Police Funding and Crime Rates in 20 of Canada's Largest Municipalities: A Longitudinal Study

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Tandis que la littérature évaluant diverses pratiques et reformes policières continue de s'accroitre, il y a présentement peu de recherche qui examine le financement de la police au Canada. Pour décrire la situation présente du financement de la police au Canada, nous recueillissions et publions des données sur les dépenses municipales de services policiers de 2010 à 2021 de 20 des municipalités urbaines les plus peuplées au Canada. Notre analyse décrit le changement du financement de la police au cours du temps et la variation entre les différentes régions, et examine la corrélation entre le financement et les taux de crime. Les dépenses sur les services policiers sont extraits des budgets municipaux, et les données sur les populations et sur l'indice de gravité de la criminalité sont extraits des bases de données de Statistique Canada. En 2019, les services policiers étaient la plus grande dépense de fonctionnement dans une majorité des municipalités. Les montants des dépenses par habitant en dollars constants sur les services policiers augmentent dans 16/20 municipalités entre 2010 et 2020. Il y a des différences marquées entre les dépenses des municipalités : en 2019, en dollars 2020, Vancouver a dépensé \$495.84 par habitant pendant que la Ville de Québec a dépensé \$217.05 par habitant. Il n'y a pas de corrélations uniformes entre les dépenses policières et les taux de crime des municipalités. Cependant, des augmentations nettes de dépenses par habitant ne sont pas associées avec des réductions plus importantes de taux de crime. Ces résultats décrivent la grande variation locale des tendances de fonds policiers, et indiquent la complexité des interactions entre les taux de crime et les fonds policiers.

Mots clés : budgets de police, financement municipal, criminalité, police, forces de l'ordre, fonds policiers

Although the literature evaluating various police practices and reforms continues to broaden, little research has examined police funding in Canada. To describe the current landscape of Canada's police funding, we collect and publish data on municipal police service expenditures from 2010 to 2021 in 20 of the most populous urban municipalities in Canada. Our analysis describes how police funding changes over time and varies between regions, and it examines its correlation with crime rates. Spending on police services is extracted from municipal budgets, and population and crime severity index data are collected from Statistics Canada databases. In 2019, police services were the top operating expenditure in a majority of the municipalities. Real per capita spending on police services increased in 16 of 20 municipalities from 2010 to 2020. Marked differences are seen in spending between municipalities: in 2019, in 2020 dollars, Vancouver spent \$495.84 per capita, whereas Quebec City spent \$217.05 per capita. No consistent associations were found between police funding and crime rates across municipalities, and overall, net increases in spending per capita are not associated with greater net decreases in crime rates. These findings describe the wide local variation in police funding trends and point to the complexity of interactions between crime rates and police funding.

Keywords: police budgets, municipal finance, crime, police, law enforcement, police funding

Introduction

Recent years have seen growing discussion regarding police reforms, alternatives to policing, and changes to police funding in response to calls to address police violence in Canada and around the world (Gillezeau 2023; Neustaeter 2021). There is a wide diversity of opinion on the issue of police funding, with strong advocacy from different groups, including police organizations, community groups, and politicians, for both new investments and reduced funds (Ho 2020; Rankin 2020; Zussman 2020). Systematic analysis of trends in police funding, regional differences, and the association between police funding and crime rates is necessary to understand the current state of police financing in Canada. A better understanding of these aspects of police financing would help inform future strategies for effective resource allocation in building safe and healthy communities.

The research available on police funding in Canada is very limited. Each year, the Canadian Centre for Justice and Community Safety Statistics publishes a report on overall police resources in Canada, including expenditures, salary trends, and police strength (Conor et al. 2020). In 2014, the Fraser Institute also conducted an evaluation of the efficiency of police resources distribution in Canada and its relation to factors, including crime rates (Di Matteo 2014). Last, Ruddell and Thomas (2015) assessed possible determinants of police strength in Canada, finding that police strength was associated with multiple factors, including levels of violent crime and population density. Aside from these few studies, there has been little empirical research into police funding in Canada. From a public administration standpoint, this area of research is important in identifying broader trends and implications for policy-makers and democratic governance.

To begin to address these gaps in research on police funding in Canada, we aimed to describe and compare resource allocation to police services from 2010 to 2021 in 20 of the largest Canadian municipalities and to examine correlations between police funding and crime statistics in the same time period. This analysis investigates three major research questions: (1) how much do municipalities spend on policing, (2) how does spending on policing vary across Canada, and (3) to what extent are variations in police spending associated with changes in crime rates over time? As the first Canada-wide longitudinal analysis of municipal police funding, our analysis represents a first step toward a greater understanding of Canadian municipal allocation of public resources. We make no claims about causality of any relationships between police funding and crime and caution readers against interpreting our results as anything more than associational. We also do not make any specific recommendations regarding police budgets but rather propose that because of the current lack of clarity in what determines police budgets and how they affect crime, conducting evaluations of police budgets and their cost-effectiveness is valuable. Our study lays the groundwork for further analysis of the determinants of police funding by identifying important patterns and data gaps at the municipal level. To this end, we also make public our datasets of compiled municipal police funding data and crime rates to facilitate access and future studies building on our work (see the Online Appendix).

