

Mitigating Drug Market Externalities: How Effective Are Current Law
Enforcement Strategies?

by

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B.A., University of Northern British Columbia, 2020

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ABSTRACT

This study investigates the impact that search warrants and subsequently, drug trafficking charges, have on drug market externalities. Specifically, this research studies the impact that the closure of an illicit drug firm has on drug use health emergencies and crime at the neighbourhood level. I employ a difference-in-differences empirical strategy to estimate how these search warrants affect neighbourhood drug use patterns and crime. Finding evidence of very small and short run effects, this paper argues that these search warrants have limited effects on crime and drug use health emergencies on average at the neighbourhood level but ultimately, the long-run effects are indistinguishable from zero.

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Introduction

The illicit drug market produces costly and dangerous externalities in the health care and justice systems, inciting policymakers to analyze trends in this market in order to quell the related externalities. Trends in overdose rates and crime rates are commonly treated as synonymous with criminal activity. This perspective has historically motivated the majority of government interventions in the drug market to focus on law enforcement (Miron and Zweibel, 1995. Caulkins, 1988. Caulkins and Reuter, 2010). This paper studies health emergencies and crime as negative market externalities of the illicit drug market and asks whether law enforcements efforts at shutting down a distributing firm is effective at influencing those externalities, through a case study from Winnipeg, Manitoba. It begins with a literature review concerning the drug market, its traditional interventions, and its interactions with crime. The paper then describes the aforementioned externality trends in Winnipeg, providing some contextual background for the community and how it is experiencing the same troubling trends that many communities face. It continues by discussing the empirical strategy employed, and its results, so as to estimate the effect that removing a drug trafficking firm from a neighbourhood has on that neighbourhood's trends in health emergencies and crime. Finally, the paper concludes by discussing some implications and limitations of the key findings of this research.

Law enforcement's effectiveness at mitigating the negative externalities of the drug market remains unclear. Efforts to pursue drug traffickers criminally through investigations and arrests can be viewed positively as successful government intervention in a drug market that would otherwise produce troubling externalities. Alternately, such interventions can be criticized for putting unreasonable pressure on a marginalised community that requires support rather than prosecution.

While efforts to quell these troubling externalities through the prosecution of drug traffickers are certainly well-intentioned, what remains unclear are the interventions' effectiveness and potential unintended consequences. This paper finds evidence of marginal and short run negative neighbourhood-specific effects on drug related health emergencies and non-violent crime. However, this study also finds evidence that in the long run, these neighbourhood effects return to zero, suggesting that the drug market is resilient enough to sustain these neighbourhood level shocks. Furthermore, this research finds evidence that the COVID-19 pandemic changed the relationship between the drug market and crime.

To my knowledge, this paper is the first to empirically estimate the influence that the closure of a drug trafficking firm has on drug market externalities. The presented evidence also raises additional important questions concerning the market system's behavior. Despite the evidence presented here suggesting any impacts found are likely small and short-lived, the damage and trauma associated with drug-related health emergencies and crime might indicate that it may be worth any effort to prevent these occurrences. Thus, any effect found here carries some economic significance and should be carefully considered within the context of communities of at-risk individuals and their relationship with law enforcement.

Literature Review

The literature contributing to the economic theory on illicit drug markets and drug use patterns faces a major constraint that the study of legal markets do not. That is, illicit drug market research is constrained by data quality concerns due to the secrecy of the market (Tedds, 2005). It is difficult to observe consumption patterns or prices because this information is not publicly available and efforts to keep consumption behavior secret are persistent so long as the markets are illegal. The literature on policy approaches addressing the market's persistent supply and demand is particularly sparse. Most theoretical literature leans on critical analysis of supply side intervention through law enforcements efforts at eliminating or at least mitigating the market and its externalities (Miron and Zwiebel, 1995. Boettke, Coyne and Hall, 2022. Gaston, 2017. Beletsky and Davis, 2017). For empirical analysis, creative proxies and law enforcement data bases estimating illicit drug prices have been employed in order to characterize market influences as best as one can.

To date, researchers using U.S. data have found evidence that price differences do impact drug use patterns as measured by emergency room visits mentioning drug use (Dave, 2006. Caulkins, 2001. Crane, Rovolo, and Comfort, 1997. Hyatt and Rhodes, 1995). There is no empirical evidence that law enforcement's local efforts in removing

drug trafficking firms are effective at causing price differences and to what extent they are effective at influencing consumption patterns. Illicit drug prices can fluctuate for many reasons. Policy makers and researchers should refrain from concluding that intervention from local law enforcement's efforts to pursue drug traffickers is effectively impacting drug prices without sufficient evidence. However, there may be additional motivation to pursue the prosecution of drug traffickers beyond their ability to influence prices.

When police carry out a search warrant, seize illicit drugs, arrest and charge someone with drug trafficking, law enforcement has effectively shut down a firm operating in that neighbourhood. In order to adjust to the potential supply deficit, the market will increase prices and/or compete for the additional customers. The markets prices will adjust according to the competitiveness of the market where highly competitive markets would see little to no impact on prices. In addition, drug consumption will respond according to consumers price elasticity; evidence suggests this elasticity is likely marginal (Dave, 2006. Dave, 2008). Given that the markets are illegal, we lack concrete evidence on the illicit drug market's behavior, but conventional economic wisdom suggests this theory should hold.

Given supply side intervention through law enforcement has largely been the policy method of choice, the "War on Drugs" has inspired passionate debate on its effectiveness. At the core of the wisdom behind the war on drugs is the economic theory laid out above, assuming that even competitive markets are deterred enough by the consequence of the judicial system where the cost of doing business increases the cost of drugs enough to deter demand. If this is true and law enforcement is actually effective at increasing the price of goods, we should be able to observe changes in drug use

patterns in response to law enforcement's interventions.

In practice, there is reasonable criticism of the economic theory behind the prohibition of illicit drugs (Miron and Zwiebel, 1995. Caulkins, 1998. Miron, 2001. Boettke, Coyne and Hall, 2013). It might be the case that there are just too many firms, and too large a quantity of drugs in the market for law enforcements efforts to make a difference in prices once a competitive market is established, let alone drug consumption patterns. If the market can be described as highly competitive, then it would indeed raise questions as to whether the allocation of resources into combating the illicit drug trade through law enforcement is an efficient use of those resources.

In addition, the spatial dynamics in which the drug market behaves within a community is not well defined. Drug traffickers of illicit drugs are not likely to behave the same way as suppliers of legal substances, such as alcohol (Contreras and Hipp, 2020). It is likely that an illicit drug trafficker's location will not remain static. However, police pressure in a specific area is likely to influence how a specific neighbourhood experiences drug use and crime. Christopher Contreras and John Hipp (2020) argue that "the process underlying this relationship [between drugs and crime] take place on a micro-spatiotemporal scale (188)." City-level analysis offers some important observations, but a neighbourhood-specific study provides insights into whether specific law enforcement efforts are influential at changing behavior in and around the drug market. Neighbourhood-level research offers a more specific value for the stakeholders involved within those neighbourhoods.

In examining the economic ideas around why law enforcement is the policy of choice in combating the illicit drug market, we can describe the prohibition of illicit drugs as a tax on producers (Miron and Zwiebel, 1995) where the threat of jail time and

the additional costs of hiding from law enforcement increases the cost of operating a firm. Whether that cost is passed on to consumers is important in considering whether this transaction cost tax is effective. In addition, firms face a further cost related to the inability to enforce contracts the same way legal markets do through the judicial process. The need to enforce contracts through extrajudicial means lowers the marginal cost of using violence (Miron and Zwiebel, 1995). We may therefore expect a link between the drug market and other crime outside of the simple possession and consumption of drugs.

A potential link between the drug market and violent crime may provide additional reasons as to why the pursuit of organized crime and the illegal drug markets criminal prosecution is of public interest. However, the extent of the relationship between the illegal drug market and additional crime is still an open question. The financial affluence that is likely gained from the illegal drug trade motivates an unregulated market to pursue real profits without the governance of anti-trust laws. Contreras and Hipp (2020) argue that drug activity may have short-term impacts on violent crime, but that those impacts are dependent on the social conditions in which a neighbourhood, community, or the context of time might provide.

Caulkins and Reuter (2017) argue that “a high proportion of nondrug crimes are committed either by drug dealers or by criminals who use these substances with sufficient intensity that their drug use contributes casually to their rates of offending (Caulkins and Reuter, 2017, 100).” The question as to how the prosecution of these individuals influences community crime rates can be an important economic question if we consider the ways crime often has communal impacts.

Contreras and Hipp (2020) suggest that even the most “structurally advantaged

blocks” may see an association between drug activity and crime. Potentially, changes in drug offenders at the neighbourhood level introduces people to different neighbourhoods and communities in order to satisfy demand when law enforcement distorts the market from equilibrium, potentially leading to increases in assaultive crime through the introduction of higher risk offenders into these structurally advantaged neighbourhoods (Contreras and Hipp, 2020, 203). Thus, we might also expect that law enforcements efforts in a community may have the unintended consequence of increasing crime.

Despite the societal incentives not to participate in such a market, demand for illicit drugs continue to increase (see Appendix A). Gary Becker and Kevin Murphy’s (1988) “rational addiction” model establishes a theory of demand for addictive goods. Supportive evidence has since suggested that influencing addictive goods cost to consumers can influence consumer behavior, however marginally (Gruber and Koszegi, 2000. Dave, 2006). Understanding a theory of demand for addictive goods is important to understanding how effective supply shocks may be. Knowing how robust a drug markets supply is has value. However, if demand for the products sold in this market is persistent, despite government intervention, then it is likely that the effect provided by the pressure of law enforcement by removing a local trafficking firm will be short lived.

Ilyana Kuziemko and Steven Levitt (2004) find that increases in the severity and expected frequency of punishment toward drug related crimes are associated with higher drug prices. More arrests and more strict punishments may be effective at influencing the markets costs of production and consumption and may consequently be influential at affecting drug use patterns. However, they point out this correlation may be

misleading and that their OLS model is certainly biased. Nevertheless, they suggest that 280 drug arrests per 100,000 residents annually is associated with an 18% rise in the street price of cocaine (Kuziemko and Levitt, 18-19, 2004). Their estimates clearly have long run price implications and do not offer short run, daily estimates that often characterize market shocks. Nevertheless, they argue that consumers are responsive to police presence, and that the expectation of the intensity with which consumers will be pursued as criminals should impact consumption behavior.

Naturally, there are social pressures associated with the control and enforcement of drug laws that make policy decisions in the interest of almost everyone. The potential unintended consequences associated with the strict legal enforcement of the criminalization of drug markets can be severe (Boettke, Coyne, Hall, 2022. Gaston, 2017). Our political perspectives on the drug market and those who partake in it are likely to influence how effective interventions might be. If the policy goal is to reduce the negative externalities associated with the drug market, we will need to carefully consider how we discuss the narratives of nimbyism (not in my backyard), abstinence, social justice and harm reduction (Loyaro and Miller, 2021). It will be important to consider how one intervention might undermine other communal goals and how our political narratives can impact otherwise well intended interventions.

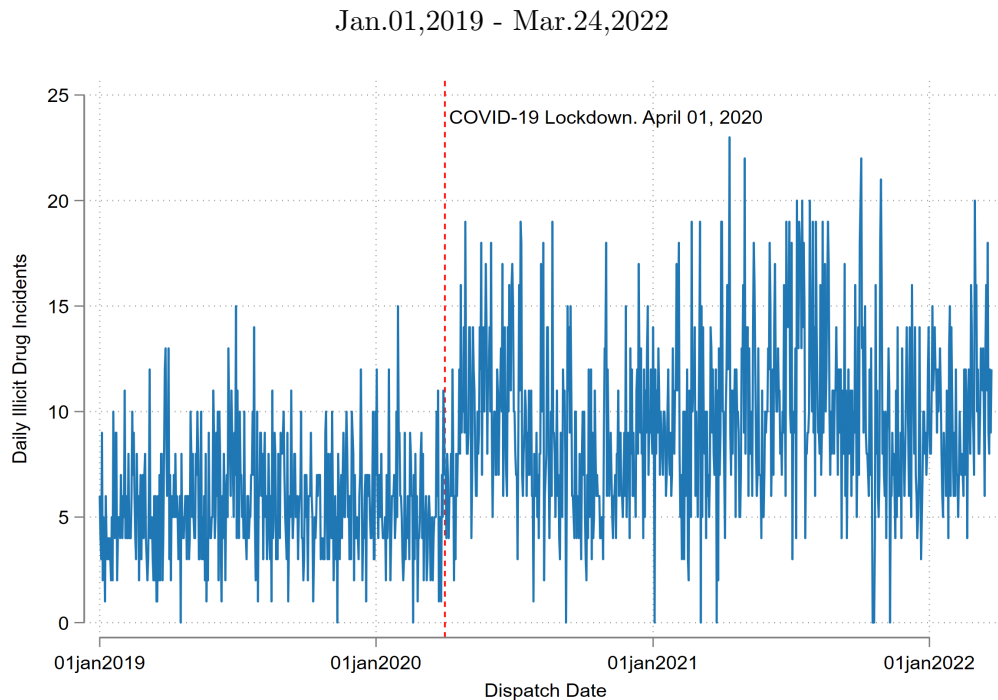
Contextual Background

Market Externalities in Winnipeg, Manitoba

Social pressures calling for government interventions are likely to be more common if substance use health emergencies and crime are more common. As a community struggles with the consequences of crime, it is not uncommon to associate that experience with the community's drug activity. Substance use concerns are particularly problematic in the presence of highly toxic illicit drugs. However, it is not obvious how substance use and crime are necessarily interconnected. The related data for substance use and crime are provided here. The observed trends in different substance use and crime categories may lead one to speculate on the relationship between them. However, it is not always clear why one relationship might exist and another appears not to. This confusion can be illustrated by the observable trends provided here from the city of Winnipeg, Manitoba.

Substance use health emergencies are on the rise in the province of Manitoba. Manitoba's most populated city, Winnipeg, collects and publishes data on emergency calls to the Winnipeg Fire and Paramedic Services (WFPS) on substance use health emergencies, which are classified under the categories of alcohol, marijuana, opioids, methamphetamines, or cocaine. Figures 1 and 2 offer a description of the trends in these calls

Figure 1: Winnipeg Fire and Paramedic Service Daily Responses to Illicit Drug Emergencies



Note: Illicit Drugs in this series belong to three categories: opioids, methemphetamines and cocaine products. Alcohol and marijuana have been excluded from this series. This graph describes daily emergency calls to the WFPS.

in Winnipeg from the sampling window of January 1st, 2019 - March 24th, 2022 in illicit drugs. The figures make clear that the issue of illicit drug use is increasing over time, seemingly doubling the mean of illicit drug use after the Provincial Government of Manitoba experienced the COVID-19 pandemic (The jump shown in Figure 1 and 2 after lockdown should not be interpreted as causal without the comparison of a counterfactual. For full trend over time, see Appendix A).

Winnipeg does offer some additional resources to combat substance use health emergencies. In particular, various non-profit organizations offer naloxone distribution, substance use rehabilitation and counselling services. However, the provincial government has primarily allocated its resources for combatting the illicit drug market to law en-

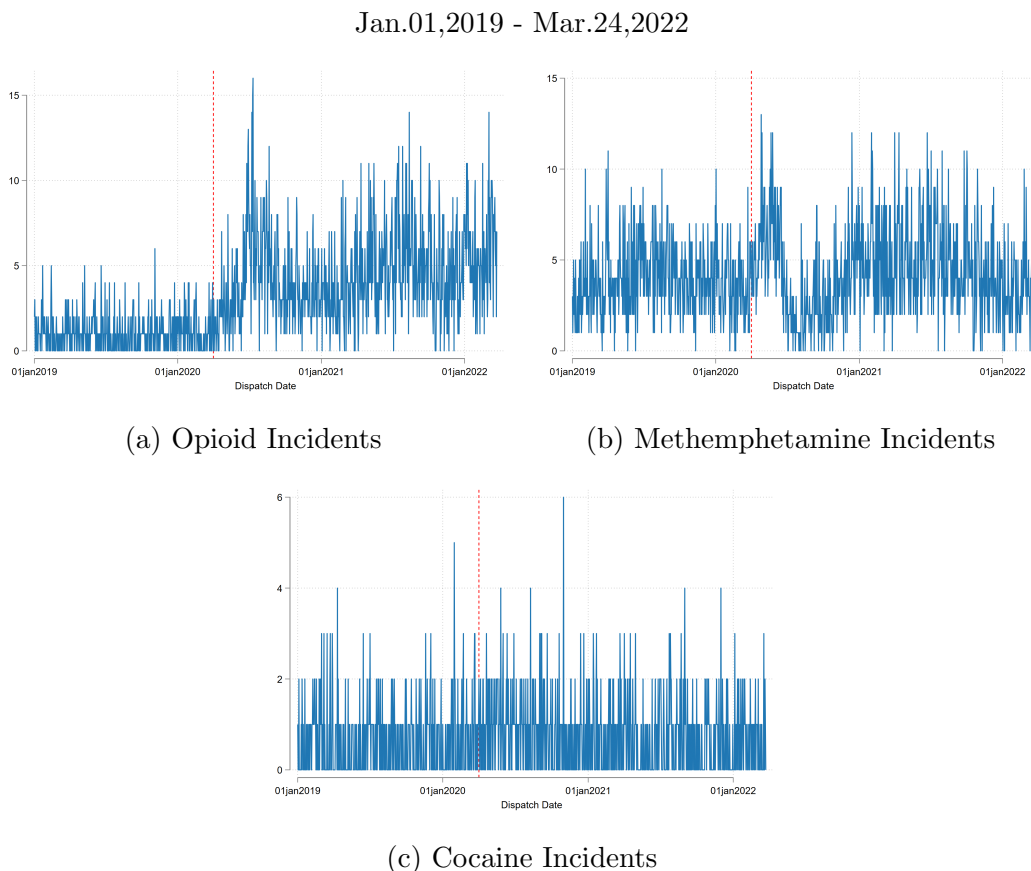
forcement initiatives. Recent calls for change in policy are in response to persistent trends in drug activity. These trends have renewed discussions surrounding resource allocation on a pressing issue that many perceive as requiring further government intervention.

