted with indicator for March 10 - May 25 period are reported. Specification 2WFE Poisson are estimates from Poisson regression with year, month-day, and zip code fixed effects. Specification 2WFE OLS are estimates of a linear regression with year, month-day, and zip code fixed effects. 2WFE OLS + Interactive FE are estimates from a linear regression with zip, year, and month-day fixed effects which vary by high- and low-crime zips. Includes data for all of Detroit during the January 2019-July 2020 period. In all models, standard errors are clustered at the zip code level. Significance: * p <0.1, ** $p < 0.05$, *** $p < 0.01$.