Literature Review

Data on police budgets are notoriously difficult to access in Canada, thwarting research into even the most rudimentary questions about how governments spend money in the pursuit of public safety. Compared with countries such as the United States, what data on police budgets and expenditures can be accessed in Canada tend be incomplete and insufficiently disaggregated, greatly limiting the insight they can offer (Sytsma and Laming 2019). Because of barriers to accessing quality data on police budgets, systematic analysis of the economics of policing in Canada is exceptionally rare. Given that increases in police budgets have long been rationalized as an investment in fighting crime (Marquis 2016), it is surprising that so little is known about the relationship between police budgets and public safety in Canada. Police budgets are as much a political issue as they are a practical, administrative one (Beck and Goldstein 2018; Holmes et al. 2008a; Levitt 2002; Murphy 2007; Ruddell and Thomas 2015). As such, the relationship between changes in spending and changes in crime is not always clear-cut. Ruddell and Thomas (2015) suggest that the political popularity of increasing police spending in some municipalities can incentivize politicians to increase police budgets even when it is not required from a public safety standpoint.

In the context of the United States, strong evidence suggests that police budgets often surge markedly during an electoral cycle (Levitt 2002), a hypothesis that has not yet been tested in Canada but ought to be. As Ruddell and Thomas (2015) reflect, because of the political saliency of municipal police spending, "there may be a disconnect between police strength [as measured through the number of staff] and the actual threats posed by crime."[1] Such a disconnect, they suggest, could explain why some jurisdictions will increase the number of police officers per capita even in the face of declining crime rates. As Ouimet (2002) finds regarding a major drop in crime in Canada during the 1990s, changes in crime rates during this period may have far more to do with factors exogenous to policing altogether, such as changing demographics, expanded opportunities for employment, and shifts in societal values.

The relationship between police budgets and public safety, as measured through crime rates, is complex and

varied. In the United States, where most of the existing research on this subject has been conducted, Marvell and Moody (1996) reviewed 36 empirical studies of what they call the "police–crime relationship." These three dozen studies "gave little evidence that more police reduce crime" (Marvell and Moody 1996, 613). As Marvell and Moody argue, however, most suffer from major methodological limitations, notably omitted-variable bias. They then provide theoretical and empirical support for the inclusion of a broad range of demographic (e.g., gender, race, age) and economic (e.g., population, personal income, employment rate, poverty level) variables when examining the relationship between budgets and crime. Marvell and Moody (1996, 625) also underscore the importance of including a measure of prison population in research on police budgets and crime on the assumption that it is "strongly related to crime reduction" and might therefore account for some of the variation in the relationship. Even in studies that have included these important control variables, however, the findings remain mixed. As Worrall and Kovandzic (2010, 514) concluded after analyzing 20 years of panel data from more than 5,000 American cities between 1990 and 2001, "the jury is still out on the direction and nature of the relationship" between police budgets and crime. A further difficulty with investigating this relationship concerns the problem of temporal ordering: police budgets may reduce crime, but so too can crime increase police budgets (Marvell and Moody 1996; Worrall and Kovandzic 2010).

Research on the economics of policing—and on the relationship between police budgets and crime rates specifically—is lacking in Canada, to the detriment of policy-making. Given the current state of knowledge, Canadian policy-makers are ill equipped to make informed, evidence-based decisions about whether to increase or reduce a police department's budget and how such changes are likely to affect those living in the community, especially those who are racialized (Beck and Goldstein 2018; Makowsky, Stratmann, and Tabarrok 2019). Although it is conceivable that trends in the United States may be generalizable to Canada, this is a question that ought to be carefully empirically tested rather than simply assumed, especially when dealing with a criminal justice system as distinctive as that in the United States (Doob and Webster 2006; Jouet 2017).

With the rise of Black Lives Matter and a growing political awareness of calls to defund the police throughout the country (Cobbina-Dungy and Jones-Brown 2021; Koulack 2020; Maynard 2020; Pasternak, Walby, and Stadnyk 2022), the importance of collecting and analyzing data on police budgets has arguably never been as relevant a policy matter as it is now. Multiple Canadian cities have already formally considered adjustments to their police budgets (Elliott 2021; Subcommittee to Define Defunding Police 2022; Neustaeter 2021; Rieger 2020), with Edmonton the first to approve a budget cut (of $11 million over two years; Cook 2020). As policy-makers in many Canadian cities grapple with opposing demands from diverse segments of the population to make significant budgetary changes concerning policing (Bricker 2020), there is a need for greater evidence and clarity. As it currently stands, even the most rudimentary questions about police budgets in Canada have not been systematically investigated. This is true not only of the field of public administration; scholarly analyses of municipal spending on the police in Canada, whether in criminology, economics, political science, or other related discipline, are virtually non-existent.

This article presents a first step toward filling these gaps in the literature by conducting a systematic analysis of police spending in 20 municipalities across Canada. We investigate how much of their total budget municipalities across Canada allocate to police services. After standardizing for differences in population, to what degree do police budget allocations vary between cities? Finally, to what extent are variations in police spending associated with changes in rates of crime over time? The first two questions were purely exploratory and involved use of descriptive statistics. To answer the third, we calculated Pearson coefficients to measure the relationship between police expenditures and crime. Considering the existing literature reviewed earlier, we hypothesized that the relationship between police funding and crime rates would not be consistent when disaggregated by municipality. Pooling data from the different municipalities, we hypothesized that there would be no strong positive or negative correlation between the net change in police funding and the net change in crime rates.

Methods

We conducted a longitudinal budgetary analysis of 20 of Canada's most populous municipalities to determine the proportion of urban municipal budgets dedicated to police services and their spending per capita on police services, as well as how these have changed over time. We also calculated correlations between municipal spending on police services and crime rates over time.