Figure 2 provides a breakdown of the trends in the sample window for each illicit drug category. We can see most of the post COVID-19 increase is due to the increased popularity and toxicity of opioid products. Before the COVID-19 pandemic, methamphetamines were the predominant illicit drug causing health emergencies. That is no longer the case as opioid-related health emergencies have since caught up to those related to methamphetamines, as measured by average daily emergency calls related to the drug in question. Now the city is dealing with a crisis of highly toxic drugs with both methamphetamines and opioids. Each drug being responsible for on average 8 health emergencies per day, or on average 4 per drug.

Figure 2 suggests that there was a transition period where methamphetamine incidents spiked immediately after the April 1st, 2020 COVID-19 lockdown. Soon after, the dip in methamphetamine incidents corresponds with an increase in opioid related incidents. The increase in opioid-related health emergencies is not unique to Winnipeg. The same occurrence was seen across Canada, where each jurisdiction suffered similar trends in both health emergencies and overdoses causing death (Hatt, 2022).

According to the Library of Parliament's research by Laura Hatt (2022), there were approximately 6,306 opioid toxicity deaths in Canada in 2020. This was a 71% increase over 2019 (Hatt, 6, 2022). In response, the federal government has allowed provinces and territories to establish supervised consumption sites. However, until now, the government of Manitoba has declined to establish supervised consumption sites within

Figure 2: Winnipeg Fire and Paramedic Services Daily Responses to Illicit Drug Emergencies



Note: The vertical axes are not all equal for each graph. The red vertical line indicates COVID-19 lockdown on April 01, 2020. Each graph describes daily emergency calls to the WFPS.

its jurisdiction (Halmarson, 2022).

Safe consumption sites can provide an alternative supply side intervention into the market without the consequence of law enforcement. However, the government of Manitoba's primary intervention into the drug market's supply has been through the use of law enforcement, the intention being to prevent drug market externalities through the enforcement of the criminal code. The provincial government has so far declined to implement a safe injection site in the province within the time period of the sample studied, or before it.

Health emergencies provide a description of drug consumption patterns. Not every drug emergency results in a mortality, but to emphasize the urgency of the substance use crisis, the Chief Medical Examiner of Manitoba reports that the number of people who died from overdose in the province of Manitoba match the trends noted above. In 2018 and 2019, there had been 202 and 200 deaths, respectively, due to drug overdose. In contrast, 372 and 407 deaths due to drug overdose occurred in 2020 and 2021, respectively, in the province of Manitoba (Malone, 2022). Note that Winnipeg does not account for all of the total deaths from the Chief Medical Examiner of Manitoba's report. However, as the province's largest and most populated city, it serves as an appropriate case study in which to investigate the illicit drug crisis and the effectiveness of current policies.

Law enforcements efforts to pursue drug related and non-drug related crime have also been persistent. Regardless of their best efforts, we see some additional differences in crime activity around the COVID-19 lockdown.

The Winnipeg Police service provides data through their neighbourhood crime maps, where crime is categorized into violent crime, non-violent crime, federal statutes, and traffic violations. Figure 3 provides a visual description of trends within the sample period.

The series offered in Figure 3 panel (a), offers a striking resemblance between the series of violent crime and opioids. The timing of the spike in violent crime corresponds closely with the spike in opioid health emergency incidents. The striking observational patterns lend itself to speculation that drug use patterns are correlated with violent crime. Although this deserves further investigation, I refrain from drawing conclusions about this relationship in this paper, but rather draw the readers attention to the

correlation between the two trends before and after the COVID-19 lockdown.

Figure 3: Winnipeg Police Crime Reports

Jan.01,2019 - Mar.24,2022



Note: The vertical axis' are not all equal for each graph. Red vertical line indicates COVID-19 lockdown on April 01, 2020. Each graph describes daily crimes as dealt with by the Winnipeg Police Service.

The speculative relationship between opioid consumption patterns and violent crime raises important questions. However, the appearance of a relationship between the two series requires further investigation as to why we do not see similar relationships between other illicit drug groups and crime. The requirement to speculate on the relationships means that we do not know for certain how one drug's popularity might have additional societal influences and whether crime is an outcome of changes in drug popularity.

Data

The evidence for this study is provided by the City of Winnipeg’s Fire and Paramedic Services (WFPS). The data set offers unique daily and neighbourhood level observations. In this data set, a record is made every time the WFPS are called to respond to an emergency where substance use is involved. Substance use is categorized as either alcohol, marijuana, methamphetamines, opioids, or cocaine. The records reflect the patients’ description of events involving one of the aforementioned categories.

The crime data is provided by the Winnipeg Police crime maps, where there is a record made for crimes categorized as non-violent crime, violent crime, federal statutes, and traffic violations. In each of these data sets, the incident’s geographic location is recorded by neighbourhood and electoral ward.

Neighbourhoods are defined boundaries developed by the Community Data Network in collaboration with Winnipeg Regional Health Authority, Manitoba Health and the Social Planning Council of Winnipeg. There are 236 different neighbourhoods in the city of Winnipeg. The City of Winnipeg provides a boundary map for each neighbourhood on their open data portal (<https://data.winnipeg.ca/City-Planning/Neighbourhood/fen6-iygi>) which corresponds to the neighbourhood boundaries in the data provided by the WFPS and the Winnipeg Police Service. Those neighbourhood boundaries also correspond to a district electoral ward in which are aggregated groups of neighbourhood clusters.

The search warrants and arrests documented are provided by the City of Winnipeg Police’s media releases, where the police force, since 2019, has provided a daily press release discussing the details of (among other police announcements) search warrants

executed on suspected drug trafficking homes. The details of these press releases provide the block and city street the search warrant was executed, on what day, the quantity of drugs seized and which charges were laid. The details of the data provide a unique opportunity to investigate the impacts that removing a neighbourhood drug dealer has on substance use emergencies and crime within that neighbourhood.

Table 1 provides a descriptive statistics summary of Figures 1 & 2. The before and after descriptive statistics of the COVID-19 lockdown are provided to describe the magnitude of the COVID-19 pandemic's apparent effects on substance use emergencies. Without a proper counterfactual, I do not interpret this observation as COVID-19's causal influence on illicit drug health emergencies (see Appendix A). Nevertheless, it is important to highlight the pandemic's potential impact on how effective removing a neighbourhood drug trafficker might be on that neighbourhood. As well, there is value in discussing the potential consequences of a social lockdown on at risk individuals. Although this is beyond the scope of this paper, the feature in the data is too obviously relevant.

Table 2 provides a summary of Figure 3. Before and after lockdown statistics are provided as well and readers should refrain from jumping to conclusions as mentioned before. Regardless, there are important differences to highlight, especially in consideration of the local trends in which we see from the health emergency data.

The lockdown in response to the pandemic poses a problem in terms of how to study these issues. Given almost every region in the world was impacted by the COVID-19 pandemic and most governments initiated some sort of social isolation policy in response, it is difficult to assess how the pandemic might have impacted peoples interaction with crime and illicit drugs without the ability to employ a counterfactual. It

would require impressive reasoning and detailed theory to suggest that the pandemic did not significantly impact these trends, however, discussion around the magnitude of the pandemic’s impact is limited.

Table 1: Descriptive Statistics of Daily Substance Use Emergency Categories

Jan.01,2019 - Mar.24,2022

	mean	sd	min	max	sum
Illicit Drugs	8.057	4.028	0	23	2,185,000
Opioid	3.168	2.813	0	16	859,280
Methamphetamines	4.174	2.410	0	13	1,132,060
Cocaine	.7141	.8524	0	6	193,660
Alcohol	12.49	5.823	0	41	3,389,510
Marijuana	.6988	.8471	0	5	189,520
Observations	271,170				

	Before Lockdown				After Lockdown			
	mean	sd	min	max	mean	sd	min	max
Illicit Drugs	5.649	2.636	0	15	9.578	4.011	0	23
Opioids	1.089	1.129	0	6	4.478	2.769	0	16
Methamphetamine	3.914	2.043	0	11	4.340	2.601	0	13
Cocaine	.6455	.8163	0	5	.7593	.8722	0	6
Alcohol	14.37	6.225	0	41	11.31	5.212	0	33
Marijuana	.7155	.871	0	5	.6874	.831	0	5
Observations	105,110				166,290			

Note: For detailed descriptive statistics for each neighbourhood, see Appendix D. The unit of observation is the count of substance use health emergencies. The total observations denotes how many days there are in the sample period.

Table 2: Descriptive Statistics of Daily Crime in Winnipeg

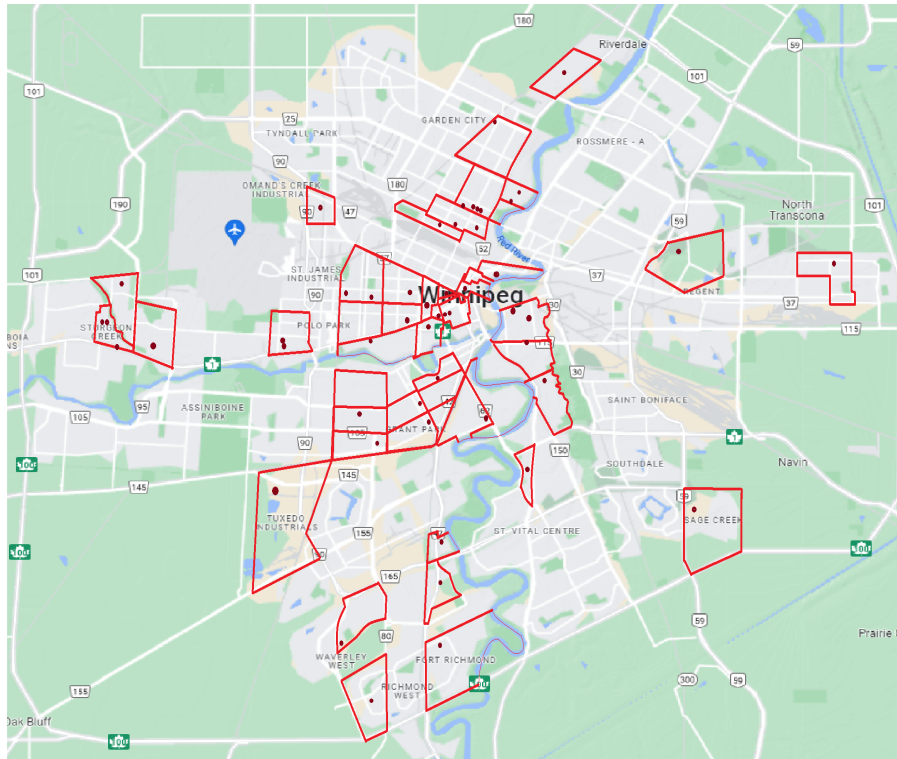
Jan.01,2019-Mar.24,2022

	mean	sd	min	max	sum
Non-Violent Crime	106.26	30.210	40	208	2.88e+07
Violent Crime	15.033	5.5226	2	42	4076750
Federal Statute	.67854	.86156	0	6	184000
Traffic Violation	.90245	1.0070	0	6	244720
Observations	271,170				

	Before Lockdown				After Lockdown			
	mean	sd	min	max	mean	sd	min	max
Non-Violent Crime	115.77	30.470	47	208	100.24	28.42	40	185
Violent Crime	13.577	4.6055	2	28	15.943	5.8523	3	42
Federal Statute	.63676	.85452	0	5	.70816	.86855	0	6
Traffic Violation	.87089	.9715	0	5	.9225	1.0277	0	6
Observations	105,110				166,290			

The treated neighbourhoods in the empirical model are defined by the neighbourhoods in which the Winnipeg Police Service executed a search warrant that resulted in an arrest, charges laid and enough illicit drugs and paraphernalia seized to warrant a trafficking charge. Importantly, this does not include simple possession charges, but possession with the purpose of trafficking. This distinction is important to distinguish between consumers and producers in the market. Figure 4 provides a map of the approximate locations where a search warrant was executed, marked by the dark red dots, in relation to its neighbourhood boundary highlighted by the lighter red boundaries.

Figure 4: Approximate Locations of Search Warrants Executed in Winnipeg
Jan.01,2019 - Mar.24,2022



Note: Red boundaries highlight the neighbourhood as defined within the data set provided by the WFPS. I.e. the red boundaries highlight the treated neighbourhoods in the model.

In Canada, the *Controlled Drugs and Substances Act (S.C. 1996, c. 19)* defines drug trafficking such that:

Trafficking in substance

5 (1) No person shall traffic in a substance included in Schedule I, II, III, IV or V or in any substance represented or held out by that person to be such a substance.

Possession for purpose of trafficking

5 (2) No person shall, for the purpose of trafficking, possess a substance included in Schedule I, II, III, IV or V.

There are many opioid products that are listed as a scheduled drug. For example, Oxycodone is listed as a Schedule 1 drug under the Controlled Drugs and Substances

Act (CDSA). Narcotics in Canada are also regulated under the CDSA, including controlled and illegal drugs such as cocaine, methamphetamines, fentanyl and heroin (also Schedule 1 drugs).

For the sake of continuity with the WFPS data, fentanyl, heroin and other opioid products seized in a trafficking arrest have been categorized under the broader category of opioid. This categorization is due to the fact that we do not know what kind of opioids the individual looking for medical help has consumed. Although risk factors may vary based on what type of opioid is being trafficked, it is important to note that perceived lower risk factor opioids might also be associated with larger doses, and perceived higher risk factor opioids might also be associated with lower doses. Therefore, the categorization does not raise questions as to the likelihood one might result in a health emergency as a result of taking an opioid product from one dealer or the next based on what type of product is being sold.

It is also important to note here that being charged with trafficking and convicted of trafficking are two separate events. It is not assumed that because one is charged with trafficking, they will be found guilty. What matters for the sake of this study, is that the police confiscated enough illicit drugs as a result of a search warrant on a dwelling, effectively removing a distributing firm from the neighbourhood. Who might or might not be found guilty is not a necessary consideration in classifying a neighbourhood as treated.

There are, without doubt, challenges to estimating the impact drug trafficking busts have on substance use health emergencies and crime. One of the most significant challenges is that detailed public data is not available on drug consumption behavior. The data provided here by the WFPS is the most detailed collection of publicly available

data in Canada for a number of reasons. First, the data's spatial dimensions coupled with its daily frequency allows researchers some unique insights into trends and impacts. Second, health emergencies arising from the use of illicit drugs are a relatively common occurrence whereas an overdose mortality, which other data sets might provide, are less frequent. Although it is also important to understand trends concerning mortality rates caused by illicit drugs, understanding which policies are effective at mitigating health emergencies more generally can go a long way toward reducing mortalities due to overdose.

Some important limitations of the data are that if someone reports to the hospital without using the WFPS, then they are not recorded within this data set. Therefore, this data set almost certainly under counts the amount of health emergencies due to substance use in Winnipeg.

In addition, the data are based on the patient's description of events. This means that, when concerning illicit drugs, it might be that the patient is untruthful out of fear of consequences for having taken an illegal substance. This issue, I argue, is not severe. When it comes to potentially life saving emergencies, there is an incentive to be honest with the paramedics so as to receive the appropriate care. If one feels it is best to not disclose the truth, there is potential for the paramedics to provide inadequate care, resulting in worse outcomes. If I am underestimating the bias resulting from inaccurate personal accounts, then the bias may manifest as an overestimate of the alcohol incident series because if the patient would still want help for substance use they may be incentivised to tell paramedics that the substance they took was a legal one. This reasoning suggests that there is some potential for the illicit drug series to be under-counted.

Methodology

Additional challenges to estimating the impact drug trafficking busts have on substance use health emergencies are related directly to the methodology used in this paper. Employing a difference-in-differences (DID) approach to estimating these impacts requires reasonable counterfactuals as controls. Without a comparable data set from another community to work with next to the one provided by the WFPS's, the controls in the model used are other, untreated neighbourhoods within Winnipeg. It is unreasonable to suggest that an individual trafficking in illicit drugs is confined to the neighbourhood from which they are found to be distributing. The spill over effects here are likely much more severe. However, it is important to note, that this issue of spill over effects across neighbourhood boundaries attenuates the estimates toward zero. Thus, any effect found would be a conservative estimate of the true neighbourhood impact.

