

How Bike Theft Trends in Toronto Have Changed Over Time

And How Cyclists Can Keep Their Bikes Safe

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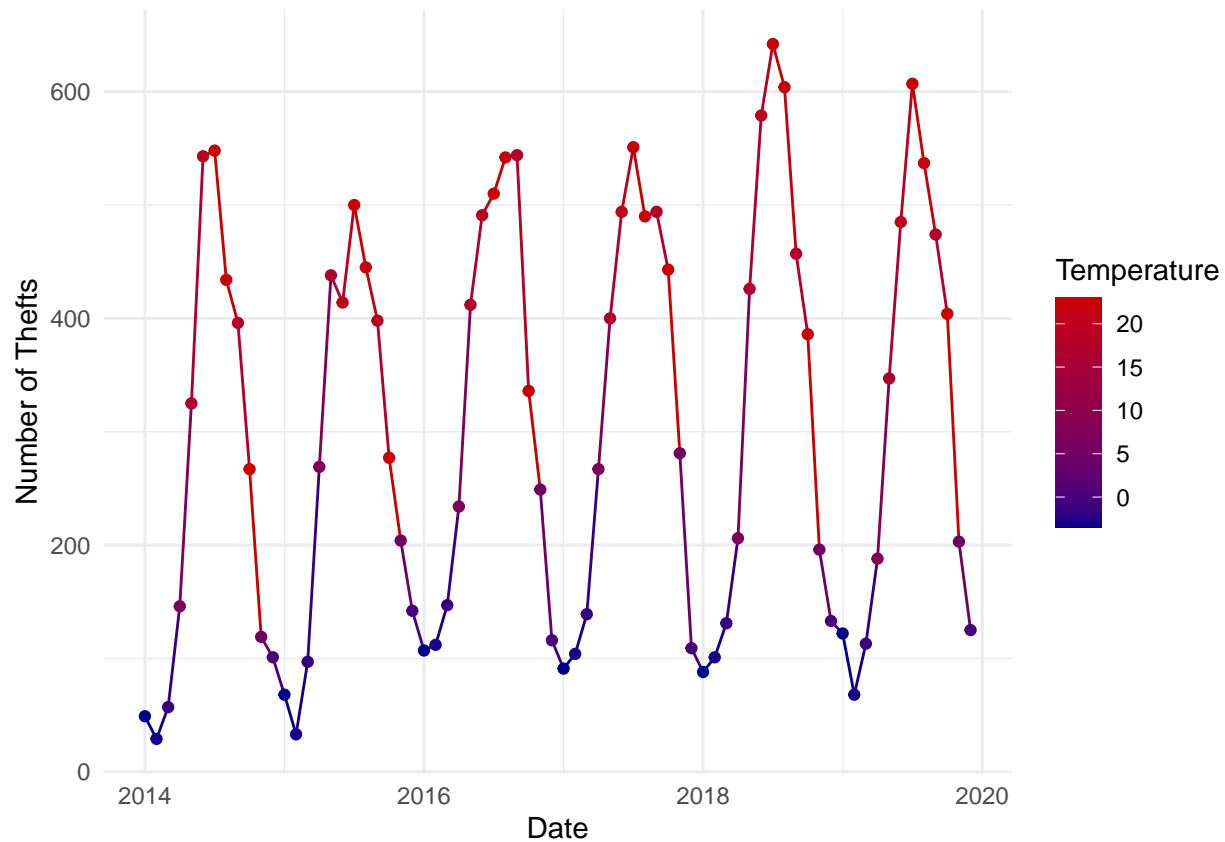
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Introduction

In August of 2020, a group of bike thieves made headlines when they were caught on video attempting to steal several bikes from a gated garage in downtown Toronto using a power saw (Walker). 11 months earlier, a thief was filmed cutting off the lock of a \$1500 bike in Toronto's financial district in broad daylight (Ricci). Unfortunately, videos like these capture only a small proportion of the bike thefts that occur in Toronto every year. According to the bike theft reports released by the Toronto Police Service, over 21,500 bikes have been stolen from 2014 to 2019 (Toronto Police Service). Unfortunately, only around 1% of those bikes have been recovered.