The 20 most populous municipalities or regional municipalities (from most to least populous as of 2020) were as follows: Toronto, Montreal, Peel Region, Calgary, York Region, Edmonton, Ottawa, Winnipeg, Vancouver, Waterloo Region, Surrey, Quebec City, Hamilton, Halifax, Laval, London, Gatineau, Saskatoon, Burnaby, and Longueuil. These municipalities span seven of Canada's ten provinces, and 2020 population estimates range from 2,988,408 for Toronto to 252,828 for Longueuil (Statistics Canada 2022).

Budgets and financial statements were collected from municipal websites in January and February 2021. Where financial documents were unavailable, municipal finance

departments were contacted by email, phone, or both to request access to the budget files. Data on actual expenses (where reported) were extracted from gross municipal operating budgets from 2010 to 2021. Where actual expenses were not reported, approved budget amounts or projected expenses were collected. Total operating expenses and law enforcement expenses were extracted from all municipalities by two members of the research team. Population estimates for each municipality from 2010 to 2020 were collected from Statistics Canada population estimates (unavailable for 2021 at the time of collection). Crime Severity Index (CSI) data were collected from Statistics Canada databases for each municipality from 2010 to 2019 (unavailable for 2020 and 2021 at the time of collection). The CSI accounts for both the volume and the severity of police-reported crimes committed and is adjusted for population and standardized to 100, using 2006 as a base year (Wallace et al. 2009).

To verify the data, two research team members independently checked all budgetary amounts for three or more random years from each municipality against the source budget files (25%–100% of years were verified, depending on the municipality). All population estimates and CSI values were also reviewed.

Budget data were converted into 2020 Canadian dollars (except for 2021 data) using the Bank of Canada inflation calculator based on Consumer Price Index values.[2] Budget proportions and per capita, average, absolute, and percentage changes in municipal police budgets were calculated. Analyses were conducted using the R program. The Pearson correlation coefficients between CSI values and spending per capita were calculated for municipalities between 2010 and 2019 (Waterloo and Surrey were excluded because of insufficient data). Consistent with previous research on police budgets and crime (Worrall and Kovandzic 2010), we also investigated whether changes in police funding in a given year were associated with changes in CSI in the next year, rather than the same year, and calculated the correlation coefficients between the two for available data between 2010 and 2019 (London, Waterloo, and Surrey were excluded because of insufficient data). Last, the correlation coefficient of the net change in CSI and net change in spending per capita was calculated by combining all municipalities using available data between 2010 and 2019. Following common practices in the social sciences (Danacica and Babucea 2007; Rajaretnam 2015), p-values < 0.05 were used to suggest the significance of an association.

Results

Data Collection
We obtained complete budget files for the 2010–2021 study period from 11 of 20 (55%) municipalities. Between one and three years of budgets were missing from the rest of the files, with the exception of Surrey (missing six years) and Waterloo Region (missing eight years).

Budgetary Findings
All budgetary results presented here have been adjusted for inflation unless otherwise stated. We chose 2019 as a single-year comparison timepoint because it is the most recent year for which we were able to collect budgetary data from all 20 municipalities (at the time of collection). Police services accounted for the largest 2019 line-item operating expenditure in 12 (60%) of the 20 municipalities: Toronto, Montreal, Peel Region, York Region, Edmonton, Winnipeg, Vancouver, Waterloo Region, Surrey, Quebec City, Hamilton, and Halifax. It was the second largest line-item expenditure in Ottawa, Laval, London, Gatineau, Saskatoon, and Longueuil.

The mean proportion of the total municipal operating budget allocated to police services was 15 percent (*SD* = 5 percent) in 2019. Of the 20 municipalities, Winnipeg allocated the largest proportion of its budget, 26 percent, to police services, and Quebec City and Ottawa each allocated the lowest proportion, 8 percent (Figure 1). Note that some of the variation in proportions is due to differing budget calculations by municipalities. Per capita spending on police services was calculated for each municipality, and 2019 spending was compared between municipalities (Figure 1). The mean per capita spending was $342.28 (*SD* = $75.67), and the median was $316.83. Vancouver spent the most, at $495.84 per capita, and Quebec City spent the least, at $217.05 per capita, resulting in a range of $278.79. Vancouver thus spent 2.3 times more per capita on police services than Quebec City in 2019.

Quebec City's spending was the lowest of the 20 municipalities from 2010 through to 2020, never surpassing $220 per capita per year. The lowest per capita amount spent in one year over this time span was $155.26 by Quebec City in 2010, and the highest was $560.68 by Longueuil in 2017.