If evidence provides no indication that neighbourhoods are impacted, then it is reasonable to suggest that the illicit drug market is competitive enough to sustain production when impacted by a supply shock. The spill over effects would be the likely source of zero estimates. This attenuation is therefore informative to the economic consequences this paper seeks to investigate. If no impact, or very small and short-term impacts are found, this suggests suppliers can easily move between regions within cities

to compensate for shortages and consumers can easily substitute from one producer to another. This strategy therefore looks to measure the neighbourhood specific impact that shutting down an illicit drug trafficking firm will have on substance use patterns and crime.

In addition, any decrease in substance use incidents is likely to vary according to the quantity of drugs seized, which drug was seized, the individual arrested and the location of the property in which the search warrant was executed. The variation in treatment effects raise some of the same concerns of heterogeneous treatment effects highlighted in the related DID literature (Goodman-Bacon, 2018; Sun and Abraham, 2020; Callaway and Sant'Anna, 2020). To address this issue, I employ a stacked DID design in an attempt to offer estimates that are more robust to the presence of heterogeneous treatment effects.

If removing an illicit drug trafficker from a neighbourhood makes room for competing firms, then we are interested in both long-run and short-run effects. In the long run, we would expect the impact to be zero due to the nature of demand in the market and presumably the robustness of supply. The illegal drug market has a seemingly healthy demand for its products, with plenty of financial incentive to continue distribution despite potential criminal consequences. It is a fair assumption to suggest that consumers can easily move from one distributor to the next once a distributor has been removed. In the short-term, it is important to know if there is a negative impact to understand whether law enforcement has any mitigating effects. In other words, how long does it take after a distributor has been removed from the market for overdose rates to catch up to its expected value pre-arrest? The event study framework serves as a useful tool if we want to analyze any possible evidence of mitigating factors in the

short run.

Empirical Model

The baseline model employed in this study is a stacked DID with two way fixed effects in event study form:

$$y_{c,j,t} = \alpha + \sum_{k=-10}^{30} \beta_k D_{k,c,j,t} + \eta_{c,j} + \rho_{c,t} + \epsilon_{j,t} \quad (1)$$

where y is the count of illicit drug health emergencies or crime (all illicit drugs, opioids, methamphetamines, cocaine, violent crime or non-violent crime) in neighbourhood (or electoral ward) j during time t (weekly). D_k takes the value one during the week a search warrant was executed and each week after for neighbourhood clusters that have had a search warrant executed within its defined boundaries and zero otherwise. $\eta_{c,j}$ and $\rho_{c,t}$ are cohort-neighbourhood and cohort-time fixed effects respectively, referring to how the data is stacked by cohort.

This model identifies the effect that the execution of a search warrant has on neighbourhood drug use patterns or crime if these patterns occur in parallel between neighbourhoods over time with and without police executing search warrants. To test this theory, this paper employs the common practice of assessing leading terms. Each event study offers coefficient estimates for 10 weeks prior ($\beta_{-10}, \dots, \beta_{-1}$) to the search warrants execution and 30 weeks after ($\beta_1, \dots, \beta_{30}$). This window serves as a useful time period to observe any short term impacts around the search warrants execution.

Correlational Model

In addition, I look at OLS regressions where I seek to investigate correlation between drug use patterns and crime. I estimate the model as:

$$C_{j,t} = \mu + \beta Drug_{j,t} + \eta_j + \rho_t + \varepsilon_{j,t} \quad (2)$$

where C represents crime (violent crime and non-violent crime, federal statutes or traffic violations) at time t in neighbourhood j . $Drug$ represents each drug (opioids, methamphetamines, cocaine, alcohol and marijuana). ρ_t represents a linear time trend and η_j represents neighbourhood controls.

This OLS model is unsatisfactory for causal inference since it describes the correlation between drug use patterns and crime if drug use health emergencies are an appropriate proxy for drug use patterns within a community. Given that they might not be, this method's estimates should be taken as suggestive evidence of any effect substance use patterns have on crime. Explicitly, this model measures the correlation between drug uses health emergencies and crime, controlling for differences in neighbourhood and a linear time trend. As it is useful to gain insight into whether crime increases with substance use, these regressions serve an informative purpose.

Results

The Relationship Between Drug Use Trends and Crime

The first point to note about the data is that the COVID-19 pandemic appears to have changed the relationship between drugs and crime in the community of Winnipeg. Although it is difficult to discuss causal relationships between covid and each variable in the data due to the lack of counterfactuals and clean identification of drug consumption, it is clear drug use patterns changed along with crime in response to the pandemic. Confounding factors make discussing the series as a whole problematic, which is why each regression is illustrated both before and after the lockdown.

As noted before, it is important to interpret the estimates reported in Table 3 carefully, as they do not describe a causal relationship. However, the idea that substance use health emergency patterns are a good proxy for substance use patterns in general is supported by the correlational relationship between alcohol and traffic violations. This relationship is well documented and thoroughly studied by policy makers and academics (Pereira et al, 2011) and it is found that increases in alcohol use are correlated with increases in traffic violations.

What is unclear is how other drugs might be correlated with traffic violations. Here Table 3 suggests there is not evidence supported by this data that other substance

use patterns are correlated with traffic violations as measured by substance use health emergencies.

The only other substance that appears to be correlated with crime is opioids. Before the lockdown, opioid use was correlated with non-violent crime but the correlation appears to have dissipated after the lockdown took effect and, instead, opioid use appears to be correlated with violent crime after the lockdown. Similarly, alcohol consumption patterns appear to be correlated with violent crime only after the lockdown was initiated.

Referencing these regression results from Table 3 with Figures 2 and 3, the correlational results between opioids and violent crime after the lockdown are not surprising. Although I control for differences in neighbourhood, the relationship appears clear at first glance over time. However, the pre-lockdown relationship between non-violent crime and opioid use is relatively surprising, especially considering all other substance use emergencies do not show a correlation between them and non-violent crime. These regressions may highlight some important effects that the pandemic and subsequent lockdown-induced social isolation had on at-risk individuals. However, it raises important questions as to why opioid consumption appears to be unique in Winnipeg with respect to its relationship with violent crime during this period, where we do not observe the same relationship with other illicit drugs.

This model likely suffers from a degree of bias due to missing variables. However, investigating the causal relationship between drug use consumption and crime is beyond the scope of this paper, these regressions highlight the important contextual differences between before and after the pandemic that should be considered when working with illicit drug consumption data.

Table 3: Regressions analyzing the correlation between substance use patterns and crime

		Before Lockdown					After Lockdown				
Panel A:	Illegal Substance	Violent Crime	Non-violent Crime	Federal Statute	Traffic Violation	Violent Crime	Non-violent Crime	Federal Statute	Traffic Violation		
	Opioids	0.00177 (0.0223)	0.135* (0.0626)	-0.00546 (0.00396)	-0.00164 (0.00290)	0.0245** (0.00771)	0.00499 (0.0254)	0.000939 (0.00164)	0.000429 (0.00204)		
	Meth	0.00547 (0.0111)	0.0405 (0.0333)	0.000802 (0.00243)	0.00172 (0.00230)	0.00433 (0.0112)	-0.0299 (0.0257)	0.00377 (0.00209)	-0.00135 (0.00167)		
	Cocaine	-0.0145 (0.0308)	0.0303 (0.0722)	-0.00395 (0.00478)	-0.00290 (0.00315)	0.0255 (0.0277)	0.0335 (0.0611)	0.00423 (0.00519)	0.000253 (0.00321)		
Panel B:	Legal Substance										
	Alcohol	0.000623 (0.00555)	0.0238 (0.0164)	0.000424 (0.00144)	0.00287* (0.00123)	0.0208*** (0.00619)	0.0125 (0.0124)	-0.000636 (0.000680)	0.00373** (0.00119)		
	Marijuana	0.0193 (0.0280)	-0.0166 (0.0774)	0.00605 (0.00645)	-0.000132 (0.00405)	0.0129 (0.0343)	0.0175 (0.0436)	0.00228 (0.00385)	0.00258 (0.00541)		
	Obs.	166290									

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Standard errors clustered at the neighbourhood level. Each regression has a set of controls for neighbourhood and a linear time trend. Each column and row represent different regressions.

The Relationship Between Suppliers and Externalities

The remaining empirical analysis focuses on the relationship between the drug supply side of the market, and the markets externalities. Those externalities being health emergencies and crime.

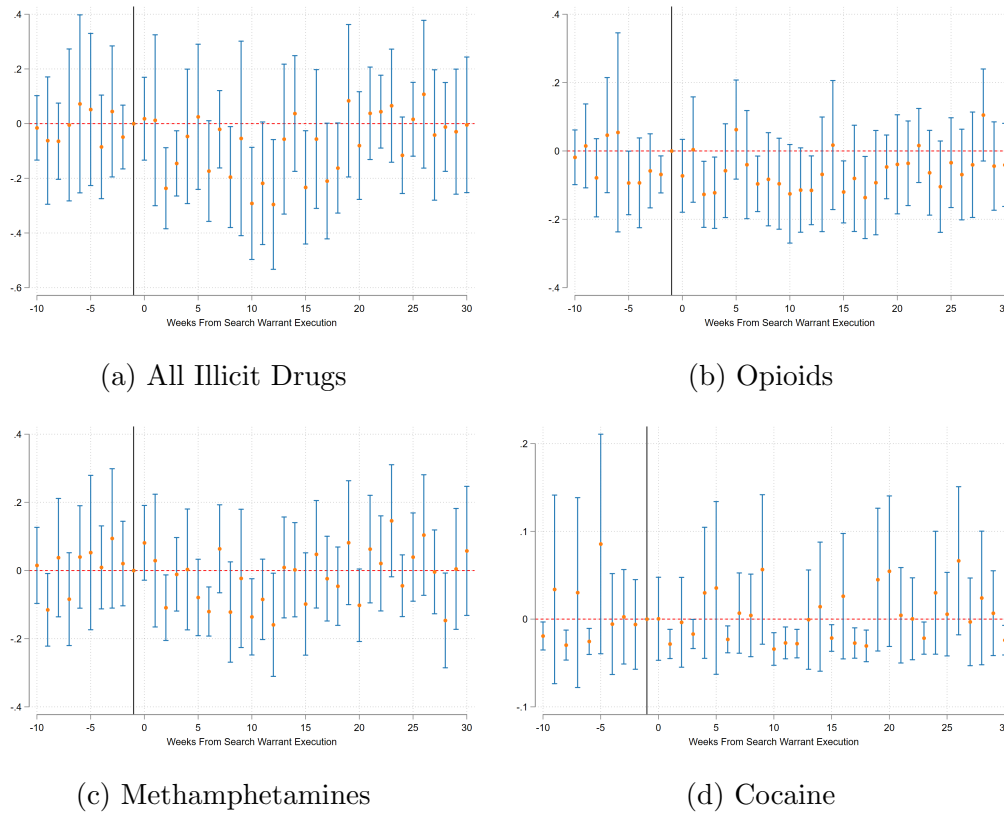
Although the relationships discussed above, as estimated by equation (2), only discuss how crime might change in response to substance use patterns changing, equation (1) estimates how drug use health emergencies and crime change within a neighbourhood due to the execution of a search warrant on a drug trafficker's dwelling. This DID model is also run as before and after lockdown regressions in order to compare how the climate for investigations in which search warrants are obtained and community social environment might have changed in response to a pandemic lockdown and how that might impact the outcomes of interest (See Appendix B).

Each regression is presented as an event study in order to assess the short run impacts that trafficking busts have on the neighbourhoods in which the traffickers operate.

Figure 5 offers the estimates of the impact on illicit drug use emergencies in response to the execution of search warrants. These results suggest that the treatment effect of removing a drug trafficking firm on illicit drug use health emergencies is zero in the long run. However, we see evidence of short-run, neighbourhood specific impacts. Figure 5 panel (a) suggests that these search warrants and neighbourhood busts are likely causal factors for drug shortages, price increases, and/or deterrent effects for illicit drug consumers and that the market also likely recovers relatively quickly. Although these results are noisy, they offer insights into how the closure of a firm can influence

Figure 5: Impact of search warrants executed on illicit drug incidents

Treatment isolated to neighbourhood in which arrest took place



Note: Standard errors clustered at the neighbourhood level. Orange circles represent coefficient estimates while the blue bands around each of those estimates represent 95% confidence intervals. Zero represents the week in which the search warrant was executed and each coefficient is for the time period further away from the search warrants execution. In this case that time period is weekly. The vertical axes on each graph are not identical and do not represent the same scale.

a neighbourhood and the drug market externalities within that neighbourhood.

The results appear to reflect that neighbourhood drug use patterns are impacted by the removal of a drug trafficking firm, resulting in lower health emergencies involving illicit drug use in that neighbourhood. The magnitude of the average impact is small, but we see that after a search warrant is executed on a neighbourhood dwelling, drug use health emergencies are lower on average and then the effect returns to zero, where the market presumably stabilizes from the shock induced by law enforcement.

Figure 5 panels (b), (c) and (d) offer the estimates of the decomposition of the illicit drug data reflected in panel (a). Panel (d) (cocaine) is not interpretable due to issues in pre-trends. However, panel (b) and (c) (opioids and methamphetamines) offer some insights into the estimate trends offered in panel (a).

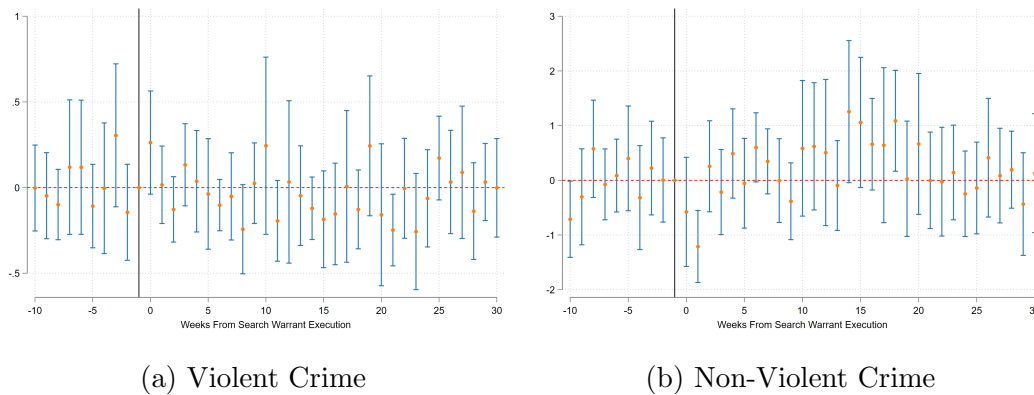
An interesting observation one can observe from the event studies is that it takes two weeks before we see evidence in the data that the search warrant is impactful at creating a potential neighbourhood shortage. In theory, this suggests that as consumers use their current supply, the “shortage” begins to be observable in the data when a supplier is no longer available, suggesting there is a lagged effect between when the firm is shut down and when consumers run out of the consumption good. This also suggests that the effect is likely not a deterrent effect due to police presence, but rather an economic effect related to the drug supply. If the police were effective deterrents of consumption patterns on neighbourhoods through the exercise of search warrants, the effect would be expected to be more immediate.

Figure 6 offers the estimates of the impact on crime in response to the execution of search warrants. In panel (a) we see no impact on violent crime: the removal of an illicit drug trafficking firm does not appear to impact neighbourhood level violent crime positively or negatively.

We might consider that the removal of a drug trafficking firm would either decrease crime or increase crime. For example, if the removal of a drug trafficking firm creates fierce competition, one might expect violent crime to increase if that competition for the neighbourhood market is combative. However, if those who both use illicit drugs and sell illicit drugs have a propensity toward violent crime, then the opposite effect might be true, where the removal of that firm will then “clean up” the neighbourhood.

Figure 6: Impact of search warrants executed on crime

Treatment isolated to neighbourhood in which arrest took place



Note: Standard errors clustered at the neighbourhood level. Orange circles represent coefficient estimates while the blue bands around each of those estimates represent 95% confidence intervals. Zero represents the week in which the search warrant was executed and each coefficient is for the time period further away from the search warrants execution. In this case that time period is weekly. The vertical axes on each graph are not identical and do not represent the same scale.

I find no evidence of either impact here.

Panel (b) suggests there is a short-term neighbourhood level impact on non-violent crime after the search warrant. This effect is minimal and short-lived. Nevertheless, it might indicate a decrease in the amount of crimes being committed following the removal of a trafficking firm, and/or the amount of drug possession charges in the neighbourhood after the removal of a drug trafficking firm. Although data limitations do not allow for identification on this issue, either outcome is of interest.

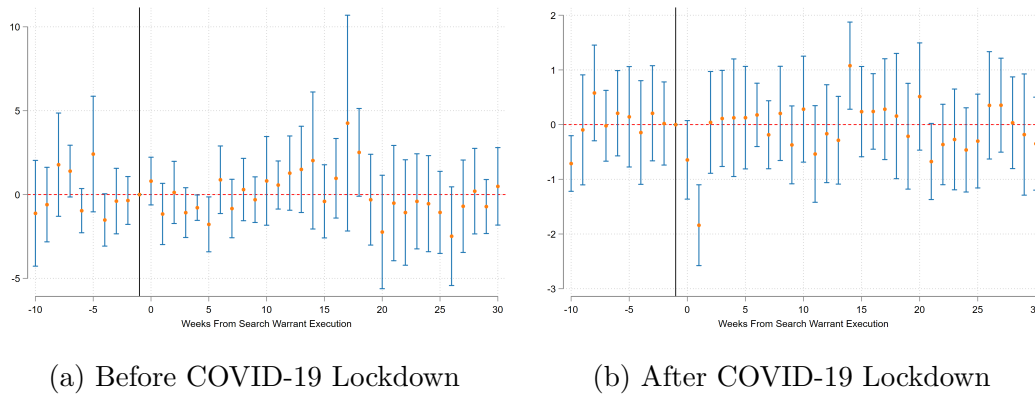
What is perhaps most notable about Figure 6 panel (b) is that this effect does not appear evident before the COVID-19 lockdown. Figure 7 provides estimates of the effect of the removal of a drug trafficking firm from a neighbourhood on non-violent crime, before and after the COVID-19 lockdown.