In this article, we will analyze the aforementioned bike theft reports to explore how bike theft trends have changed over time. Cyclists can leverage the patterns we have identified to assess and minimize their risk of becoming a victim of bike theft.

How have bike theft numbers changed over the past few years at the monthly level?

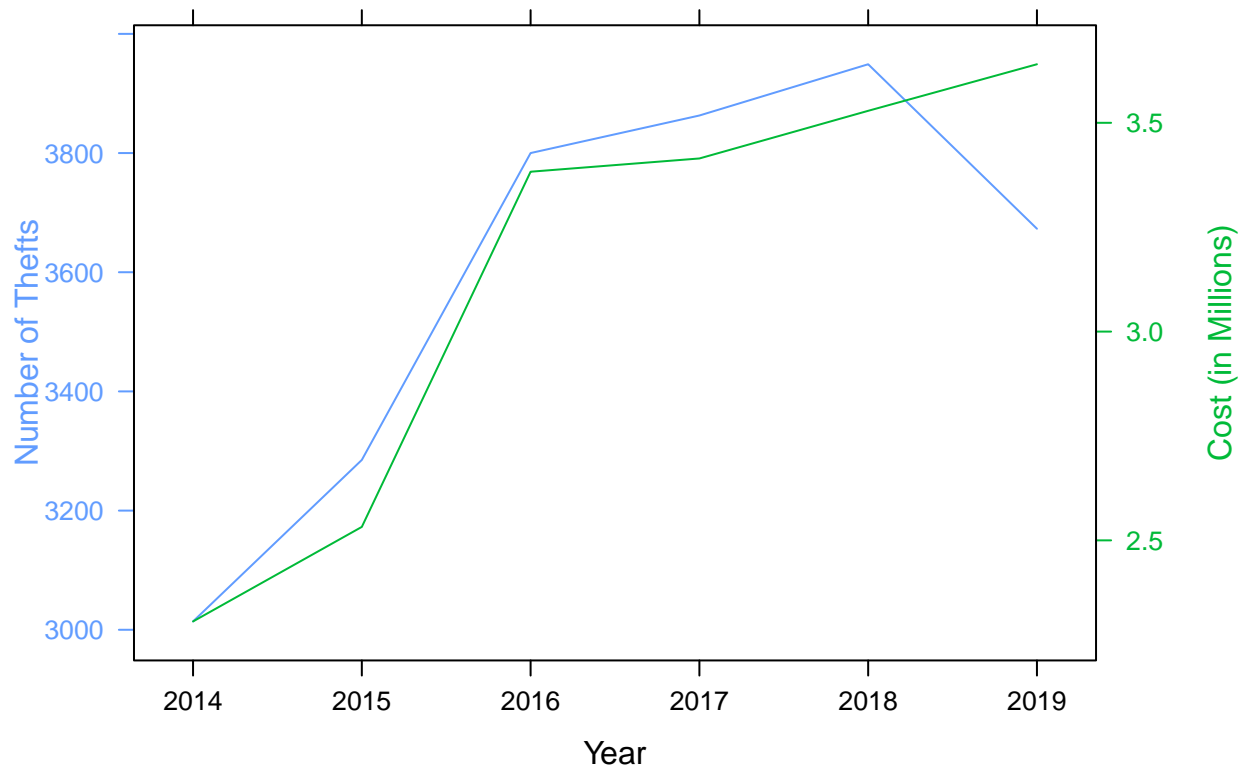


After grouping bike thefts by month, the most noticeable pattern that emerges is the cyclic trend between the seasons and theft counts. In the winter when temperatures often fall below freezing, bike theft counts drop to their lowest counts (generally, falling below 100 thefts). On the other hand, in the summer, bike theft counts reach their peak with typically over 500 thefts in the warmest months of the year.