For the time periods studied and after adjusting for inflation, municipalities all had a net increase in their gross spending on police services, except for Montreal, which had a 3.0 percent ($21 million) decrease (Table 1). Average yearly changes in per capita spending ranged from –$4.19 to +$8.24. Most municipalities (16 of 20; 80 percent) had a net increase in per capita spending (Table 1). Exceptions were Toronto, with a net decrease of $4.59 (–1.10 percent); Montreal, with a net decrease of $41.94 (–9.98 percent); Calgary, with a net decrease of $4.43 (1.15 percent); and Halifax, with a net decrease of $12.28 (4.23 percent). Quebec City had the largest net increase in spending per capita at $63.14 (+41.67 percent). Changes in per capita and gross spending are similar when considering the time period ending in 2019 (Appendix A).
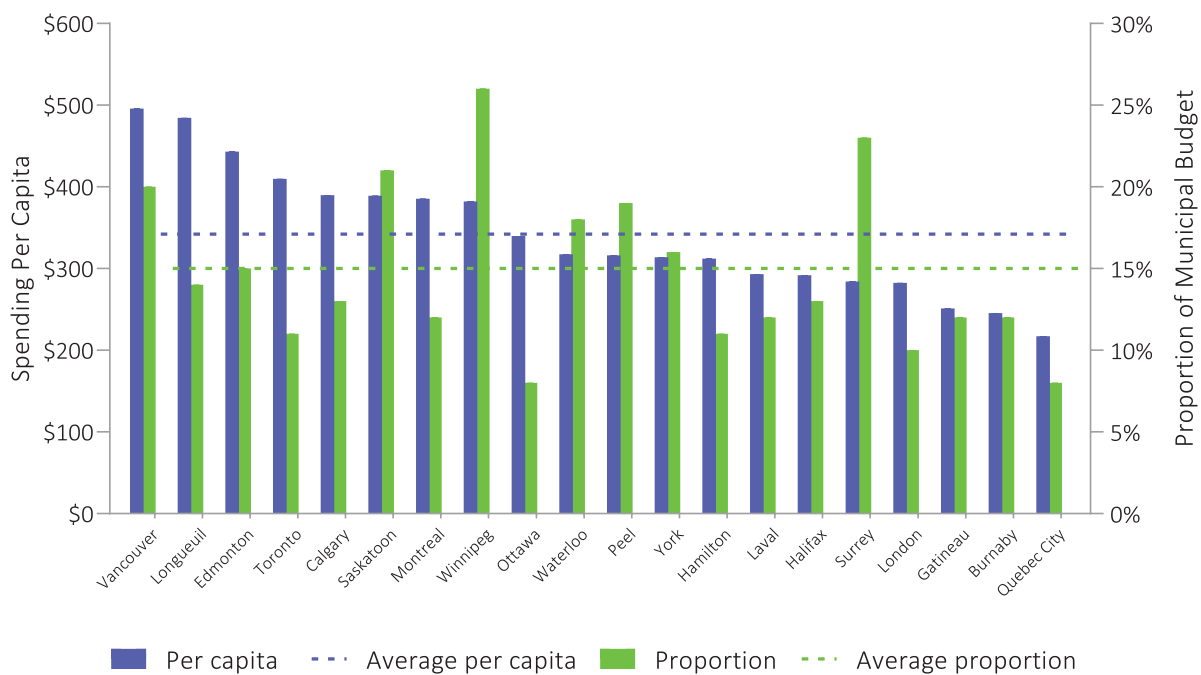
Figure 1: Municipal Spending on Police Services per Capita and Proportions of Municipal Gross Budgets Allocated to Police Services, 2019.
Note: Per capita spending data has been adjusted for inflation (2020 Canadian dollars).

Table 1: Changes in per Capita and Gross Spending on Police Services

Municipality	Time Period	Net Difference in Spending per Capita ($)	Average Change in per Capita Spending per Year ($)	Gross Net Change in Police Budget		Average Change in Gross Spending per Year	
				%	Absolute ($, Millions)	%	Absolute ($, Millions)
Toronto	2010–2021	−4.59	−0.46	+10.2	+114.0	+0.9	+10.4
Montreal	2010–2021	−41.94	−4.19	−3.0	−21.2	−0.3	−1.9
Peel Region	2012–2020	+9.44	+1.18	+18.7	+79.3	+2.2	+9.9
Calgary	2010–2021	−4.43	−0.44	+20.0	+86.2	+1.7	+7.8
York Region	2010–2021	+50.63	+5.06	+41.0	+115.4	+3.2	+10.5
Edmonton	2010–2021	+36.08	+3.61	+40.9	+139.8	+3.2	+12.7
Ottawa	2010–2020	+21.18	+2.12	+23.7	+68.6	+2.2	+6.9
Winnipeg	2010–2021	+52.19	+5.22	+35.6	+79.1	+2.9	+7.2
Vancouver	2010–2021	+48.16	+4.82	+25.9	+70.6	+2.1	+6.5
Waterloo Region	2018–2021	+16.48	+8.24	+13.1	+23.9	+4.2	+8.0
Surrey	2015–2020	+23.35	+4.67	+22.3	+31.9	+4.2	+6.4
Quebec City	2010–2021	+63.14	+6.31	+54.8	+47.1	+4.3	+4.3
Hamilton	2011–2021	+20.73	+2.30	+18.8	+29.8	+1.7	+3.0
Halifax	2010–2020	−12.28	−1.23	+7.8	+9.0	+0.8	+0.9
Laval	2010–2021	+5.23	+0.52	+25.9	+29.8	+2.5	+2.7
London	2010–2021	+20.00	+2.00	+26.4	+26.6	+3.1	+2.5
Gatineau	2010–2021	+29.76	+2.98	+27.9	+16.5	+2.3	+1.6
Saskatoon	2012–2021	+32.84	+4.10	+33.9	+29.1	+3.3	+3.2
Burnaby	2010–2021	+28.12	+2.81	+29.5	+15.5	+2.5	+1.5
Longueuil	2010–2019	+9.73	+1.08	+10.1	+11.1	+1.3	+1.2

Notes: All values have been adjusted to 2020 Canadian dollars.

Municipal budgets (unadjusted for inflation) were examined to identify years in which police budgets were reduced from the previous year's budget. Half of the municipalities increased their police budget every year from 2010 to 2021 (or years collected). Yearly increases ranged from 0.01 percent (Calgary, 2021) to 26 percent (Quebec City, 2015). Police budget cuts ranged from 0.05 percent (Vancouver, 2020) to 12.3 percent (Laval, 2017). All three budget cuts over 5 percent were counterbalanced by larger increases in the year either immediately preceding or immediately following. Laval's 12.3 percent cut in 2017 was followed by a 23.2 percent increase, and Burnaby's 5.9 percent reduction in 2013 was followed by a 6.8 percent increase the next year. Longueuil's 2018 budget cut of 10.9 percent was preceded by a 14.3 percent budget increase. Conversely, Quebec City's 26 percent increase in 2015 was not balanced by a prior or later budget cut. This further demonstrates overall municipal trends of maintaining a steady increase in spending on police services over time.