The conditions of the pandemic and subsequent social lockdown appear to have impacted the relationship between the drug market and non-violent crime. It is possible

that the requirement to isolate provides added incentives in response to a search warrant being executed. It is beyond the scope of this study to identify what these incentives are, however, they may be useful to identify if they are at all replicable outside of the context of a pandemic. However, it is difficult to interpret this result in a way that is specifically informative to the literature due to the level of uncertainty related to the data constraints the non-violent crime variable faces.

Figure 7: Impact of search warrants executed on non-violent crime

Treatment isolated to neighbourhood in which arrest took place



Note: Standard errors clustered at the neighbourhood level. Orange circles represent coefficient estimates while the blue bands around each of those estimates represent 95% confidence intervals. Zero represents the week in which the search warrant was executed and each coefficient is for the time period further away from the search warrants execution. In this case that time period is weekly. The vertical axes on each graph are not identical and do not represent the same scale.

Robustness Checks

This section employs two robustness checks. The first is to aggregate the data to the electoral ward level and repeat the exercise. Electoral wards, in this case, are geographical boundaries that are aggregate groups of the neighbourhoods identified in the data. Both the WFPS and the Winnipeg Police Service provide Winnipeg electoral wards as an additional geographic dimension in the data. This robustness check attempts to see if the results hold at higher levels of aggregation to help identify the severity of potential spill-over effects. If the most immediate neighbourhoods surrounding the treated neighbourhood are affected by the treatment as well, then aggregating the data in larger geographic ranges can be useful to see if the effects are identical, similar, or different. Identical results would suggest that the most immediate surrounding neighbourhoods are also impacted by the closure of a drug trafficking firm. Similar results would suggest this is also true, but to a less extreme extent if the effects attenuate. Different results, in particular if there is no effect after aggregating the data this way, suggests that the treatment is more likely neighbourhood-specific and that the spill-over effects are likely not too severe.

The intuition behind this idea is that if all neighbourhoods around the treated neighbourhood are also treated, then substance use will decrease in unison. The model ran where only the neighbourhood in which the search warrant was executed on was treated will not pick up these effects on other neighbourhoods. So, broadening the treatment set, while clustering on a different set of geographic boundaries, is a useful robustness exercise to see how any effects found might spread across geographic lines.

Second, I employ a technique that includes dropping all untreated neighbourhoods from the data. This exercise is, again, to check the severity of spill-over effects. This method relies on the staggered treatment employed in this research design but uses the not yet treated groups as counterfactuals, where the group will receive treatment later. Similar to the previous robustness check, these regressions help check for spill-over effects by eliminating neighbourhoods from the data set in which the spill-over effect might pollute the estimate. The biggest draw back of this approach is that it reduces precision due to the decrease in clustered units when calculating standard errors. Nevertheless, it serves as a useful robustness check to ensure the effects we see are consistent.

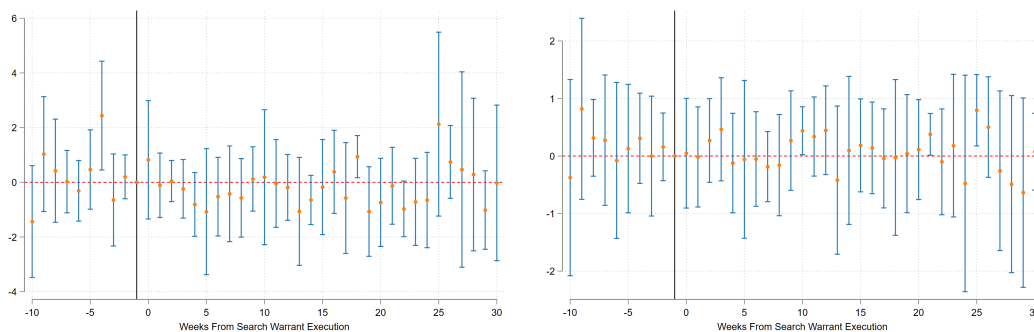
Regarding robustness check one, Figure 8 provides the relevant evidence. We observe no evidence of an effect in these regression results. In particular, the estimate on all illicit drugs produces treatment effects equal to zero, where all coefficients fail to reject the null and there is no observable negative trend. As well, the estimate on non-violent crime is much different, where we no longer observe the short-term decrease after the execution of a search warrant.

Robustness check 2 (Figure 9) provides very similar estimates to the key findings reported in Figures 5 and 6. Although the estimates lose precision, we see coefficient estimates with considerably similar values to that of the key findings of this paper.

Not only do these exercises allow us to gain confidence in the original specifications output, but they also inform us that these estimates are likely neighbourhood-specific effects. There is likely some of spill-over effects still present, but the model appears able to estimate neighbourhood effects on substance use health emergencies and non-violent crime.

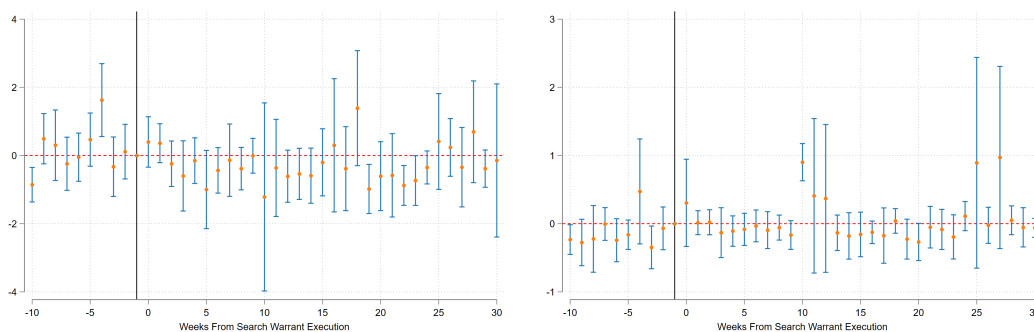
Figure 8: Robustness Check 1

Treatment at electoral ward level



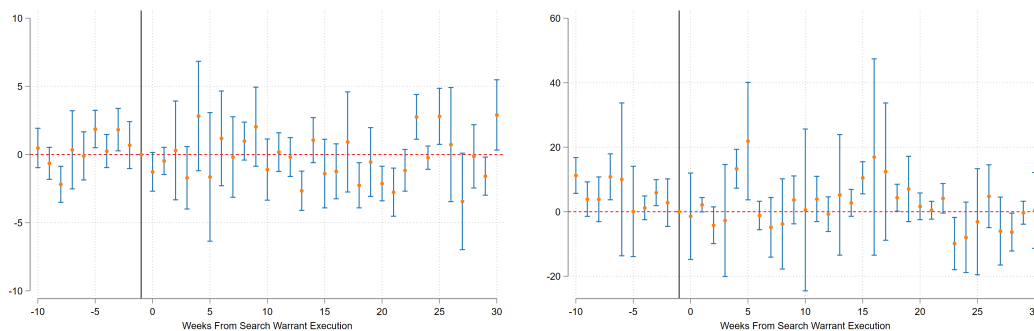
(a) All Illicit Drugs

(b) Opioids



(c) Methamphetamines

(d) Cocaine



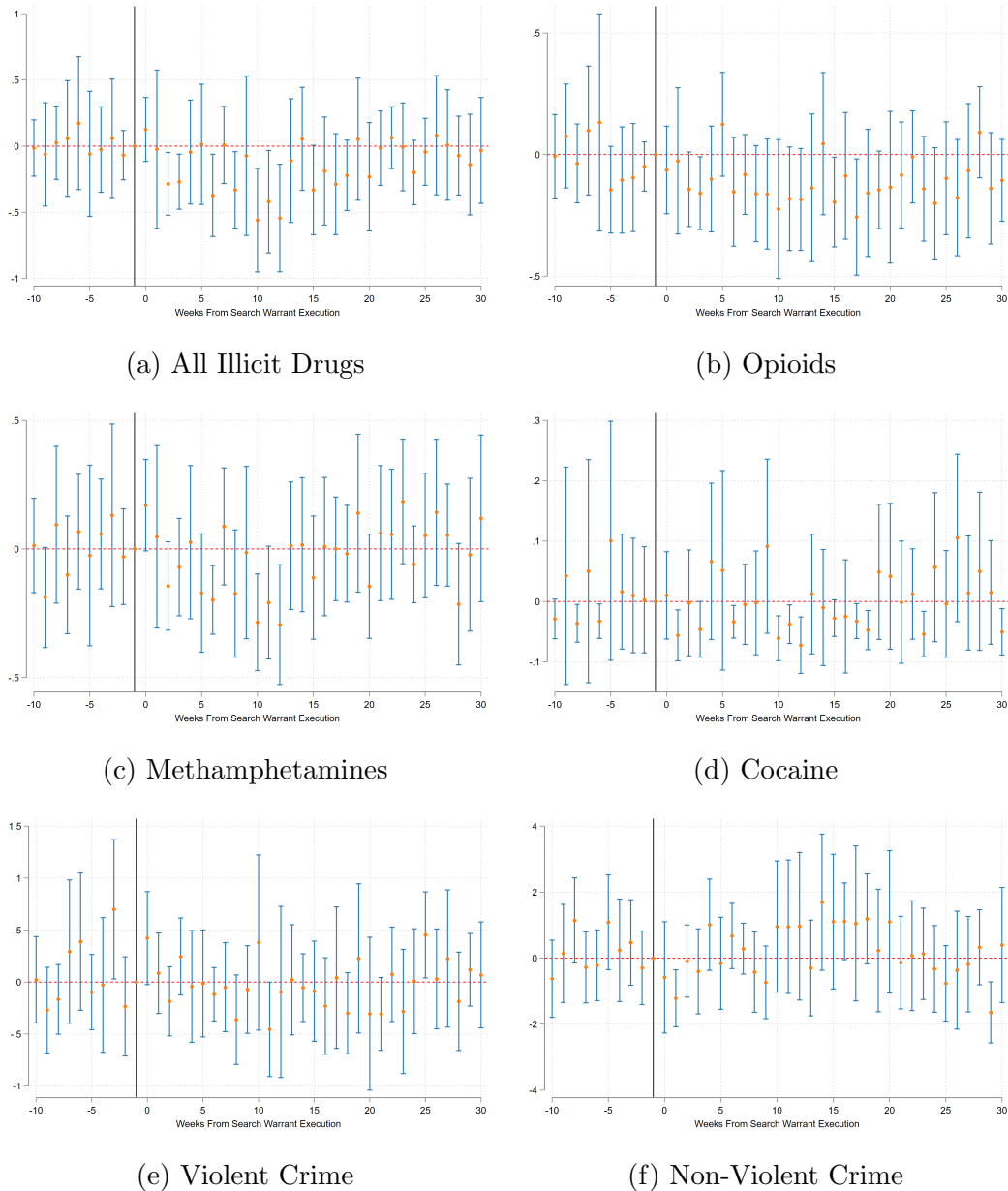
(e) Violent Crime

(f) Non-Violent Crime

Note: Standard errors clustered at the neighbourhood level. Orange circles represent coefficient estimates while the blue bands around each of those estimates represent 95% confidence intervals. Zero represents the week in which the search warrant was executed and each coefficient is for the time period further away from the search warrants execution. In this case that time period is weekly. The vertical axes on each graph are not identical and do not represent the same scale.

Figure 9: Robustness Check 2

Only treated neighbourhoods included in the model



Note: Standard errors clustered at the neighbourhood level. Orange circles represent coefficient estimates while the blue bands around each of those estimates represent 95% confidence intervals. Zero represents the week in which the search warrant was executed and each coefficient is for the time period further away from the search warrants execution. In this case that time period is weekly. The vertical axes on each graph are not identical and do not represent the same scale.

Discussion

Key Findings

This study has four key findings. First, I provide evidence that the removal of a drug trafficking firm has a short run neighbourhood-specific impact on illicit drug health emergencies. On average, long run effects are zero. The appearance of a short run effect may be due to either a neighbourhood facing a shortage in drugs due to the missing firm, a disincentive to consume in that neighbourhood due to police presence, or an increase in prices due to a supply shock. However, it is notable that these effects are small and dissipate quickly over time. The economic significance of this finding carries value with respect to the allocation of resources toward law enforcement and its effects on health resources. This paper provides evidence that law enforcement does appear to have some mitigating effects on health emergencies, but this finding is neighbourhood specific and eventually the effect dissipates where a competitive market appears to adjust to the shock initiated by law enforcements efforts. In addition, the finding highlights some important implications for medical resources. The evidence presented here suggests we should not expect law enforcements influence on the drug supply to have large effects on medical resources.

Second, the relationship between closing a drug trafficking firm and neighbourhood crime appears to be very small. The short-run impact on non-violent crime found after the onset of the COVID pandemic suggests that there is a link between the drug market and crime that can be empirically measured. However, this affect appears evident only after the COVID-19 lockdown was initiated by the Provincial Government and not before. It may be, where some steady state exists, law enforcements efforts to close trafficking firms do not have an impact on non-violent crime. However, in the presence of market turmoil, such as those conditions seen during a pandemic, the need to isolate provides further incentive to refrain from criminal activity. Additionally, the effect found may be attributable to drug-related crime itself. It is possible that the impact that is measured here is a decrease in drug possession charges, where a trafficking charge was not warranted. However, this study can only speculate on the matter due to data limitations. Regardless, if a distributing firm is removed from a neighbourhood, it thereby follows that it would be increasingly likely that possession charges would decrease in that neighbourhood. Expanding the scope of consideration to the requirement to isolate under the conditions of a pandemic, would increase the likelihood of this negative neighbourhood effect.

Third, there does not appear to be any relationship between the removal of a drug trafficking firm and neighbourhood-specific violent crime. One might expect that the removal of a firm might initiate more intense and potentially hostile competition from other firms to obtain the additional market share. Or, perhaps, one might expect to see that those associated with crime who consume drugs might no longer be consuming regularly in the neighbourhood for which the drug was purchased, as hypothesized by Caulkins and Reuter (2017). However, this study finds no evidence of an impact on violent crime either way as a result of removing a trafficking firm from the neighbour-

hood.

Finally, the correlation between opioid use patterns and violent crime only appear observable after the COVID-19 lockdown. It may be worth speculating that this is a time in which there appears to be a substitution effect between methamphetamines and opioids. This result would support Contreras and Hipp's (2020) suggestion that this relationship is dependent on the context of the time in which the market goes through a transition; substitution effects may initiate some market turmoil with additional negative externalities. This may also help illuminate why empirical evidence of the relationship between drug consumption and violent crime has been weak (Miron and Zwiebel, 1995).

It may be the case that established illicit drug markets offer little evidence of a relationship between consumption and crime. This is evident in this study in the statistical relationship between other drug consumption trends. However, emerging markets may provide a competitive enough environment providing additional incentives to use violence. Or this trend might be attributable to the pandemic and the social conditions experienced under government mandated lockdown.

The statistical relationship between drug activity and violent crime appears only statistically significant with opioid and alcohol consumption after the onset of the pandemic. Because no other substance use pattern produced the same statistical relationship, one might expect that this is indicative of a market transition where the increased use of opioid consumption has additional externality concerns on top of overdose rates. Although this is the weakest result of the study, the implications of such findings might be the most impactful. As such, this study recommends further research into such effects be done in order to assess any potential unintended consequences of

government intervention into the market.

Future research

Although the substitution effects toward opioids are speculative, the implications for such impacts into market intervention are severe. If market intervention and/or market shortages do cause consumers to substitute to other consumer goods, the market has the potential to compete for this new consumer base in harmful ways. If there was a new higher level of demand for opioid drugs due to the pandemic in Manitoba that helped contribute to the increase in opioid substance abuse, then it would be in the government's best interest to understand how the market behaves to better calculate its interventions. Whether those interventions are from law enforcement efforts or from larger macro shocks due to the COVID-19 pandemic remains an open question. However, the timing of the post pandemic shock to both drug activity and crime suggests a relationship with the pandemic that requires future research.

In addition, further research should be done to assess whether there are effects at the aggregated city level of crime and drug use health emergencies. This research would require data on appropriate city level counterfactuals that this study did not have access to. The market itself suffers from data quality issues due to the nature of illegal markets. However, hospitals, paramedic services, and health authorities can provide similar data sets to assess whether law enforcements efforts are effective at mitigating health emergencies.

I am unable to conclude that law enforcements efforts have any long run impact on the drug market. Although there are many reasons as to why drug prices might change, it appears as though a sufficiently competitive market exists in Winnipeg in

which the closure of a drug trafficking firm acts more as a short run inconvenience to the drug market than a long run supply shock. Dave's (2006) research on drug price elasticities is important to understanding consumer behavior in the market. However, the relationship between law enforcement and price changes should be explored further, if at all possible in the context of available data.