This seasonal pattern makes sense considering that cyclists are more likely to regularly bike when the weather is warm. This in turn affords bike thieves more opportunities to spot and steal bikes during the summer months compared to the winter months. In fact, our analysis indicates that over 5 times the number of bikes stolen in the winter will be stolen in the summer of that year. Therefore, cyclists should strive to be extra vigilant when storing and locking up their bikes in the summer.

We can also observe that as the years progress, the number of thefts appear to increase during both the summer and winter months. Therefore, we'd like to determine how bike thefts numbers in Toronto have changed over time when weather isn't a factor.

How have bike theft numbers changed at the yearly level?

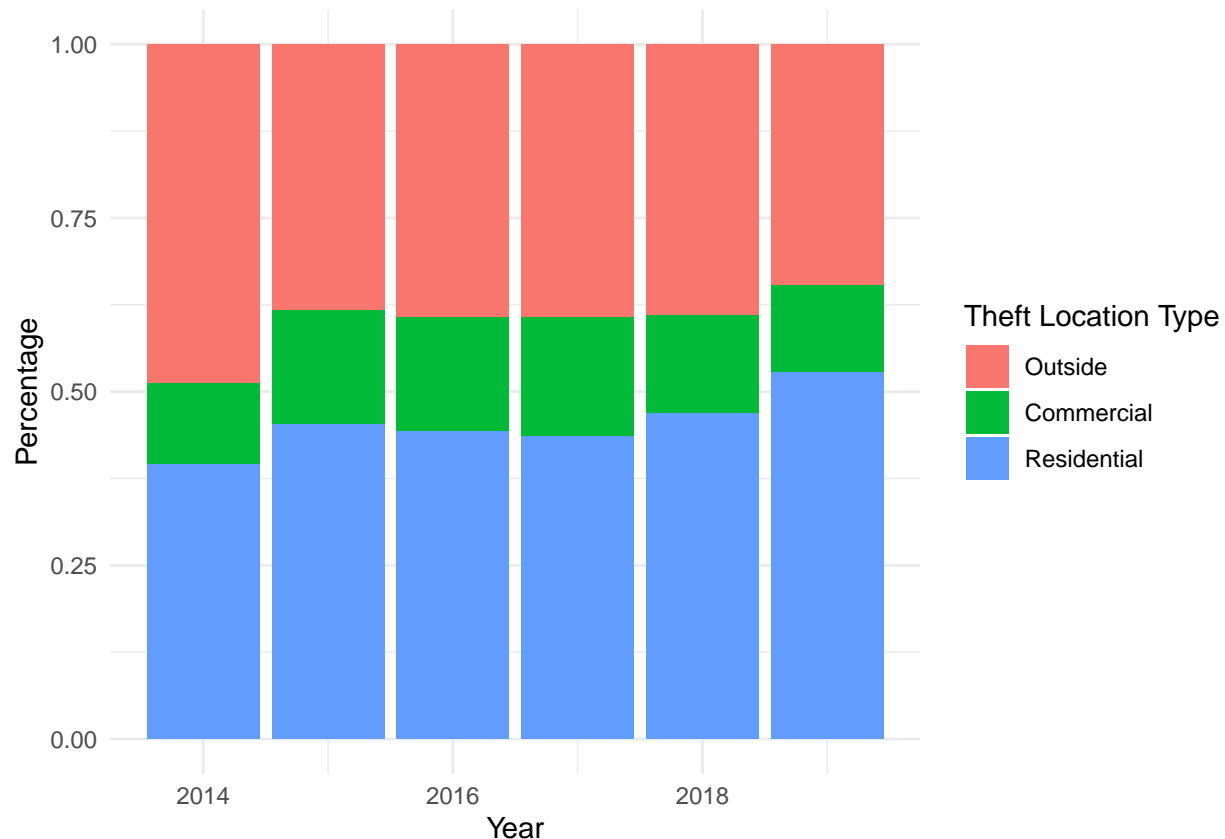


By aggregating bike theft counts over the course of each year (displayed in blue), we can focus on how the frequency of this crime has changed since 2014 ignoring seasonal factors. From our visualization, we notice that the number of bike thefts has steadily increased for each year between 2014 and 2018. The largest increase occurred between 2015 and 2016 which saw 15% jump in stolen bikes. However, this trend was broken in 2019 which saw a decrease in the number of bikes thefts.