CSI values, which indicate both the volume and the severity of police-reported crimes committed, were collected for 2010–2019. CSI values had a net decrease in 15 of 20 municipalities over the nine years (Figure 2), with a mean net change of –9.09 (SD = 14.35). Correlation coefficients between CSI values and per capita spending on police services were calculated for municipalities with sufficient data (Waterloo and Surrey were excluded). Five municipalities had a correlation between crime rates and per capita spending on police services, with $p < 0.05$, and the average correlation across all municipalities was –0.192 (p = 0.115; Table 2). The strongest negative correlation was –0.860 in Gatineau, and the strongest positive correlation was 0.804 in Saskatoon. Correlation coefficients were also calculated to examine the extent to which a change in police funding was correlated with a change in CSI in the next year (London, Waterloo, and Surrey were excluded). The average correlation was –0.206 (p = 0.035; Table 3). The strongest negative correlation was –0.716 in Winnipeg, and this was the only correlation with $p < 0.05$. Figure 2 shows the trends in CSI values and police funding over time. Comparing the net change in spending per capita and net change in CSI in all 20 municipalities combined produced a correlation coefficient of 0.43 (p = 0.061).

Discussion

The aims of this study were to provide an overview of Canadian municipal police funding trends and to examine the relationship between police funding and crime rates. Our analysis found that police services are a top budget priority in most municipalities, with up to 26 percent of total expenditures allocated to police. Accordingly, spending on police services increased in a vast majority of the municipalities between 2010 and 2020, after adjusting for inflation. Across Canada, correlations

between crime rates and police funding varied enormously, as reported in Tables 2 and 3 and demonstrated in Figure 2, suggesting that any potential associations must be influenced by other socio-political factors that vary by local context, confirming our first hypothesis. Our analysis also found no strong correlation between net change in police funding and net change in crime rates across all municipalities, confirming our second hypothesis.

Our results are consistent with analyses by the Canadian Centre for Justice Statistics, which found similar per capita spending on law enforcement overall in Canada and that law enforcement operating expenditures have generally increased since 1996 (Conor, Robson, and Marcellus 2019). Our analysis collected municipal gross expenditure data, which include non-tax revenues such as provincial grants and transit fares. A similar analysis done by Black Lives Matter (BLM) used tax dollar expenditure data rather than gross expenditures and found that the proportion spent on police services specifically from tax dollars is generally higher than the proportion allocated from the gross municipal budgets analysed here. For instance, whereas we found that

Table 2: Correlation between Real per Capita Police Funding and Crime Severity Index, 2010–2019

Municipality	r	p-Value
Toronto	−0.519	0.125
Montreal	0.207	0.566
Peel[a]	−0.739	0.036*
Calgary	0.129	0.722
York	−0.062	0.864
Edmonton	0.777	0.008**
Ottawa	−0.619	0.056
Winnipeg	−0.347	0.327
Vancouver	0.124	0.733
Quebec City	−0.639	0.047*
Hamilton[b]	−0.587	0.097
Halifax	−0.075	0.837
Laval	0.169	0.640
London[c]	−0.563	0.188
Gatineau	−0.860	0.001**
Saskatoon[a]	0.804	0.016*
Burnaby	−0.196	0.587
Longueuil	−0.462	0.178
Average	−0.192	0.115
95% confidence interval	(0.436, 0.052)	

[a]Because of data limitations, Peel and Saskatoon correlations span 2012–2019

[b]Because of data limitations, the Hamilton correlation spans 2011–2019.

[c]Because of data limitations, the London correlation is missing 2013–2015 values.

*$p < 0.05$; **$p < 0.01$.

Table 3: Correlation between Change in Real per Capita Police Funding (2011–2018) and Change in Crime Severity Index the Next Year (2012–2019)

Municipality	r	p-value
Toronto	−0.097	0.819
Montreal	−0.567	0.143
Peel[a]	−0.250	0.633
Calgary	−0.658	0.076
York Region	−0.649	0.081
Edmonton	−0.047	0.912
Ottawa	−0.151	0.721
Winnipeg	−0.716	0.046[*]
Vancouver	0.320	0.439
Quebec	0.283	0.498
Hamilton[b]	−0.356	0.433
Halifax	0.006	0.989
Laval	−0.184	0.663
Gatineau	−0.666	0.071
Saskatoon[a]	0.502	0.311
Burnaby	0.002	0.996
Longueuil	−0.268	0.521
Average	−0.206	0.035
95% confidence interval	(−0.395, −0.016)	

[a]Because of data limitations, Peel and Saskatoon correlations span 2012–2019

[b]Because of data limitations, the Hamilton correlation spans 2011–2019.

[*]$p < 0.05$.

Toronto plans to spend 10 percent of its gross operating budget on police services in 2021 (City of Toronto 2021), BLM's analysis revealed that the proportion of municipal tax dollars allocated to police in Toronto is more than 25 percent (Black Lives Matter Canada 2021).