Even though large-scale, macro shocks may be the only means of impacting the market in the long run, such as the pandemic's influence appears to have had, it is likely that the market behaves differently in response to the presence of law enforcement and potential legal consequences relative to a hypothetical market in which the sale of these products are legal. It remains unclear as to the extent law enforcement may have unintended consequences on drug market externalities. The research in this paper suggests law enforcement has very little influence on externality trends. However, if law enforcement has the potential to cause more crime, or even more health emergencies due to creating instability in the drug market, as the literature suggests, research should be done to identify if these concerns are observable.

Concluding Remarks

I refrain from concluding on the question as to whether the resources put into law enforcement to combat the illicit drug market are cost-effective. However, this research serves to provide evidence that efforts to pursue the drug market criminally within a given neighbourhood through policing appears be less successful than one might expect. The statistical evidence presented here suggests that any short term impact on health emergencies is marginal. Discussion around potential unimpactful policies in which economic theory has inspired are important to reflect on so to avoid making

negative market externalities worse and exhausting resources without evidence of benefit. However, it is reasonable to consider the benefit of potentially mitigating these trends, even marginally. The benefit that even small reductions in health emergencies due to illicit drugs might offer can potentially save lives and thus, in many cases the benefits can outweigh the costs. Therein lies the difficult nature of interpreting the estimates provided. Even small influences may be worth the costs associated with law enforcement resource expenditures.

Just as it is important to use economic theory to recommend policy, it is equally important to use economic theory to test these policies outcomes. This paper finds small and short run neighbourhood impacts on crime and drug use patterns. The rate at which at-risk individuals are suffering from toxic drug consumption needs to be addressed appropriately. Perhaps one of the take aways most germane to policy makers is that the arrest of drug traffickers does not appear to impact violent crime negatively and has very marginal impacts on non-violent crime. The implication is that policy makers should take care to prescribe policy that is effective at preventing health emergencies as the relationship between drug suppliers and other crime appears marginal. Considering that law enforcement is potentially ineffective at impacting the market's negative externalities, additional or different intervention is likely necessary. However, this recommendation comes with a warning about potential unintended consequences. If government intervention is influential at causing a substitution to a more toxic and potentially deadly drug, then the costs will almost certainly outweigh the benefits.

As Caulkins and Rueter (2010) highlight, it is likely the intensity of local law enforcement efforts that is most likely to influence drug prices and consumption patterns

rather than any one individual trafficking arrest. Increasing the risk of selling per kilogram sold is more likely to influence the calculus gone into production and sales. Therefore, long-run influences on neighbourhood level impacts might require greater intensity from law enforcement but may be less desirable from a social perspective.

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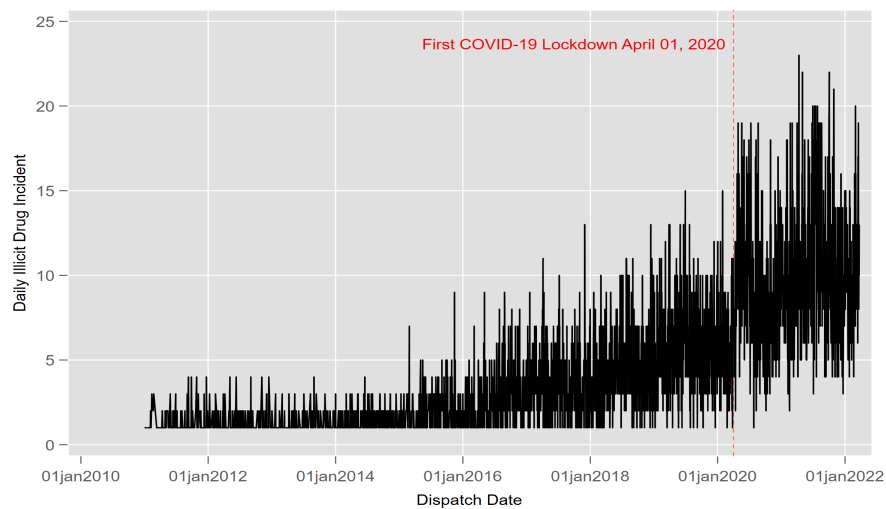
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Appendix A

Winnipeg Fire and Paramedic Service Responses to Illicit Drug Emergencies

Jan.01,2011 - Mar.24,2022



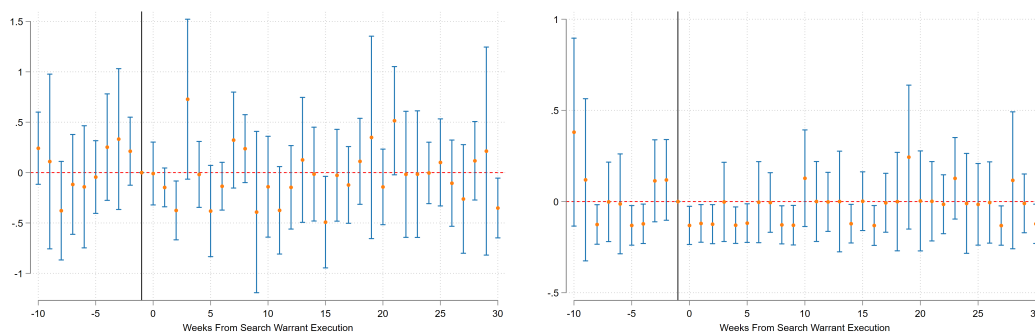
Note: Illicit Drugs in this series belong to three categories: opioids, methamphetamines and cocaine. Alcohol and marijuana have been excluded from this series.

It is important to be careful here if one wishes to suggest the COVID-19 lockdown caused the increase shown in Figure 3.1 & 3.2 due to the lack of an appropriate counterfactual. Despite the jump in illicit drug incidents immediately after the lockdown in Manitoba is enforced, the overall trend of illicit drug incidents were increasing in post treatment trends.

Appendix B

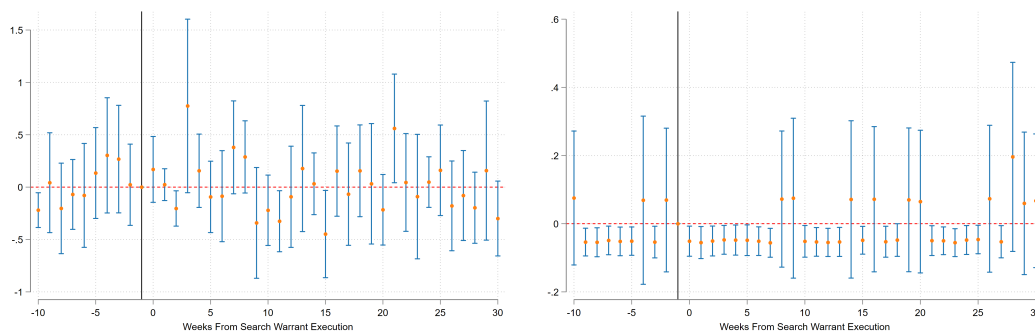
Figure 11: Before COVID-19 lockdown impact of search warrants executed on illicit drug incidents

Treatment isolated to neighbourhood in which arrest took place



(a) All Illicit Drugs

(b) Opioids



(c) Methamphetamines

(d) Cocaine

Note: Standard errors clustered at the neighbourhood level. Orange circles represent coefficient estimates while the blue bands around each of those estimates represent 95% confidence intervals. Zero represents the week in which the search warrant was executed and each coefficient is for the time period further away from the search warrants execution. In this case that time period is weekly. The vertical axes on each graph are not identical and do not represent the same scale.

Figure 12: Before COVID-19 Lockdown impact of search warrants executed on crime

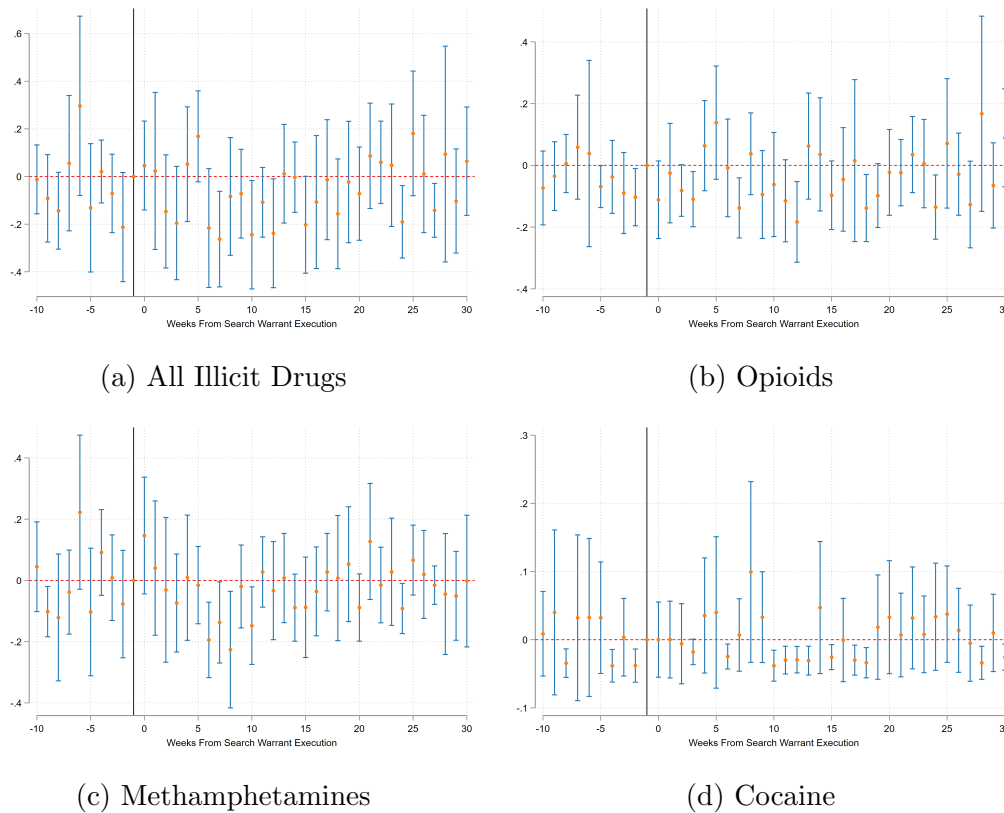
Treatment isolated to neighbourhood in which arrest took place



Note: Standard errors clustered at the neighbourhood level. Orange circles represent coefficient estimates while the blue bands around each of those estimates represent 95% confidence intervals. Zero represents the week in which the search warrant was executed and each coefficient is for the time period further away from the search warrants execution. In this case that time period is weekly. The vertical axes on each graph are not identical and do not represent the same scale.

Figure 13: After COVID-19 lockdown impact of search warrants executed on illicit drug incidents

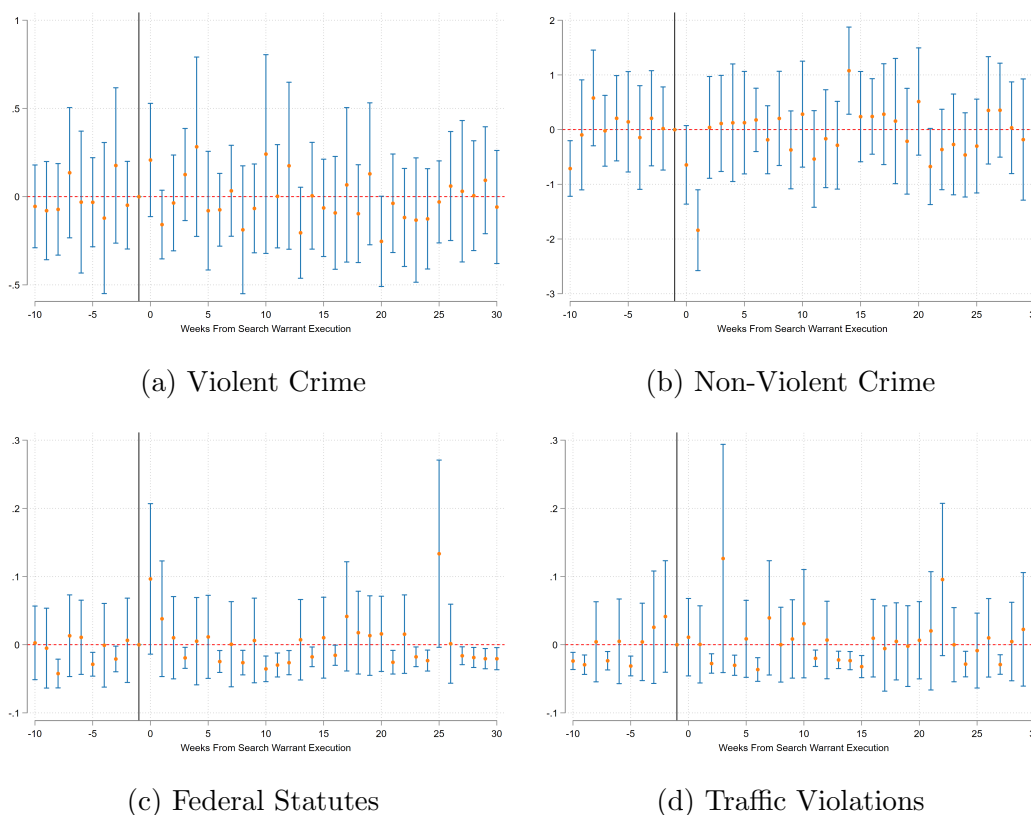
Treatment isolated to neighbourhood in which arrest took place



Note: Standard errors clustered at the neighbourhood level. Orange circles represent coefficient estimates while the blue bands around each of those estimates represent 95% confidence intervals. Zero represents the week in which the search warrant was executed and each coefficient is for the time period further away from the search warrants execution. In this case that time period is weekly. The vertical axes on each graph are not identical and do not represent the same scale.

Figure 14: After COVID-19 Lockdown impact of search warrants executed on crime

Treatment isolated to neighbourhood in which arrest took place



Note: Standard errors clustered at the neighbourhood level. Orange circles represent coefficient estimates while the blue bands around each of those estimates represent 95% confidence intervals. Zero represents the week in which the search warrant was executed and each coefficient is for the time period further away from the search warrants execution. In this case that time period is weekly. The vertical axes on each graph are not identical and do not represent the same scale.

Appendix C

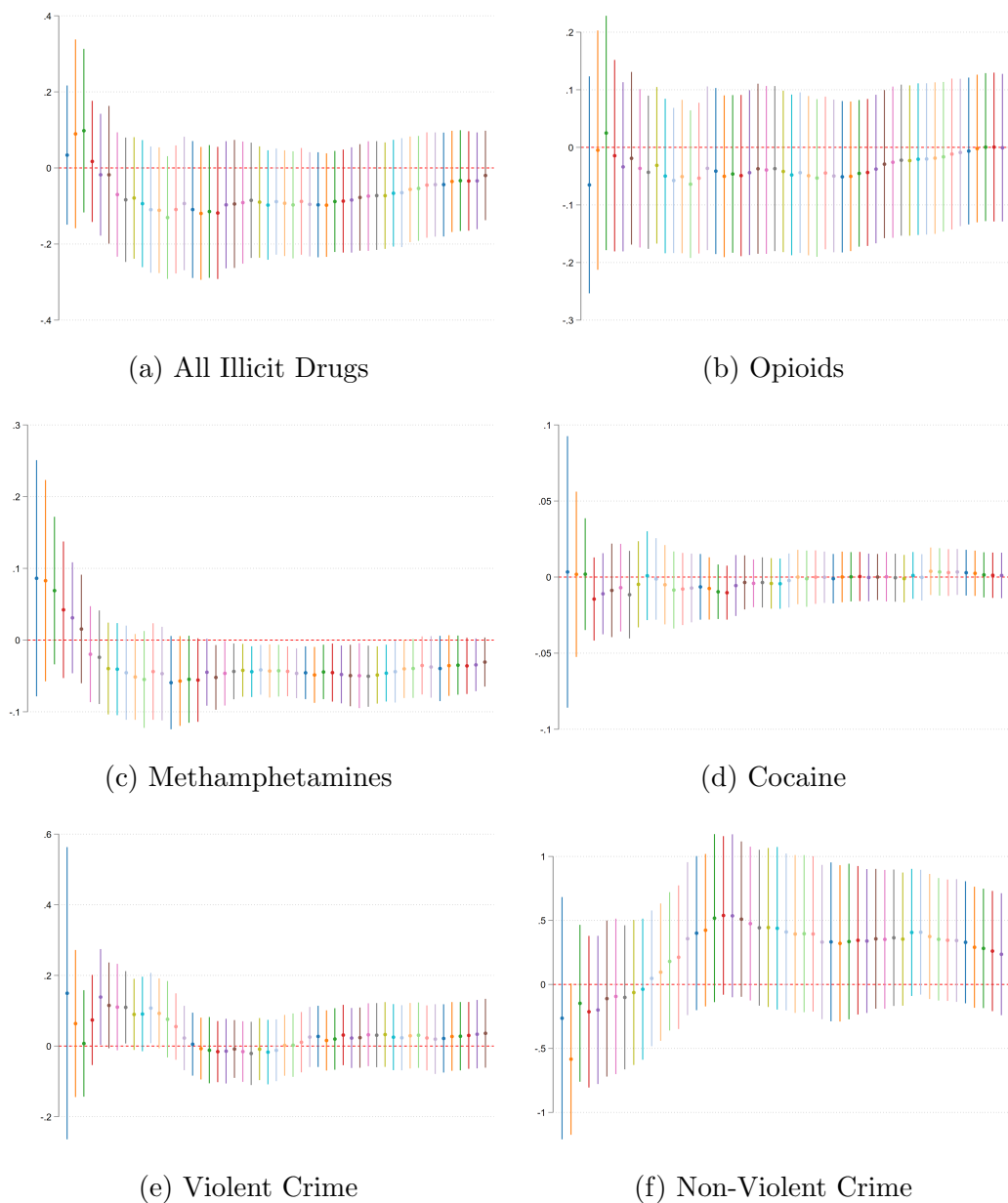
The model ran in this appendix is a DiD where each coefficient represents a new regression with an additional week of treatment added. Where the first coefficient represents the DiD regression on the treatment variable where only the week in which a search warrant was executed is equal to 1 and 0 otherwise. The second coefficient estimate represents the regression where the week of the search warrants execution is equal to 1, as well as the week prior and zero otherwise, and so on. This analysis is an attempt to observe changes in the coefficients without the attenuation of having treatment on in perpetuity.