Interestingly, although the number of bike thefts decreased in 2019, the profit (in green) made by bike thieves did not. In fact, although the number of bike thefts decreased by a count of 300 between 2018 and 2019, the cost of the bikes stolen in 2019 totaled over \$100,000 more than the cost of the bikes stolen in 2018. This indicates that bike thieves have become more discerning about the cost and potential resale value of the bikes they steal. Therefore, amateur cyclists are advised to avoid purchasing extravagant bicycles because they may be easily targeted by bike thieves.

Considering that bike theft counts have generally increased over time, we'd like to determine the safest place for cyclists to keep their bikes... by identifying where bikes have been usually stolen from over the past few years.

How have bike theft location types changed over time?

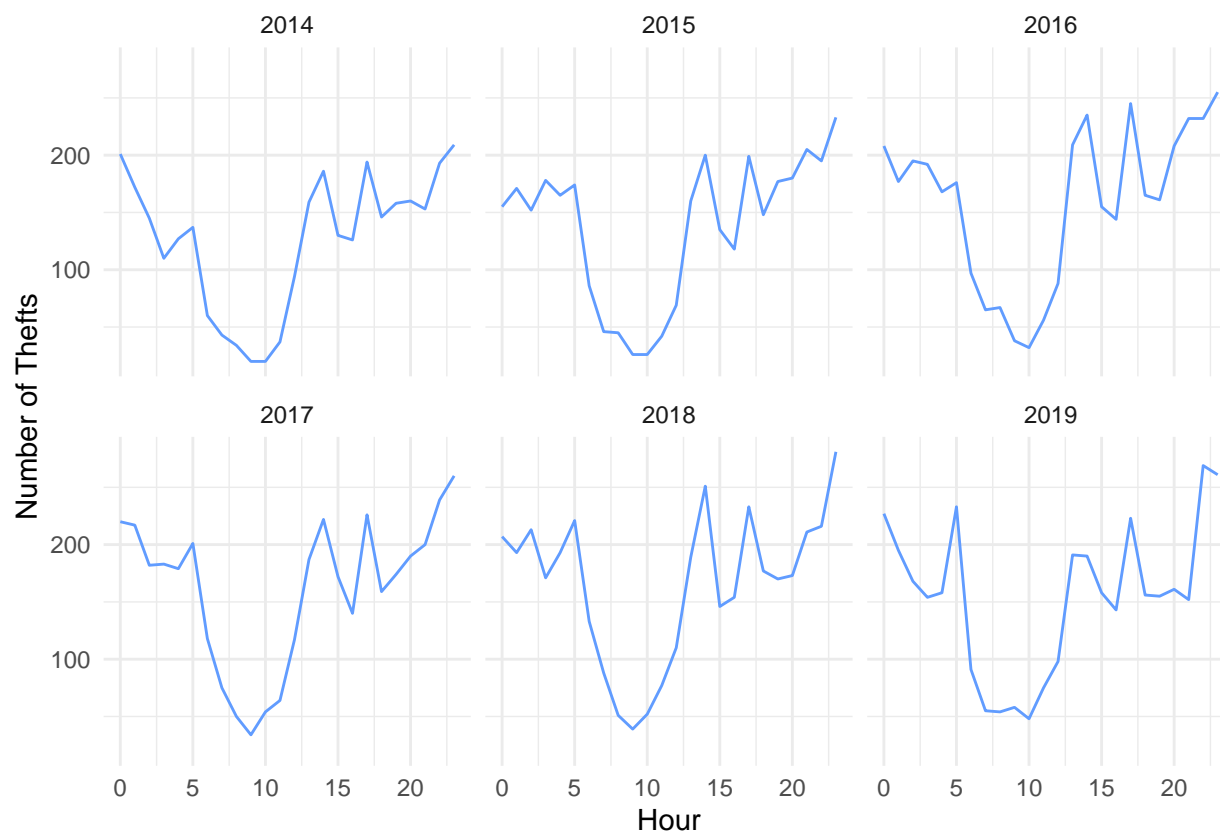


Two main patterns stand out when we look at the change in theft location type over time: the percentage of thefts occurring at a cyclist's place of residence has increased over time while the percentage of thefts occurring outside has decreased over time. More specifically, the