Although our analysis suggests that overall changes in crime rates and police funding are not consistently inversely correlated at the municipal level (i.e., greater investments in policing were not necessarily associated with reductions in crime), all but two municipalities had a net increase in police funding per capita. This finding underscores the need for further systematic analysis of the police–crime relationship in Canada using more robust multivariate models inclusive of demographic, economic, and other controls. There have been only two previous studies of the relationship between police budgets and crime in Canada. A study by Ruddell and Thomas (2015) found that spending on police was positively associated with violent crime rates in 50 Canadian municipalities, whereas an analysis by the Fraser Institute found no clear relationship between crime rates and per capita police expenditures in Canadian provinces (Di Matteo 2014).

Our study also compared the change in police funding with the change in crime rates in the next year. A negative correlation between changes in police funding and crime rates in the next year would suggest that increasing police funding is related to later decreases in crime rates, although no causality can be established from this analysis. Only 1 municipality (Winnipeg) of 17 had a statistically significant negative correlation ($r = –0.716$, $p = 0.046$). An American study by Chappell et al. (2006) found evidence that increasing police budgets, and thereby the number of police officers a department can hire, can result in a reduction in arrests by enabling shifts in police strategies and priorities. Other American reports have found that greater spending on law enforcement has not necessarily led to decreases in crime (Bump 2020) or that benefits of policing vary by jurisdiction, particularly for American cities with large Black populations (Chalfin et al. 2020). Still others have reported no statistically significant relationship between budgets and arrests emerging from their data and analysis at all (Eitle and Monahan 2009). Most recently, some sociologists argue that even if police may have an impact on reducing crime, other, more effective crime prevention strategies exist (Sharkey 2020). Moreover, an analysis of the Canadian "crime drop" of the 1990s found that it occurred despite a reduction in police officers per capita (but a mild increase in police funding), suggesting, rather, that changing age demographics and increasing employment rates in the 1990s were more likely to have had an impact on crime rates (Ouimet 2002).

One of the most important findings of this study is that municipal spending on police services varies significantly across Canada (Figure 2). This raises the question of what explains such vast differences; for example, Vancouver spent more than double per capita on policing in 2019 than Quebec City. It is possible that the difference may in part be explained by the overall higher crime rate in Vancouver, which is approximately twice as high as Quebec's. Relatedly, Vancouver, Edmonton, Winnipeg, and Saskatoon have the highest crime rates and among the highest police budgets in recent years. Edmonton and Saskatoon also had strong positive correlations between police funding per capita and CSI (0.77 and 0.80, respectively; both ps < 0.05). This could fit with the economic rational choice theory that "maintains that resources for policing are allocated in response to crime rates and represent the shared public interest in controlling crime" (Holmes et al. 2008, 130). Alternatively, the relationships may indicate a detection bias, in which increased police funding leads to increased measurement of crimes. Both Zhao et al. (2003) and Chalfin et al. (2020) find evidence of a positive relationship between increases in police budgets and increases in low-level arrests from evaluating a 1994 federal granting program to boost US police budgets. In any case, overall police funding has increased continuously as crime rates have decreased across Canada over the past three decades

Figure 2: Police Funding per Capita versus CSI, 2010–2020.

Notes: CSI data only available up to 2019. All data are adjusted for inflation (2020 Canadian dollars). CSI = crime severity index.

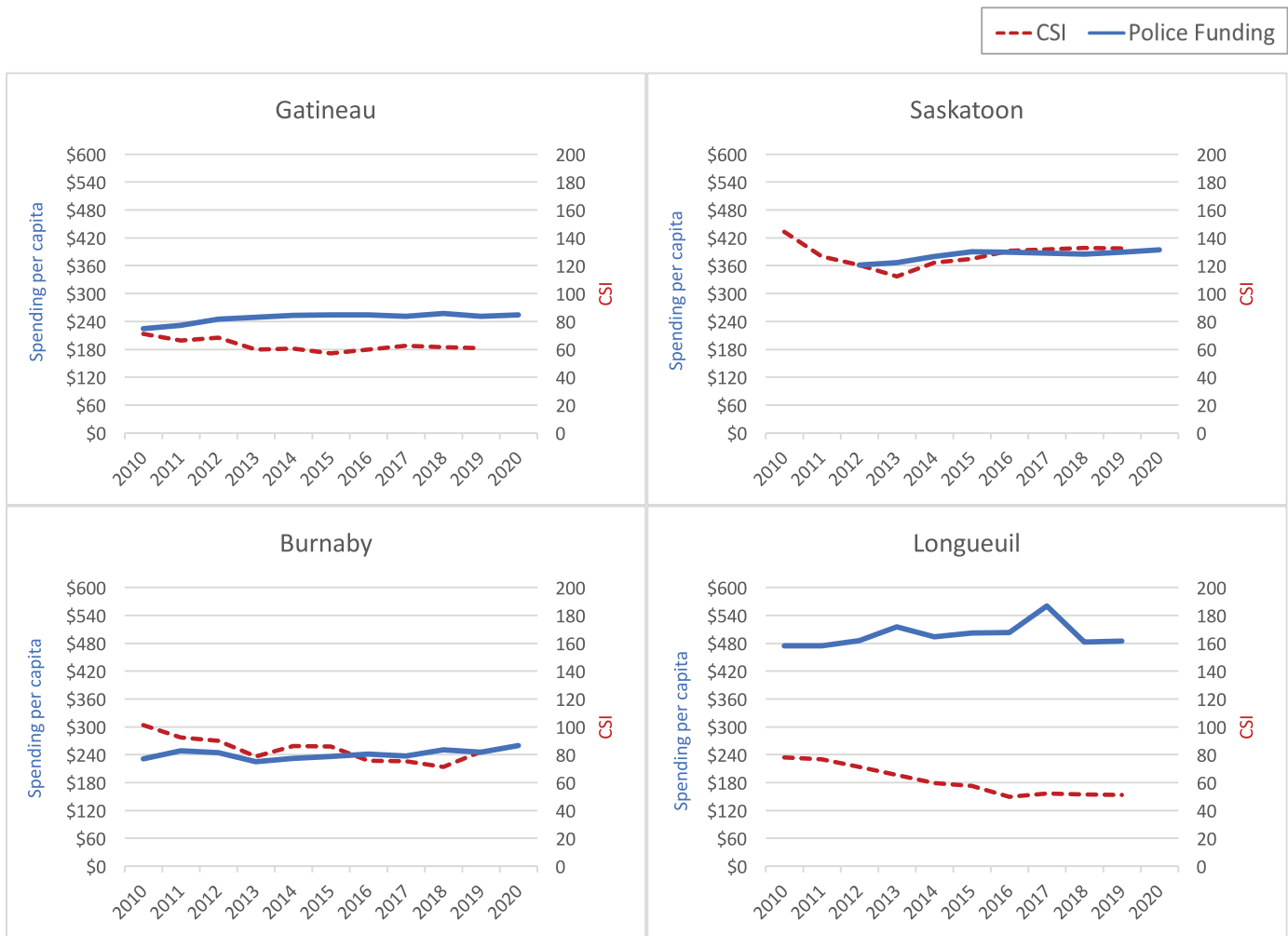(*Continued*)