Here, in Figure 15, we see estimates in which tell a similar story but with less precision. Where there is likely a very small, short run effect that returns to zero in illicit drug health emergencies. In addition, the same effect is observed in non-violent crime, where two weeks after the search warrant was executed, we see a negative, statistically significant estimate. Perhaps what is highlighted better in this exercise is that the evidence of a treatment effect appears to be driven primarily by decreases in methamphetamine incidents.

An interesting difference in which this method highlights is that Figure 15 suggests there is a short run positive effect on violent crime in response to the removal of a drug trafficking firm. This was not observed in the event study of Figure 6.

Figure 15: Impact of search warrants executed on drug market externalities

Treatment isolated to neighbourhood in which arrest took place



Note: Standard errors clustered at the neighbourhood level. Circles represent coefficient estimates while the bands around each of those estimates represent 95% confidence intervals. The first estimate to the left represents the week in which the search warrant was executed and each coefficient is for the time period further away from the search warrants execution. In this case that time period is weekly. The vertical axes on each graph are not identical and do not represent the same scale.

Appendix D

Table 4: Descriptive Statistics for Daily Illicit Drug Incidents by Neighbourhood

	mean	sd	min	max	sum
Agassiz	.0033927	.0581727	0	1	4
Airport	.0237489	.1731929	0	3	28
Alpine Place	.0279898	.1797856	0	2	33
Amber Trails	.0152672	.1294011	0	2	18
Archwood	.0016964	.0411693	0	1	2
Armstrong Point	.0033927	.0581727	0	1	4
Assiniboia Downs	0	0	0	0	0
Assiniboine Park	0	0	0	0	0
Beaumont	.0212044	.1898751	0	3	25
Betsworth	.0025445	.0504005	0	1	3
Birchwood	.0050891	.0711861	0	1	6
Booth	.0237489	.1523306	0	1	28
Bridgewater Centre	.0008482	.0291235	0	1	1
Bridgewater Forest	.0016964	.0411693	0	1	2
Bridgewater Lakes	0	0	0	0	0
Bridgewater Trails	0	0	0	0	0
Broadway-Assininoine	.1026293	.3454554	0	2	121
Brockville	.0025445	.0504005	0	1	3
Brooklands	.0356234	.2070568	0	2	42
Bruce Park	.0084818	.091744	0	1	10
Buchanan	.014419	.1449632	0	3	17
Buffalo	.0008482	.0291235	0	1	1
Burrows Central	.0992366	.3339699	0	3	117
Burrows-Keewatin	.0568278	.2625339	0	3	67
Canterbury Park	.0050891	.0711861	0	1	6
Centennial	.2281595	.5026459	0	3	269
Central Park	.2637829	.6076504	0	5	311
Central River Heights	0	0	0	0	0
Central St. Boniface	.0788804	.3023172	0	3	93
Chalmers	.1747243	.4551225	0	3	206
Chevier	.0050891	.0919948	0	2	6
China Town	.0474979	.2595218	0	3	56
Civic Centre	.0339271	.1989849	0	3	40
Cloutier Drive	0	0	0	0	0
Colony	.0754877	.28589	0	2	89
Crescent Park	.0135708	.1157498	0	1	16
Crescentwood	.0067854	.0821285	0	1	8
Crestview	.0356234	.198688	0	2	42
Dakota Crossing	.0050891	.0711861	0	1	6
Daniel McIntyre	.3681086	.6398223	0	4	434
Dear Lodge	.0050891	.0711861	0	1	6
Dufferin	.1662426	.4315806	0	3	196

	mean	sd	min	max	sum
Dufferin Industrial	.014419	.1327356	0	2	17
Dufresne	.0016964	.0411693	0	1	2
Dugald	.0016964	.0411693	0	1	2
Eaglemere	.0008482	.0291235	0	1	1
Earl Grey	.0296862	.1841813	0	3	35
East Elmwood	.014419	.1261782	0	2	17
Ebby-Wentworth	.0084818	.1005721	0	2	10
Edgeland	.0050891	.0711861	0	1	6
Elm Park	.0042409	.0650114	0	1	5
Elmhurst	.0059372	.076857	0	1	7
Eric Coy	0	0	0	0	0
Exchange District	.0593723	.2699493	0	2	70
Fairfield Park	.0016964	.0411693	0	1	2
Fort Richmond	.0424088	.2138648	0	2	50
Fraipont	0	0	0	0	0
Garden City	.0381679	.2126765	0	3	45
Glendale	.0050891	.0822511	0	2	6
Glenelm	.0169635	.1356013	0	2	20
Glenwood	.0101781	.1085397	0	2	12
Grant Park	.0084818	.091744	0	1	10
Grassie	.0016964	.0411693	0	1	2
Heritage Park	.0212044	.1660228	0	2	25
Holden	0	0	0	0	0
Inkster Gardens	.0042409	.0769693	0	2	5
Inkster Industrial Park	.0093299	.1046352	0	2	11
Inkster-Faraday	.0593723	.3025695	0	5	70
Island Lakes	.0050891	.0919948	0	2	6
J.B. Mitchell	.0042409	.0650114	0	1	5
Jameswood	.0016964	.0411693	0	1	2
Jefferson	.0458015	.2171093	0	2	54
Kensington	.0059372	.076857	0	1	7
Kern Park	.0093299	.0961808	0	1	11
Kil-Cona Park	0	0	0	0	0
Kildare-Redonda	.0152672	.1358029	0	2	18
Kildonan Crossing	.0059372	.0872054	0	2	7
Kildonan Drive	.0127226	.1194539	0	2	15
Kildonan Park	.0033927	.0581727	0	1	4
King Edward	.0229008	.1657971	0	2	27
Kingston Crescent	.0008482	.0291235	0	1	1
Kirkfield	.0067854	.0821285	0	1	8
Lavalee	.0033927	.0581727	0	1	4
Legislature	.0449534	.2113452	0	2	53
Leila North	.0101781	.1085397	0	2	12
Leila-Mcphillips Triangle	.0254453	.1679716	0	2	30
Linden Ridge	.0025445	.0504005	0	1	3
Linden Woods	.0033927	.0712872	0	2	4
Logan-C.P.R.	.1518236	.476817	0	6	179
Lord Roberts	.0347752	.1923278	0	2	41
Lord Selkirk Park	.2052587	.5311417	0	4	242

	mean	sd	min	max	sum
Luxton	.0313825	.1838996	0	2	37
Maginot	.014419	.1667498	0	4	17
Mandalay West	.0178117	.1385897	0	2	21
Margaret Park	.0110263	.1123021	0	2	13
Marlton	0	0	0	0	0
Mathers	.0076336	.0963304	0	2	9
Maybank	.0059372	.076857	0	1	7
Mcleod Industrial	.0025445	.0504005	0	1	3
Mcmillan	.0279898	.1700802	0	2	33
Meadows	.0042409	.0769693	0	2	5
Meadow Wood	.0076336	.0963304	0	2	9
Melrose	.0076336	.0870732	0	1	9
Minnetonka	.0093299	.0961808	0	1	11
Minto	.0373198	.2067575	0	3	44
Mission Gardens	.0093299	.1046352	0	2	11
Mission Industrial	.0033927	.0581727	0	1	4
Montcalm	.0339271	.1989849	0	2	40
Munroe East	.0262935	.1652926	0	2	31
Munroe West	.0101781	.1085397	0	2	12
Murray Industrial Park	0	0	0	0	0
Mynarski	.0067854	.0821285	0	1	8
Niakwa Park	.0008482	.0291235	0	1	1
Niakwa Place	0	0	0	0	0
Norberry	.0076336	.0870732	0	1	9
Norman Park	0	0	0	0	0
North Inkster Industrial	.0025445	.0504005	0	1	3
North Point Douglas	.264631	.5569709	0	3	312
North River Heights	.0025445	.0504005	0	1	3
North St. Boniface	.0152672	.1419163	0	2	18
North Transcona Yards	.0008482	.0291235	0	1	1
Norwood East	.0347752	.2009616	0	2	41
Norwood West	.0152672	.1226656	0	1	18
Oak Point Highway	.0033927	.0712872	0	2	4
Old Tuxedo	.0025445	.0650999	0	2	3
Omand's Creek Industrial	.0008482	.0291235	0	1	1
Pacific Industrial	.0093299	.1197669	0	2	11
Parc La Salle	.0025445	.0504005	0	1	3
Parker	.0008482	.0291235	0	1	1
Peguis	.0025445	.0650999	0	2	3
Pembina Strip	.0347752	.2051423	0	2	41
Point Road	.0025445	.0504005	0	1	3
Polo Park	.0627651	.2595467	0	2	74
Portage and Main	.0466497	.222721	0	2	55
Portage-Ellice	.1721798	.4532916	0	3	203
Prairie Pointe	.0008482	.0291235	0	1	1
Pulberry	.0067854	.0821285	0	1	8

	mean	sd	min	max	sum
Radisson	.0059372	.0872054	0	2	7
Regent	.0347752	.2009616	0	2	41
Richmond Lakes	.0008482	.0291235	0	1	1
Richmond West	.0101781	.1085397	0	2	12
Ridgedale	0	0	0	0	0
Ridgewood South	0	0	0	0	0
River East	.0195081	.1443659	0	2	23
River Park South	.0161154	.1387973	0	2	19
River West Park	.0008482	.0291235	0	1	1
River-Osborne	.1043257	.352252	0	3	123
Riverbend	.0118745	.1083671	0	1	14
Rivergrove	.0101781	.1085397	0	2	12
Riverview	.0161154	.1387973	0	2	19
Robertson	.0178117	.1445852	0	2	21
Roblin Park	.0025445	.0650999	0	2	3
Rockwood	.0101781	.1004145	0	1	12
Roslyn	.0169635	.1291895	0	1	20
Rosser-Old Kildonan	.0042409	.0769693	0	2	5
Rossmere-A	.0593723	.2730758	0	3	70
Rossmere-B	.0161154	.1387973	0	2	19
Royalwood	0	0	0	0	0
Sage Creek	.0042409	.0769693	0	2	5
Sargent Park	.0415606	.22749	0	3	49
Saskatchewan North	0	0	0	0	0
Seven Oaks	.0178117	.1323227	0	1	21
Shaughnessy Park	.0186599	.1353781	0	1	22
Silver Heights	.0152672	.1477769	0	2	18
Sir John Franklin	.0042409	.0650114	0	1	5
South Point Douglas	.3935539	.6614481	0	5	464
South Pointe	.0025445	.0504005	0	1	3
South Portage	.3350297	.6253442	0	6	395
South River Heights	.0025445	.0504005	0	1	3
South Tuxedo	.0050891	.0822511	0	2	6
Southboine	.0016964	.0582469	0	2	2
Southdale	.0135708	.122865	0	2	16
Southland Park	0	0	0	0	0
Spence	.4639525	.7846241	0	5	547
Springfield North	.0025445	.0504005	0	1	3
Springfield South	.0008482	.0291235	0	1	1
St. Boniface Industrial Park	.0050891	.0711861	0	1	6
St. George	.014419	.1449632	0	3	17
St. James Industrial	.0932994	.3161433	0	2	110
St. John's	.3341815	.6264762	0	5	394
St. John's Park	.028838	.1724179	0	2	34
St. Matthews	.2137405	.5131029	0	3	252
St. Norbert	.0076336	.0870732	0	1	9

	mean	sd	min	max	sum
St. Vital Centre	.0161154	.1325402	0	2	19
St. Vital Perimeter South	0	0	0	0	0
Stock Yards	0	0	0	0	0
Sturgeon Creek	.0161154	.1387973	0	2	19
Symington Yards	.0033927	.0712872	0	2	4
Talbot-Grey	.0262935	.1652926	0	2	31
Templeton-Sinclair	.0152672	.1419163	0	2	18
The Forks	.0127226	.1194539	0	2	15
The Maples	.0373198	.2225755	0	2	44
Tissot	.0033927	.0581727	0	1	4
Transcona North	0	0	0	0	0
Transcona South	0	0	0	0	0
Transcona Yards	.0008482	.0291235	0	1	1
Trappistes	0	0	0	0	0
Turnbull Drive	0	0	0	0	0
Tuxedo	.0101781	.1004145	0	1	12
Tuxedo Industrial	.0025445	.0650999	0	2	3
Tyndall Park	.0313825	.192911	0	2	37
Tyne-Tees	.0152672	.1294011	0	2	18
University	.0042409	.0650114	0	1	5
Valhalla	.0067854	.0821285	0	1	8
Valley Gardens	.0212044	.1608284	0	2	25
Varennes	.0042409	.0650114	0	1	5
Varsity View	.0008482	.0291235	0	1	1
Vialoux	.0195081	.1443659	0	2	23
Victoria Crescent	0	0	0	0	0
Victoria West	.0195081	.1443659	0	2	23
Vista	.0042409	.0650114	0	1	5
Waverly Heights	.0050891	.0822511	0	2	6
Wellington Crescent	.0016964	.0411693	0	1	2
West Alexander	.3307888	.6187454	0	5	390
West Broadway	.2425785	.5361488	0	4	286
West Fort Garry Industrial	.0025445	.0650999	0	2	3
West Kildonan Industrial	0	0	0	0	0
West Wolseley	.0178117	.1503419	0	2	21
Westdale	.0135708	.122865	0	2	16
Weston	.1696353	.4419368	0	3	200
Weston Shops	.0093299	.1046352	0	2	11
Westwood	.0127226	.1194539	0	2	15
Whyte Ridge	.0067854	.1088047	0	3	8
Wildwood	0	0	0	0	0
Wilkes South	.0008482	.0291235	0	1	1
William Whyte	.5640373	.8230112	0	5	665
Windsor Park	.0279898	.1889933	0	2	33
Wolseley	.0703986	.3016042	0	3	83
Woodhaven	0	0	0	0	0
Worthington	.0135708	.1157498	0	1	16
Observations	271170				