percentage of thefts occurring outside has decreased from 49% to 35% while the percentage of thefts occurring at a residence has increased from 39% to 52%. Therefore, although a plurality of thefts took place outside in 2014, a majority of thefts now take place at an apartment or house now.

We can speculate that due to a more vigilant public, over time thieves find it increasingly difficult to steal bikes in broad daylight. For example, sawing open an expensive bike lock is a lot more suspicious than discreetly picking open a cheap lock. Therefore, thieves seem to have shifted tactics and are now targeting residential areas where they are less likely to be caught. Therefore, it looks like cyclists should consider beefing up their home security, perhaps taking advantage of motion sensor alarms to ward off bike thieves.

To determine if our speculation is correct, let's find the time of day when bike thefts typically occur. If the majority of bike thefts occur during the night, when cyclists have stored their bikes at home, our hypothesis would be supported.

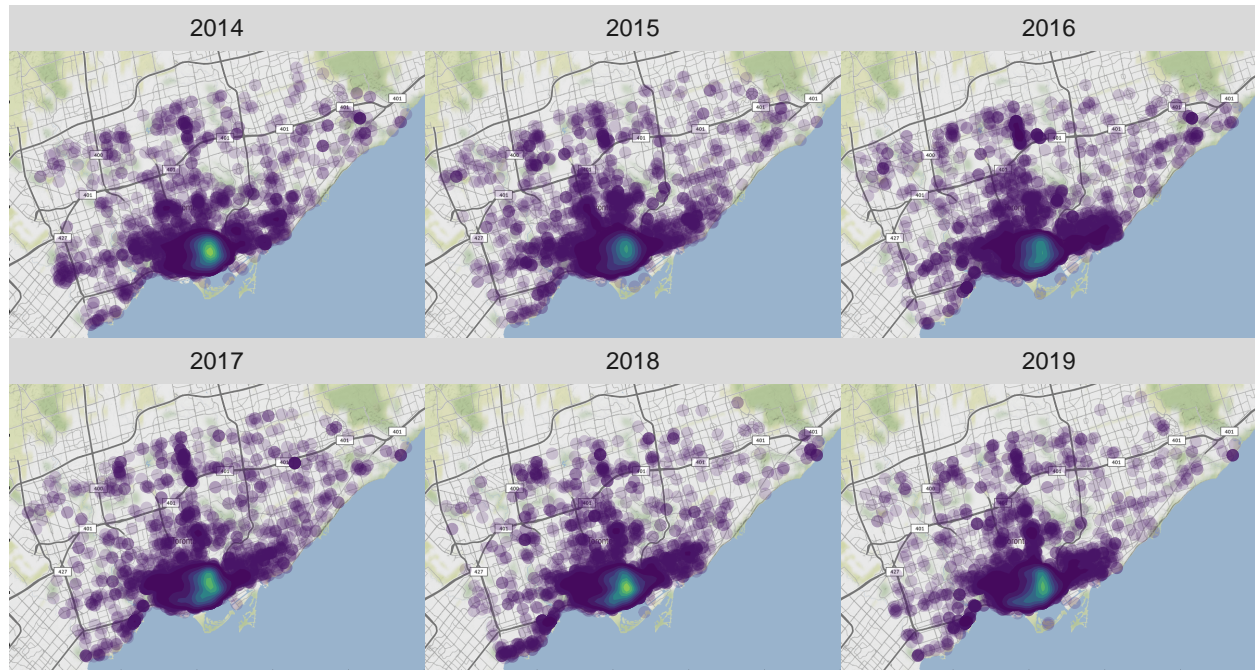
At what time during the day do bike thefts typically occur?