Figure 2: Continued

Figure 2: Continued

(Farrell and Brantingham 2013). Future research should thus further examine whether funding decisions may be based on past crime rates and explore whether investments in police have an impact on future crime rates. Such analyses should also consider other influential factors that could explain police budget increases, such as union negotiations, given that salaries account for 80–90 percent of police budgets (Conor et al. 2020). Investigating these questions will help promote evidence-based public resource allocation decisions and policy.

Further research and clarity on law enforcement funding are critical, particularly as total operating expenditures for all police services in Canada reached $15.1 billion in 2018 (Conor, Robson, and Marcellus 2019) and as various health experts and advocates are calling for a redistribution of responsibilities and a reallocation of resources from police services to other health-promoting public services (Glauser 2020; Labby 2020). Considering the growing field of research demonstrating the significant harms of over-policing and police violence (Khenti

2014; House of Commons 2021; Wortley, Laniyonu, and Laming 2020), future studies should consider potential relationships between police funding and violence. We know little in the Canadian context about the relationship between changes to police budgets and actual policing practices, particularly how budgets shape decisions about who to arrest, who to charge, and for what alleged violations. Policing, especially street-level policing (Lowe 2011), is a highly discretionary matter. Police officers on patrol enjoy a wide latitude of discretion in their day-to-day work (Bittner 1970). Although still mixed in its findings, a growing body of evidence in the United States suggests that increases in police budgets can result in direct increases in police arrests, especially for lower-level violations (e.g., minor drug possession; Chalfin et al. 2020; Zhao, Scheider, and Thurman 2003). This is an important line of inquiry that ought to be replicated in Canada. On the basis of a large-scale dynamic panel regression analysis of 940 US cities between 1990 and 2018, Beck and colleagues (2022) have presented some

of the strongest evidence yet that declines in low-level misdemeanour arrests are likely to be sharpest in municipalities that reduce their police service's budgets, net of crime, demographic, and other controls. As such, the size of a police department's budget and, by extension, the number of police officers it employs, may be "more consequential for policing outcomes than policy" (Beck et al. 2022, 3).

This research is critical to advising police funding and capacity reforms aiming to create safer communities. To our knowledge, this is the first published analysis that has compared municipal spending on police services across Canada longitudinally, although, as noted, researchers at Black Lives Matter Canada (2021) have published analyses of municipal tax dollars spent on police across Canada in 2020 and 2021. Provincial- and national-level reports on law enforcement funding are also published regularly by the Canadian Centre for Justice Statistics (Conor, Robson, and Marcellus 2019). This study provides a greater understanding of municipal resource allocation to police services in Canada and its relationship to crime rates and demonstrates the need for further research into patterns in law enforcement funding. Our datasets are available in the Online Appendix.

Limitations

We faced a critical challenge in accessing the necessary data to conduct our analysis. Several years of data on municipal budgets were missing for Peel, Waterloo, Surrey, Hamilton, London, Saskatoon, and Longueuil. These municipalities did not make all of their budgets available publicly on their websites and did not respond to our inquiries. Peel, Ottawa, Surrey, Halifax, and Longueuil had not published their 2021 municipal budgets at the time of data collection. Actual municipal expenses were collected when possible, but in some cases were not available, and approved budgetary amounts or projected spending amounts were collected instead. All 2020 and 2021 data were approved or projected amounts. The missing data limit our interpretation of trends in police funding over the 11 years. This challenge with data collection points to a larger issue of availability and accessibility of municipal finance data, and specifically police finance data (Sytsma and Laming 2019). The lack of public access to these data poses an important barrier to current and future research on police financing and limits the scope of possible analysis.

Comparability across municipalities was limited by certain factors. Municipal budgets varied in their organization and breakdown. For example, some budgets included utilities in their operating budget, and others did not. This reduces the comparability of proportions of budgets allocated to police reported in the results. Municipal police budgets are funded mainly by municipal property taxes. Thus, variations in property taxes across the 20 municipalities affect municipal budgets and the amount of resources available to allocate to police services. Comparability of municipalities is limited by this variation in property taxes and, as a result, in the amount of public resources available. Comparability is also limited by other differences between municipalities, such as level of urbanization, demographics, socio-economic status, and types of public services funded municipally (varies by province), among others. As noted by Marvell and Moody (1996), such variables should be considered in more complex analyses of the relationship between policing and crime.