Table 5: Descriptive Statistics for Daily Opioid Incidents by Neighbourhood

	mean	sd	min	max	sum
Agassiz	.0008482	.0291235	0	1	1
Airport	.0059372	.076857	0	1	7
Alpine Place	.0110263	.10447	0	1	13
Amber Trails	.0127226	.1194539	0	2	15
Archwood	.0016964	.0411693	0	1	2
Armstrong Point	.0025445	.0504005	0	1	3
Assiniboia Downs	0	0	0	0	0
Assiniboine Park	0	0	0	0	0
Beaumont	.0084818	.116234	0	2	10
Betsworth	0	0	0	0	0
Birchwood	.0008482	.0291235	0	1	1
Booth	.0093299	.0961808	0	1	11
Bridgewater Centre	.0008482	.0291235	0	1	1
Bridgewater Forest	.0016964	.0411693	0	1	2
Bridgewater Lakes	0	0	0	0	0
Bridgewater Trails	0	0	0	0	0
Broadway-Assininoine	.0347752	.1878622	0	2	41
Brockville	.0016964	.0411693	0	1	2
Brooklands	.0161154	.1259726	0	1	19
Bruce Park	.0042409	.0650114	0	1	5
Buchanan	.0059372	.076857	0	1	7
Buffalo	0	0	0	0	0
Burrows Central	.0415606	.207997	0	2	49
Burrows-Keewatin	.0135708	.1295901	0	2	16
Canterbury Park	.0008482	.0291235	0	1	1
Centennial	.1094148	.3555114	0	3	129
Central Park	.1263783	.4183499	0	4	149
Central River Heights	0	0	0	0	0
Central St. Boniface	.0373198	.1983761	0	2	44
Chalmers	.086514	.3044319	0	3	102
Chevier	.0025445	.0504005	0	1	3
China Town	.014419	.1192609	0	1	17
Civic Centre	.0067854	.0918852	0	2	8
Cloutier Drive	0	0	0	0	0
Colony	.0262935	.1652926	0	2	31
Crescent Park	.0033927	.0581727	0	1	4
Crescentwood	.0025445	.0504005	0	1	3
Crestview	.0186599	.1353781	0	1	22
Dakota Crossing	.0016964	.0411693	0	1	2
Daniel McIntyre	.1552163	.4085207	0	3	183
Dear Lodge	.0016964	.0411693	0	1	2
Dufferin	.0763359	.2900878	0	3	90
Dufferin Industrial	.0025445	.0650999	0	2	3
Dufresne	.0008482	.0291235	0	1	1

	mean	sd	min	max	sum
Dugald	0	0	0	0	0
Eaglemere	.0008482	.0291235	0	1	1
Earl Grey	.0076336	.1125839	0	3	9
East Elmwood	.0025445	.0504005	0	1	3
Ebby-Wentworth	.0025445	.0504005	0	1	3
Edgeland	.0008482	.0291235	0	1	1
Elm Park	.0016964	.0411693	0	1	2
Elmhurst	.0025445	.0504005	0	1	3
Eric Coy	0	0	0	0	0
Exchange District	.0186599	.1353781	0	1	22
Fairfield Park	0	0	0	0	0
Fort Richmond	.0101781	.1004145	0	1	12
Fraipont	0	0	0	0	0
Garden City	.0118745	.1159363	0	2	14
Glendale	0	0	0	0	0
Glenelm	.0084818	.091744	0	1	10
Glenwood	.0016964	.0411693	0	1	2
Grant Park	.0008482	.0291235	0	1	1
Grassie	.0008482	.0291235	0	1	1
Heritage Park	.0084818	.1005721	0	2	10
Holden	0	0	0	0	0
Inkster Gardens	.0016964	.0411693	0	1	2
Inkster Industrial Park	.0033927	.0581727	0	1	4
Inkster-Faraday	.0330789	.2095146	0	4	39
Island Lakes	.0016964	.0411693	0	1	2
J.B. Mitchell	.0016964	.0411693	0	1	2
Jameswood	.0008482	.0291235	0	1	1
Jefferson	.0152672	.1226656	0	1	18
Kensington	.0025445	.0504005	0	1	3
Kern Park	.0042409	.0650114	0	1	5
Kil-Cona Park	0	0	0	0	0
Kildare-Redonda	.0059372	.076857	0	1	7
Kildonan Crossing	.0042409	.0769693	0	2	5
Kildonan Drive	.0025445	.0504005	0	1	3
Kildonan Park	0	0	0	0	0
King Edward	.0076336	.0963304	0	2	9
Kingston Crescent	0	0	0	0	0
Kirkfield	.0025445	.0504005	0	1	3
Lavalee	.0016964	.0411693	0	1	2
Legislature	.0118745	.1083671	0	1	14
Leila North	.0008482	.0291235	0	1	1
Leila-Mcphillips Triangle	.0093299	.0961808	0	1	11
Linden Ridge	0	0	0	0	0
Linden Woods	.0016964	.0411693	0	1	2
Logan-C.P.R.	.0364716	.1963844	0	2	43
Lord Roberts	.0118745	.1083671	0	1	14

	mean	sd	min	max	sum
Lord Selkirk Park	.072095	.2897102	0	3	85
Luxton	.014419	.1192609	0	1	17
Maginot	.0025445	.0504005	0	1	3
Mandalay West	.0118745	.1083671	0	1	14
Margaret Park	.0067854	.0918852	0	2	8
Marlton	0	0	0	0	0
Mathers	.0033927	.0581727	0	1	4
Maybank	.0033927	.0581727	0	1	4
McLeod Industrial	.0008482	.0291235	0	1	1
Mcmillan	.0076336	.0870732	0	1	9
Meadows	.0016964	.0411693	0	1	2
Meadow Wood	.0042409	.0650114	0	1	5
Melrose	.0025445	.0504005	0	1	3
Minnetonka	.0025445	.0504005	0	1	3
Minto	.014419	.1192609	0	1	17
Mission Gardens	.0016964	.0411693	0	1	2
Mission Industrial	.0016964	.0411693	0	1	2
Montcalm	.0093299	.0961808	0	1	11
Munroe East	.0042409	.0650114	0	1	5
Munroe West	.0025445	.0504005	0	1	3
Murray Industrial Park	0	0	0	0	0
Mynarski	.0016964	.0411693	0	1	2
Niakwa Park	0	0	0	0	0
Niakwa Place	0	0	0	0	0
Norberry	.0025445	.0504005	0	1	3
Norman Park	0	0	0	0	0
North Inkster Industrial	0	0	0	0	0
North Point Douglas	.115352	.3548262	0	3	136
North River Heights	.0008482	.0291235	0	1	1
North St. Boniface	.0067854	.0821285	0	1	8
North Transcona Yards	0	0	0	0	0
Norwood East	.0178117	.1445852	0	2	21
Norwood West	.0059372	.076857	0	1	7
Oak Point Highway	0	0	0	0	0
Old Tuxedo	.0008482	.0291235	0	1	1
Omand's Creek Industrial	0	0	0	0	0
Pacific Industrial	.0059372	.0872054	0	2	7
Parc La Salle	.0008482	.0291235	0	1	1
Parker	.0008482	.0291235	0	1	1
Peguis	0	0	0	0	0
Pembina Strip	.0195081	.1443659	0	2	23
Point Road	0	0	0	0	0
Polo Park	.0313825	.1884591	0	2	37
Portage and Main	.0152672	.1358029	0	2	18
Portage-Ellice	.0424088	.2216613	0	3	50
Prairie Pointe	0	0	0	0	0

	mean	sd	min	max	sum
Pulberry	.0033927	.0581727	0	1	4
Radisson	.0033927	.0712872	0	2	4
Regent	.014419	.1192609	0	1	17
Richmond Lakes	0	0	0	0	0
Richmond West	.0025445	.0504005	0	1	3
Ridgedale	0	0	0	0	0
Ridgewood South	0	0	0	0	0
River East	.0076336	.0963304	0	2	9
River Park South	.0059372	.076857	0	1	7
River West Park	0	0	0	0	0
River-Osborne	.0356234	.1943685	0	2	42
Riverbend	.0050891	.0711861	0	1	6
Rivergrove	.0050891	.0711861	0	1	6
Riverview	.0016964	.0411693	0	1	2
Robertson	.0067854	.0918852	0	2	8
Roblin Park	.0008482	.0291235	0	1	1
Rockwood	.0042409	.0650114	0	1	5
Roslyn	.0067854	.0821285	0	1	8
Rosser-Old Kildonan	.0008482	.0291235	0	1	1
Rossmere-A	.0186599	.1353781	0	1	22
Rossmere-B	.0076336	.0870732	0	1	9
Royalwood	0	0	0	0	0
Sage Creek	.0016964	.0411693	0	1	2
Sargent Park	.014419	.1261782	0	2	17
Saskatchewan North	0	0	0	0	0
Seven Oaks	.0042409	.0650114	0	1	5
Shaughnessy Park	.0059372	.076857	0	1	7
Silver Heights	.0042409	.0769693	0	2	5
Sir John Franklin	.0008482	.0291235	0	1	1
South Point Douglas	.0916031	.3084917	0	3	108
South Pointe	.0016964	.0411693	0	1	2
South Portage	.0882103	.3122106	0	3	104
South River Heights	0	0	0	0	0
South Tuxedo	.0025445	.0650999	0	2	3
Southboine	.0008482	.0291235	0	1	1
Southdale	.0050891	.0711861	0	1	6
Southland Park	0	0	0	0	0
Spence	.2298558	.5456333	0	4	271
Springfield North	0	0	0	0	0
Springfield South	0	0	0	0	0
St. Boniface Industrial Park	.0016964	.0411693	0	1	2
St. George	.0067854	.0821285	0	1	8
St. James Industrial	.0296862	.1747202	0	2	35
St. John's	.1560645	.4154121	0	3	184
St. John's Park	.0110263	.10447	0	1	13
St. Matthews	.1017812	.3493704	0	2	120

	mean	sd	min	max	sum
St. Norbert	.0033927	.0581727	0	1	4
St. Vital Centre	.0084818	.091744	0	1	10
St. Vital Perimeter South	0	0	0	0	0
Stock Yards	0	0	0	0	0
Sturgeon Creek	.0059372	.076857	0	1	7
Symington Yards	0	0	0	0	0
Talbot-Grey	.0118745	.1083671	0	1	14
Templeton-Sinclair	.0042409	.0650114	0	1	5
The Forks	.0016964	.0411693	0	1	2
The Maples	.0110263	.1123021	0	2	13
Tissot	.0016964	.0411693	0	1	2
Transcona North	0	0	0	0	0
Transcona South	0	0	0	0	0
Transcona Yards	.0008482	.0291235	0	1	1
Trappistes	0	0	0	0	0
Turnbull Drive	0	0	0	0	0
Tuxedo	.0033927	.0581727	0	1	4
Tuxedo Industrial	.0008482	.0291235	0	1	1
Tyndall Park	.0110263	.1196226	0	2	13
Tyne-Tees	.0059372	.076857	0	1	7
University	0	0	0	0	0
Valhalla	.0025445	.0504005	0	1	3
Valley Gardens	.0067854	.0821285	0	1	8
Varennes	.0016964	.0411693	0	1	2
Varsity View	0	0	0	0	0
Vialoux	.0084818	.091744	0	1	10
Victoria Crescent	0	0	0	0	0
Victoria West	.0118745	.1083671	0	1	14
Vista	.0033927	.0581727	0	1	4
Waverly Heights	.0008482	.0291235	0	1	1
Wellington Crescent	.0008482	.0291235	0	1	1
West Alexander	.1374046	.4055436	0	3	162
West Broadway	.1221374	.3758547	0	4	144
West Fort Garry Industrial	0	0	0	0	0
West Kildonan Industrial	0	0	0	0	0
West Wolseley	.0101781	.1160976	0	2	12
Westdale	.0050891	.0711861	0	1	6
Weston	.0746395	.2816272	0	2	88
Weston Shops	.0016964	.0411693	0	1	2
Westwood	.0042409	.0650114	0	1	5
Whyte Ridge	.0042409	.0650114	0	1	5
Wildwood	0	0	0	0	0
Wilkes South	.0008482	.0291235	0	1	1
William Whyte	.2374894	.5384242	0	5	280
Windsor Park	.0084818	.091744	0	1	10
Wolseley	.0356234	.198688	0	2	42
Woodhaven	0	0	0	0	0
Worthington	.0067854	.0821285	0	1	8
Observations	271170				

Table 6: Descriptive Statistics for Daily Methamphetamine Incidents by Neighbourhood

	mean	sd	min	max	sum
Agassiz	.0025445	.0504005	0	1	3
Airport	.0127226	.1121224	0	1	15
Alpine Place	.0127226	.1121224	0	1	15
Amber Trails	.0025445	.0504005	0	1	3
Archwood	0	0	0	0	0
Armstrong Point	.0008482	.0291235	0	1	1
Assiniboia Downs	0	0	0	0	0
Assiniboine Park	0	0	0	0	0
Beaumont	.0118745	.1159363	0	2	14
Betsworth	.0016964	.0411693	0	1	2
Birchwood	.0042409	.0650114	0	1	5
Booth	.0110263	.10447	0	1	13
Bridgewater Centre	0	0	0	0	0
Bridgewater Forest	0	0	0	0	0
Bridgewater Lakes	0	0	0	0	0
Bridgewater Trails	0	0	0	0	0
Broadway-Assininoine	.0559796	.240799	0	2	66
Brockville	.0008482	.0291235	0	1	1
Brooklands	.0152672	.1294011	0	2	18
Bruce Park	.0033927	.0581727	0	1	4
Buchanan	.0067854	.0821285	0	1	8
Buffalo	.0008482	.0291235	0	1	1
Burrows Central	.0458015	.2171093	0	2	54
Burrows-Keewatin	.0356234	.198688	0	2	42
Canterbury Park	.0042409	.0650114	0	1	5
Centennial	.1060221	.3134604	0	2	125
Central Park	.1204411	.3531298	0	3	142
Central River Heights	0	0	0	0	0
Central St. Boniface	.0356234	.1899509	0	2	42
Chalmers	.0687023	.2661349	0	2	81
Chevier	.0025445	.0504005	0	1	3
China Town	.0313825	.1792241	0	2	37
Civic Centre	.0262935	.1652926	0	2	31
Cloutier Drive	0	0	0	0	0
Colony	.0466497	.2188763	0	2	55
Crescent Park	.0093299	.0961808	0	1	11
Crescentwood	.0025445	.0504005	0	1	3
Crestview	.0093299	.0961808	0	1	11
Dakota Crossing	.0016964	.0411693	0	1	2
Daniel McIntyre	.1857506	.4363771	0	3	219
Dear Lodge	.0033927	.0581727	0	1	4
Dufferin	.0763359	.2750672	0	2	90
Dufferin Industrial	.0118745	.1083671	0	1	14
Dufresne	.0008482	.0291235	0	1	1

	mean	sd	min	max	sum
Dugald	.0016964	.0411693	0	1	2
Eaglemere	0	0	0	0	0
Earl Grey	.0169635	.1291895	0	1	20
East Elmwood	.0067854	.0821285	0	1	8
Ebby-Wentworth	.0050891	.0711861	0	1	6
Edgeland	.0033927	.0581727	0	1	4
Elm Park	.0025445	.0504005	0	1	3
Elmhurst	.0025445	.0504005	0	1	3
Eric Coy	0	0	0	0	0
Exchange District	.0356234	.1899509	0	2	42
Fairfield Park	.0016964	.0411693	0	1	2
Fort Richmond	.0245971	.1549596	0	1	29
Fraipont	0	0	0	0	0
Garden City	.0237489	.1523306	0	1	28
Glendale	.0042409	.0650114	0	1	5
Glenelm	.0067854	.0821285	0	1	8
Glenwood	.0059372	.076857	0	1	7
Grant Park	.0059372	.076857	0	1	7
Grassie	.0008482	.0291235	0	1	1
Heritage Park	.0093299	.1046352	0	2	11
Holden	0	0	0	0	0
Inkster Gardens	.0016964	.0411693	0	1	2
Inkster Industrial Park	.0050891	.0711861	0	1	6
Inkster-Faraday	.0186599	.1353781	0	1	22
Island Lakes	.0016964	.0411693	0	1	2
J.B. Mitchell	.0025445	.0504005	0	1	3
Jameswood	.0008482	.0291235	0	1	1
Jefferson	.0220526	.1469169	0	1	26
Kensington	.0033927	.0581727	0	1	4
Kern Park	.0033927	.0581727	0	1	4
Kil-Cona Park	0	0	0	0	0
Kildare-Redonda	.0042409	.0650114	0	1	5
Kildonan Crossing	.0016964	.0411693	0	1	2
Kildonan Drive	.0067854	.0821285	0	1	8
Kildonan Park	.0033927	.0581727	0	1	4
King Edward	.0084818	.091744	0	1	10
Kingston Crescent	.0008482	.0291235	0	1	1
Kirkfield	.0042409	.0650114	0	1	5
Lavalee	.0016964	.0411693	0	1	2
Legislature	.0313825	.1792241	0	2	37
Leila North	.0084818	.091744	0	1	10
Leila-Mcphillips Triangle	.0101781	.1004145	0	1	12
Linden Ridge	.0008482	.0291235	0	1	1
Linden Woods	.0008482	.0291235	0	1	1
Logan-C.P.R.	.1111111	.3935434	0	5	131
Lord Roberts	.0169635	.1356013	0	2	20

	mean	sd	min	max	sum
Lord Selkirk Park	.1246819	.364689	0	2	147
Luxton	.0161154	.1259726	0	1	19
Maginot	.0093299	.1124559	0	2	11
Mandalay West	.0050891	.0711861	0	1	6
Margaret Park	.0042409	.0650114	0	1	5
Marlton	0	0	0	0	0
Mathers	.0025445	.0504005	0	1	3
Maybank	.0025445	.0504005	0	1	3
McLeod Industrial	.0016964	.0411693	0	1	2
Mcmillan	.0152672	.1294011	0	2	18
Meadows	.0016964	.0411693	0	1	2
Meadow Wood	.0025445	.0504005	0	1	3
Melrose	.0025445	.0504005	0	1	3
Minnetonka	.0059372	.076857	0	1	7
Minto	.0220526	.1525856	0	2	26
Mission Gardens	.0033927	.0581727	0	1	4
Mission Industrial	.0016964	.0411693	0	1	2
Montcalm	.0220526	.1469169	0	1	26
Munroe East	.0161154	.1259726	0	1	19
Munroe West	.0050891	.0822511	0	2	6
Murray Industrial Park	0	0	0	0	0
Mynarski	.0042409	.0650114	0	1	5
Niakwa Park	.0008482	.0291235	0	1	1
Niakwa Place	0	0	0	0	0
Norberrry	.0050891	.0711861	0	1	6
Norman Park	0	0	0	0	0
North Inkster Industrial	.0025445	.0504005	0	1	3
North Point Douglas	.1382528	.3644481	0	3	163
North River Heights	.0016964	.0411693	0	1	2
North St. Boniface	.0050891	.0711861	0	1	6
North Transcona Yards	.0008482	.0291235	0	1	1
Norwood East	.0135708	.1157498	0	1	16
Norwood West	.0093299	.0961808	0	1	11
Oak Point Highway	.0025445	.0504005	0	1	3
Old Tuxedo	.0008482	.0291235	0	1	1
Omand's Creek Industrial	.0008482	.0291235	0	1	1
Pacific Industrial	.0025445	.0504005	0	1	3
Parc La Salle	.0008482	.0291235	0	1	1
Parker	0	0	0	0	0
Peguis	.0008482	.0291235	0	1	1
Pembina Strip	.0135708	.1157498	0	1	16
Point Road	.0025445	.0504005	0	1	3
Polo Park	.0254453	.1575401	0	1	30
Portage and Main	.0305344	.1721253	0	1	36
Portage-Ellice	.1136556	.3331821	0	2	134
Prairie Pointe	.0008482	.0291235	0	1	1