Overall, it appears that for every year, there is a consistent bike theft pattern that changes depending on the time of day. That is, the number of bike thefts generally starts fairly high after midnight, dips to almost 0 during the morning commute, rises after cyclists park their bikes at work, and dips again during the lunch hour. Then, the number rises again after lunch, dips again during the commute home, and rises again as the night grows later. Furthermore, as the years pass, the number of thefts in the evening (when bikes are stored “safely” at home) has clearly increased. This supports our hypothesis that over time, bike thieves have focused their attention on targeting residential areas after dark. This adds credibility to our suggestion of heightening home security systems to prevent bike thefts in residential areas.

Now that we understand that a majority of bike thefts occur in residential areas, let’s determine if there are locations in Toronto where bike thefts are concentrated.

Where in Toronto do the majority of bike thefts occur?



This visualization shows the density of bike thefts across the city of Toronto. We can observe that the frequency of bike thefts is perpetually dense in the downtown area, especially around the Waterfront Communities neighbourhood. Furthermore, a dense string of bike thefts along Yonge Street can be observed every year as well. Bike thefts in the more suburban areas of Toronto are fairly uniformly scattered. It appears that these trends have been consistent for the past few years and likely will continue to hold true in the future.

This finding is likely a result of the increased business activity and increased population density in downtown Toronto. Because there are more people riding bikes into the downtown area as well as more people living in the downtown area (and thus storing their bikes after dark in the downtown area), it is not too surprising that there are more bike thefts there compared to the rest of Toronto. The correlation between a higher population density in downtown Toronto with a higher density of bike thefts ties in nicely with our visualization of bike theft location types where we observed an increase in the percentage of residential bike thefts.

These density plots of the location of bike thefts capture high risk areas well. Cyclists commuting or living in these hotspots are advised to take extra precautions when locking or storing their bikes, as the rate of bike theft is significantly higher in those areas.

Summary

By visualizing the dataset of bike theft reports from 2014-2019 released by the Toronto Police Service, we are able to identify a variety of bike theft trends to help cyclists minimize their risk of losing their bike. Unsurprisingly, bike theft trends subscribe to a seasonal schedule with more thefts occurring in the warmer

summer months compared to the colder winter months. Unfortunately, the cost of stolen bikes has steadily increased over the past few years while the number of stolen bikes has almost always increased as well. Although the number of bike thefts has dropped in 2019 compared to 2018, the profit of bike thieves has increased over these two years, indicating that increasingly expensive bikes are being targeted.

Furthermore, we observed that over time, a greater percentage of bike thefts occurred at apartments or houses compared to commercial and outside thefts. Coupled with our visualization of popular bike theft times, it appears that there is an increasing focus on targeting residential areas after dark. This insight is especially relevant for areas of Toronto that have a high population density because these neighbourhoods become the hunting ground of bike thieves after dark.

To keep their bikes safe, we suggest that cyclists be extra vigilant during the summer and when locking or storing their bikes in areas with a high population density. Because of the increase in opportunities to spot and steal bikes, bike theft rates are many times higher during the warmer months and in downtown Toronto compared to the rest of the year and in other parts of Toronto. Additionally, we advise that non-professional cyclists do not purchase overly expensive bicycles because they may be especially targeted by bike thieves who have been stealing increasingly expensive bikes over the past few years. Lastly, due to the increase in residential thefts, we suggest that cyclists purchase strong home security systems for their personal safety and to prevent the theft of their bikes.

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