This study used only CSI values as a measure for crime. Other measures may yield different observations that may be interesting to examine in future research. For example, future research could consider a measure of crime rates disaggregated by type (e.g., property vs. violent crime; see, e.g., Levitt 2002). Federal and provincial funding of law enforcement were also outside of the scope of this study and should be considered in future research.

We inputted a one-year time lag when examining the correlation between changes in spending on police and CSI values. It is possible that a two-year time lag or longer or a time lag in the other direction would have represented the association between police funding and crime differently, although this would not have affected overall budget trends. We were also unable to control for other variables, which may influence the relationship between police funding and crime rates, such as neighbourhood socio-demographics. Future research that does involve more robust multivariate modelling of the budget–crime relationship could benefit from the more sophisticated statistical techniques discussed in Worrall and Kovandzic (2010).

Conclusion

Our longitudinal analysis of municipal resource allocation to police services across Canada revealed substantial variation in spending per capita between municipalities. Municipal spending on police has mainly increased steadily since 2010 across Canada, and police services were the top operating expenditure for 60 percent of the municipalities in 2019. Our analysis also revealed no consistent correlation between police funding and crime rates across the municipalities. We make no causal claims based on our analysis and caution readers against interpreting them as anything more than correlational. Although we do not make specific policy recommendations regarding police budgets, our findings raise questions about the reasoning for such vast differences in police funding across the country despite overall downward crime rates. This study thus lays the groundwork for future research into the context and rationales for resource allocation to law enforcement in

Canada, a critical area of study considering the growing discourse aiming to find effective solutions to address police violence (Gillezeau 2023), including proposals to reduce police funding. However, further research faces the critical challenge of police funding data availability, a data gap that should be addressed immediately by police leaders, governance bodies, and review and accountability agencies. Furthering this field of study will grow the evidence base available to inform public resource allocation to best promote the well-being of communities.

Contributions
ADP and MSSS designed the study protocol. MSSS and NB collected the data. MSSS was primarily responsible for conducting the data analysis and drafting the initial manuscript. ALu conducted the literature review. ALo, FIM, BGO, AO-B, NP, and ADP advised on the study design, data interpretation, and presentation of results. All authors aided in modifying and refining the final manuscript.

Notes
1 Note that many of the studies we review deal with police strength rather than budgets per se. However, as numerous scholars have pointed out (see, e.g., Kovandzic and Sloan 2002), there is little difference between these measures given that the majority (between 80 percent and 90 percent in Canada and the United States alike; see Conor et al. 2020; Walker 1999) of police budgets goes to paying police salaries. As Greenberg et al. (1983) show, the two measures are highly correlated with one another. Unless otherwise specified, we use the terms *strength* and *budget* interchangeably.

2 The 2021 data were extracted from budgets published in early 2021, which we assume did not predict the actual inflation rates for 2021. We thus assume that the 2021 budgeted values are closer to 2020 dollars.

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Appendix A: Changes in per Capita and Gross Spending on Police Services, Time Period Ending in 2019

Municipality	Time Period	Net Difference in Spending Per Capita ($)	Average Change in Per Capita per Year ($)	Gross Police Budget Net Change		Average Change in Gross Spending per Year	
				%	Absolute ($, Millions)	%	Absolute ($, Millions)
Toronto	2010–2019	−7.28	−0.81	+8.8	+99	+1.0	+11.0
Montreal	2010–2019	−34.67	−3.85	+0.0	+0	+0.0	+0.0
Peel Region	2012–2019	+3.67	+0.52	+14.4	+61	+1.9	+8.7
Calgary	2010–2019	+5.29	+0.59	+20.8	+90	+2.2	+10.0
York Region	2010–2019	+44.25	+4.92	+31.7	+89	+3.1	+9.9
Edmonton	2010–2019	+31.75	+3.53	+32.9	+112	+3.2	+12.5
Ottawa	2010–2019	+16.97	+1.89	+20.2	+58	+2.1	+6.5
Winnipeg	2010–2019	+50.19	+5.58	+31.3	+69	+3.1	+7.7
Vancouver	2010–2019	+55.51	+6.17	+26.0	+71	+2.6	+7.9
Waterloo Region	2018–2019	+16.48	+8.24	+3.0	+5	+3.0	+5.4
Surrey	2015–2019	+17.11	+4.28	+17.2	+25	+4.1	+6.2
Quebec City	2010–2019	+61.79	+6.87	+47.7	+41	+4.7	+4.6
Hamilton	2011–2019	+15.81	+1.98	+13.0	+21	+1.6	+2.6
Halifax	2010–2019	+1.70	+0.19	+11.0	+13	+1.2	+1.4
Laval	2010–2019	+4.40	+0.49	+11.7	+14	+1.6	+1.5
London	2010–2019	+14.16	+1.57	+18.9	+19	+3.4	+3.6
Gatineau	2010–2019	+27.21	+3.02	+22.4	+13	+2.3	+1.5
Saskatoon	2012–2019	+27.79	+3.97	+24.9	+21	+3.2	+3.1
Burnaby	2010–2019	+13.98	+1.55	+19.1	+10	+2.1	+1.1
Longueuil	2010–2019	+9.73	+1.08	+10.1	+11	+1.3	+1.2

Note: All values have been adjusted to 2020 Canadian dollars.