	mean	sd	min	max	sum
Pulberry	.0025445	.0504005	0	1	3
Radisson	.0025445	.0504005	0	1	3
Regent	.0169635	.1291895	0	1	20
Richmond Lakes	.0008482	.0291235	0	1	1
Richmond West	.0076336	.0963304	0	2	9
Ridgedale	0	0	0	0	0
Ridgewood South	0	0	0	0	0
River East	.0110263	.10447	0	1	13
River Park South	.0050891	.0711861	0	1	6
River West Park	0	0	0	0	0
River-Osborne	.0568278	.2388294	0	2	67
Riverbend	.0050891	.0711861	0	1	6
Rivergrove	.0016964	.0411693	0	1	2
Riverview	.0127226	.1194539	0	2	15
Robertson	.0110263	.10447	0	1	13
Roblin Park	.0008482	.0291235	0	1	1
Rockwood	.0042409	.0650114	0	1	5
Roslyn	.0076336	.0870732	0	1	9
Rosser-Old Kildonan	.0033927	.0581727	0	1	4
Rossmere-A	.0296862	.1931795	0	3	35
Rossmere-B	.0033927	.0581727	0	1	4
Royalwood	0	0	0	0	0
Sage Creek	.0016964	.0411693	0	1	2
Sargent Park	.0186599	.1353781	0	1	22
Saskatchewan North	0	0	0	0	0
Seven Oaks	.0084818	.091744	0	1	10
Shaughnessy Park	.0127226	.1121224	0	1	15
Silver Heights	.0093299	.0961808	0	1	11
Sir John Franklin	.0008482	.0291235	0	1	1
South Point Douglas	.2832909	.5399025	0	3	334
South Pointe	.0008482	.0291235	0	1	1
South Portage	.2247668	.4887849	0	3	265
South River Heights	.0025445	.0504005	0	1	3
South Tuxedo	.0008482	.0291235	0	1	1
Southboine	.0008482	.0291235	0	1	1
Southdale	.0076336	.0870732	0	1	9
Southland Park	0	0	0	0	0
Spence	.2137405	.4824047	0	3	252
Springfield North	.0008482	.0291235	0	1	1
Springfield South	0	0	0	0	0
St. Boniface Industrial Park	.0025445	.0504005	0	1	3
St. George	.0042409	.0650114	0	1	5
St. James Industrial	.0466497	.2149629	0	2	55
St. John's	.1475827	.397702	0	3	174
St. John's Park	.0161154	.1259726	0	1	19
St. Matthews	.100933	.3151373	0	2	119

	mean	sd	min	max	sum
St. Norbert	.0033927	.0581727	0	1	4
St. Vital Centre	.0067854	.0821285	0	1	8
St. Vital Perimeter South	0	0	0	0	0
Stock Yards	0	0	0	0	0
Sturgeon Creek	.0059372	.076857	0	1	7
Symington Yards	.0016964	.0411693	0	1	2
Talbot-Grey	.0110263	.10447	0	1	13
Templeton-Sinclair	.0067854	.0821285	0	1	8
The Forks	.0110263	.10447	0	1	13
The Maples	.0203562	.1471617	0	2	24
Tissot	.0008482	.0291235	0	1	1
Transcona North	0	0	0	0	0
Transcona South	0	0	0	0	0
Transcona Yards	0	0	0	0	0
Trappistes	0	0	0	0	0
Turnbull Drive	0	0	0	0	0
Tuxedo	.0059372	.076857	0	1	7
Tuxedo Industrial	.0008482	.0291235	0	1	1
Tyndall Park	.0118745	.1083671	0	1	14
Tyne-Tees	.0076336	.0963304	0	2	9
University	.0033927	.0581727	0	1	4
Valhalla	.0025445	.0504005	0	1	3
Valley Gardens	.0110263	.1196226	0	2	13
Varennes	.0016964	.0411693	0	1	2
Varsity View	.0008482	.0291235	0	1	1
Vialoux	.0101781	.1004145	0	1	12
Victoria Crescent	0	0	0	0	0
Victoria West	.0067854	.0821285	0	1	8
Vista	.0008482	.0291235	0	1	1
Waverly Heights	.0025445	.0504005	0	1	3
Wellington Crescent	.0008482	.0291235	0	1	1
West Alexander	.1594572	.3952413	0	3	188
West Broadway	.1060221	.3318764	0	2	125
West Fort Garry Industrial	.0016964	.0411693	0	1	2
West Kildonan Industrial	0	0	0	0	0
West Wolseley	.0076336	.0870732	0	1	9
Westdale	.0067854	.0918852	0	2	8
Weston	.0814249	.2827575	0	2	96
Weston Shops	.0076336	.0870732	0	1	9
Westwood	.0076336	.0870732	0	1	9
Whyte Ridge	.0016964	.0411693	0	1	2
Wildwood	0	0	0	0	0
Wilkes South	0	0	0	0	0
William Whyte	.2841391	.5259105	0	3	335
Windsor Park	.0118745	.1083671	0	1	14
Wolseley	.0322307	.1860482	0	2	38
Woodhaven	0	0	0	0	0
Worthington	.0059372	.076857	0	1	7
Observations	271170				

Table 7: Descriptive Statistics for Daily Cocaine Incidents by Neighbourhood

	mean	sd	min	max	sum
Agassiz	0	0	0	0	0
Airport	.0050891	.0711861	0	1	6
Alpine Place	.0042409	.0650114	0	1	5
Amber Trails	0	0	0	0	0
Archwood	0	0	0	0	0
Armstrong Point	0	0	0	0	0
Assiniboia Downs	0	0	0	0	0
Assiniboine Park	0	0	0	0	0
Beaumont	.0008482	.0291235	0	1	1
Betsworth	.0008482	.0291235	0	1	1
Birchwood	0	0	0	0	0
Booth	.0033927	.0581727	0	1	4
Bridgewater Centre	0	0	0	0	0
Bridgewater Forest	0	0	0	0	0
Bridgewater Lakes	0	0	0	0	0
Bridgewater Trails	0	0	0	0	0
Broadway-Assininoine	.0118745	.1083671	0	1	14
Brockville	0	0	0	0	0
Brooklands	.0042409	.0650114	0	1	5
Bruce Park	.0008482	.0291235	0	1	1
Buchanan	.0016964	.0411693	0	1	2
Buffalo	0	0	0	0	0
Burrows Central	.0118745	.1083671	0	1	14
Burrows-Keewatin	.0076336	.0870732	0	1	9
Canterbury Park	0	0	0	0	0
Centennial	.0127226	.1121224	0	1	15
Central Park	.0169635	.1291895	0	1	20
Central River Heights	0	0	0	0	0
Central St. Boniface	.0059372	.076857	0	1	7
Chalmers	.0195081	.1383609	0	1	23
Chevier	0	0	0	0	0
China Town	.0016964	.0411693	0	1	2
Civic Centre	.0008482	.0291235	0	1	1
Cloutier Drive	0	0	0	0	0
Colony	.0025445	.0504005	0	1	3
Crescent Park	.0008482	.0291235	0	1	1
Crescentwood	.0016964	.0411693	0	1	2
Crestview	.0076336	.0870732	0	1	9
Dakota Crossing	.0016964	.0411693	0	1	2
Daniel McIntyre	.0271416	.162565	0	1	32
Dear Lodge	0	0	0	0	0
Dufferin	.0135708	.1157498	0	1	16
Dufferin Industrial	0	0	0	0	0
Dufresne	0	0	0	0	0

	mean	sd	min	max	sum
Dugald	0	0	0	0	0
Eaglemere	0	0	0	0	0
Earl Grey	.0050891	.0711861	0	1	6
East Elmwood	.0050891	.0822511	0	2	6
Ebby-Wentworth	.0008482	.0291235	0	1	1
Edgeland	.0008482	.0291235	0	1	1
Elm Park	0	0	0	0	0
Elmhurst	.0008482	.0291235	0	1	1
Eric Coy	0	0	0	0	0
Exchange District	.0050891	.0822511	0	2	6
Fairfield Park	0	0	0	0	0
Fort Richmond	.0076336	.0870732	0	1	9
Fraipont	0	0	0	0	0
Garden City	.0025445	.0504005	0	1	3
Glendale	.0008482	.0291235	0	1	1
Glenelm	.0016964	.0411693	0	1	2
Glenwood	.0025445	.0504005	0	1	3
Grant Park	.0016964	.0411693	0	1	2
Grassie	0	0	0	0	0
Heritage Park	.0033927	.0581727	0	1	4
Holden	0	0	0	0	0
Inkster Gardens	.0008482	.0291235	0	1	1
Inkster Industrial Park	.0008482	.0291235	0	1	1
Inkster-Faraday	.0076336	.0870732	0	1	9
Island Lakes	.0016964	.0411693	0	1	2
J.B. Mitchell	0	0	0	0	0
Jameswood	0	0	0	0	0
Jefferson	.0084818	.1005721	0	2	10
Kensington	0	0	0	0	0
Kern Park	.0016964	.0411693	0	1	2
Kil-Cona Park	0	0	0	0	0
Kildare-Redonda	.0050891	.0711861	0	1	6
Kildonan Crossing	0	0	0	0	0
Kildonan Drive	.0033927	.0581727	0	1	4
Kildonan Park	0	0	0	0	0
King Edward	.0067854	.0821285	0	1	8
Kingston Crescent	0	0	0	0	0
Kirkfield	0	0	0	0	0
Lavalee	0	0	0	0	0
Legislature	.0016964	.0411693	0	1	2
Leila North	.0008482	.0291235	0	1	1
Leila-Mcphillips Triangle	.0059372	.0872054	0	2	7
Linden Ridge	.0016964	.0411693	0	1	2
Linden Woods	.0008482	.0291235	0	1	1
Logan-C.P.R.	.0042409	.0650114	0	1	5
Lord Roberts	.0059372	.076857	0	1	7

	mean	sd	min	max	sum
Lord Selkirk Park	.0084818	.091744	0	1	10
Luxton	.0008482	.0291235	0	1	1
Maginot	.0025445	.0504005	0	1	3
Mandalay West	.0008482	.0291235	0	1	1
Margaret Park	0	0	0	0	0
Marlton	0	0	0	0	0
Mathers	.0016964	.0411693	0	1	2
Maybank	0	0	0	0	0
McLeod Industrial	0	0	0	0	0
Mcmillan	.0050891	.0711861	0	1	6
Meadows	.0008482	.0291235	0	1	1
Meadow Wood	.0008482	.0291235	0	1	1
Melrose	.0025445	.0504005	0	1	3
Minnetonka	.0008482	.0291235	0	1	1
Minto	.0008482	.0291235	0	1	1
Mission Gardens	.0042409	.0650114	0	1	5
Mission Industrial	0	0	0	0	0
Montcalm	.0025445	.0504005	0	1	3
Munroe East	.0059372	.076857	0	1	7
Munroe West	.0025445	.0504005	0	1	3
Murray Industrial Park	0	0	0	0	0
Mynarski	.0008482	.0291235	0	1	1
Niakwa Park	0	0	0	0	0
Niakwa Place	0	0	0	0	0
Norberry	0	0	0	0	0
Norman Park	0	0	0	0	0
North Inkster Industrial	0	0	0	0	0
North Point Douglas	.0110263	.10447	0	1	13
North River Heights	0	0	0	0	0
North St. Boniface	.0033927	.0581727	0	1	4
North Transcona Yards	0	0	0	0	0
Norwood East	.0033927	.0581727	0	1	4
Norwood West	0	0	0	0	0
Oak Point Highway	.0008482	.0291235	0	1	1
Old Tuxedo	.0008482	.0291235	0	1	1
Omand's Creek Industrial	0	0	0	0	0
Pacific Industrial	.0008482	.0291235	0	1	1
Parc La Salle	.0008482	.0291235	0	1	1
Parker	0	0	0	0	0
Peguis	.0016964	.0411693	0	1	2
Pembina Strip	.0016964	.0411693	0	1	2
Point Road	0	0	0	0	0
Polo Park	.0059372	.076857	0	1	7
Portage and Main	.0008482	.0291235	0	1	1
Portage-Ellice	.0161154	.1387973	0	2	19
Prairie Pointe	0	0	0	0	0

	mean	sd	min	max	sum
Pulberry	.0008482	.0291235	0	1	1
Radisson	0	0	0	0	0
Regent	.0033927	.0581727	0	1	4
Richmond Lakes	0	0	0	0	0
Richmond West	0	0	0	0	0
Ridgedale	0	0	0	0	0
Ridgewood South	0	0	0	0	0
River East	.0008482	.0291235	0	1	1
River Park South	.0050891	.0822511	0	2	6
River West Park	.0008482	.0291235	0	1	1
River-Osborne	.0118745	.1230407	0	2	14
Riverbend	.0016964	.0411693	0	1	2
Rivergrove	.0033927	.0581727	0	1	4
Riverview	.0016964	.0411693	0	1	2
Robertson	0	0	0	0	0
Roblin Park	.0008482	.0291235	0	1	1
Rockwood	.0016964	.0411693	0	1	2
Roslyn	.0025445	.0504005	0	1	3
Rosser-Old Kildonan	0	0	0	0	0
Rossmere-A	.0110263	.10447	0	1	13
Rossmere-B	.0050891	.0711861	0	1	6
Royalwood	0	0	0	0	0
Sage Creek	.0008482	.0291235	0	1	1
Sargent Park	.0084818	.091744	0	1	10
Saskatchewan North	0	0	0	0	0
Seven Oaks	.0050891	.0711861	0	1	6
Shaughnessy Park	0	0	0	0	0
Silver Heights	.0016964	.0411693	0	1	2
Sir John Franklin	.0025445	.0504005	0	1	3
South Point Douglas	.0186599	.1353781	0	1	22
South Pointe	0	0	0	0	0
South Portage	.0220526	.1469169	0	1	26
South River Heights	0	0	0	0	0
South Tuxedo	.0016964	.0411693	0	1	2
Southboine	0	0	0	0	0
Southdale	.0008482	.0291235	0	1	1
Southland Park	0	0	0	0	0
Spence	.0203562	.1412756	0	1	24
Springfield North	.0016964	.0411693	0	1	2
Springfield South	.0008482	.0291235	0	1	1
St. Boniface Industrial Park	.0008482	.0291235	0	1	1
St. George	.0033927	.0581727	0	1	4
St. James Industrial	.0169635	.1291895	0	1	20
St. John's	.0305344	.1721253	0	1	36
St. John's Park	.0016964	.0411693	0	1	2
St. Matthews	.0110263	.10447	0	1	13

	mean	sd	min	max	sum
St. Norbert	.0008482	.0291235	0	1	1
St. Vital Centre	.0008482	.0291235	0	1	1
St. Vital Perimeter South	0	0	0	0	0
Stock Yards	0	0	0	0	0
Sturgeon Creek	.0042409	.0650114	0	1	5
Symington Yards	.0016964	.0582469	0	2	2
Talbot-Grey	.0033927	.0581727	0	1	4
Templeton-Sinclair	.0042409	.0650114	0	1	5
The Forks	0	0	0	0	0
The Maples	.0059372	.0872054	0	2	7
Tissot	.0008482	.0291235	0	1	1
Transcona North	0	0	0	0	0
Transcona South	0	0	0	0	0
Transcona Yards	0	0	0	0	0
Trappistes	0	0	0	0	0
Turnbull Drive	0	0	0	0	0
Tuxedo	.0008482	.0291235	0	1	1
Tuxedo Industrial	.0008482	.0291235	0	1	1
Tyndall Park	.0084818	.091744	0	1	10
Tyne-Tees	.0016964	.0411693	0	1	2
University	.0008482	.0291235	0	1	1
Valhalla	.0016964	.0411693	0	1	2
Valley Gardens	.0033927	.0581727	0	1	4
Varennes	.0008482	.0291235	0	1	1
Varsity View	0	0	0	0	0
Vialoux	.0008482	.0291235	0	1	1
Victoria Crescent	0	0	0	0	0
Victoria West	.0008482	.0291235	0	1	1
Vista	0	0	0	0	0
Waverly Heights	.0016964	.0411693	0	1	2
Wellington Crescent	0	0	0	0	0
West Alexander	.0339271	.1857461	0	2	40
West Broadway	.014419	.1261782	0	2	17
West Fort Garry Industrial	.0008482	.0291235	0	1	1
West Kildonan Industrial	0	0	0	0	0
West Wolseley	0	0	0	0	0
Westdale	.0016964	.0411693	0	1	2
Weston	.0135708	.1157498	0	1	16
Weston Shops	0	0	0	0	0
Westwood	.0008482	.0291235	0	1	1
Whyte Ridge	.0008482	.0291235	0	1	1
Wildwood	0	0	0	0	0
Wilkes South	0	0	0	0	0
William Whyte	.0424088	.209858	0	2	50
Windsor Park	.0076336	.0870732	0	1	9
Wolseley	.0025445	.0504005	0	1	3
Woodhaven	0	0	0	0	0
Worthington	.0008482	.0291235	0	1	1
Observations	271170				