

Lock It or Lose It: Staying One Pedal Ahead of Bike Theft

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Are you concerned about the security of your bike in Toronto? Navigating the bustling streets safely is only part of the journey; the other crucial aspect is ensuring your bike's safety. For regular cyclists, understanding the nuances of bike security isn't just a necessity—it's fundamental to avoiding mishaps and fostering a community where cyclists can unite against common threats. This sense of community not only enhances individual safety but strengthens collective vigilance. To delve deeper into this issue and unearth actionable insights, examining comprehensive datasets on bike safety becomes imperative. By analyzing bike theft data from the [Toronto Police Service Public Safety Data Portal](#), we aim to uncover insights from the data patterns to guide the development of effective bike protection strategies and, by extension, our freedom to roam Toronto's streets with peace of mind.

How Much Are We Losing to Bike Thieves Each Year?

Focusing on the Annual Losses and Rate of Change on the Apartment Type

First, the location data of stolen bikes is crucial, as it informs riders about secure parking options and supports advocacy for better bike security infrastructure and policies. Our analysis of theft reports identifies a variety of locations, highlighting the need for a focused approach to enhance security in both outdoor and non-outdoor settings. Analysis of the data reveals numerous locations reported in the thefts, across outdoor, semi-outdoor, and indoor settings. In this story, the key difference between outdoor and non-outdoor spaces lies in their management of environmental conditions, impacting the perceived and actual security of parked bicycles. Outdoor areas, easily accessible to anyone, expose parked bikes to higher risks of theft due to the lack of controlled access and surveillance. Conversely, non-outdoor spaces, like indoor parking, which often seem safer due to restricted access and potential monitoring, might suffer from underreporting and an underestimated risk of theft. Interestingly, bikes are often parked indoors for extended periods, which suggests a significant opportunity for enhancing security measures in these non-outdoor spaces. To this end, our focused analysis reveals the top three non-outdoor locations most affected by theft, underscoring the potential for targeted security improvements in these areas.

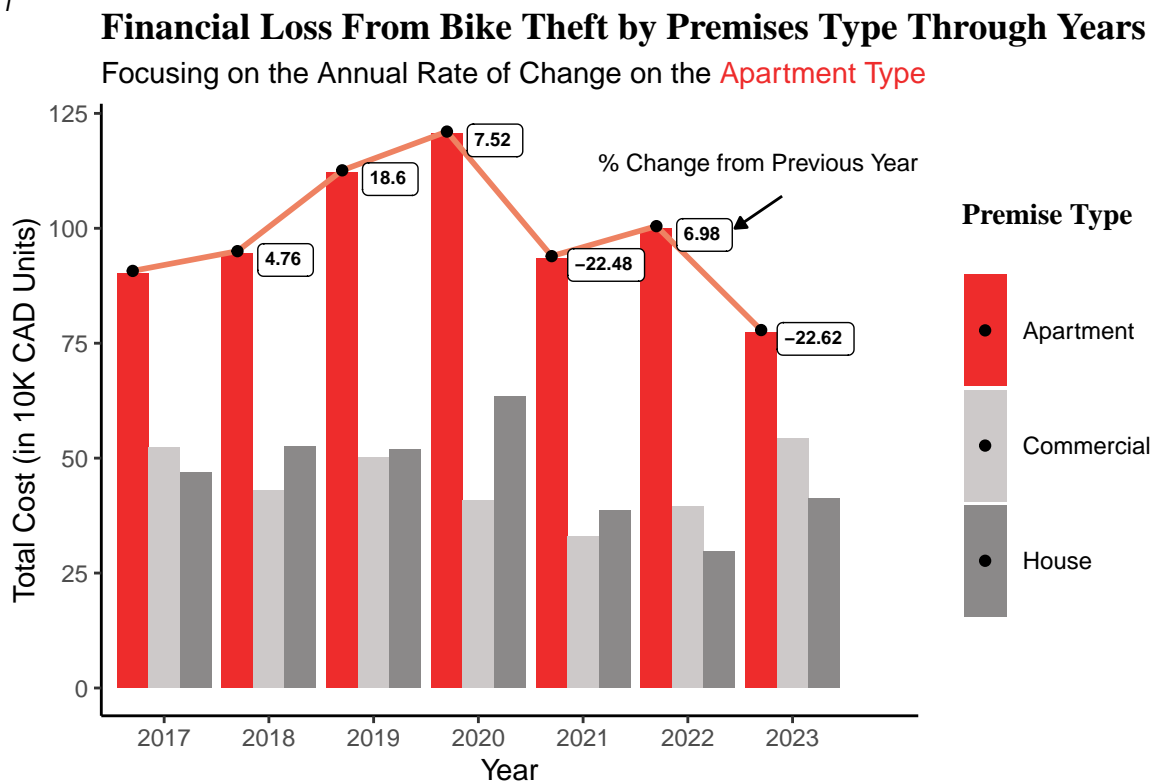


A cyclist is riding through downtown Toronto, with the iconic CN Tower looming in the background. [Credit](#)

The bar chart in Figure 1 provides a detailed analysis of the financial loss from bike theft across three non-outdoor premises types—apartments, commercial spaces, and houses—highlighting

the stark differences in theft patterns. Apartments consistently incur the highest losses, with amounts ranging from CAD 750,000 to CAD 1,210,000 — up to 25 times the average annual income in Toronto. Losses at apartments increased dramatically and peaked at an 18.6% rise from 2017 to 2018, before experiencing a notable decline of 22.48% in 2021. This decline in apartment bike thefts might correlate with increased home occupancy due to pandemic restrictions, reducing theft opportunities. The trend continues downward in 2023, suggesting a sustained change, possibly due to improved security or altered theft reporting habits. In contrast, commercial and house premises experience minor fluctuations in bike theft financial losses, indicating stability and significantly lower theft rates compared to apartments. It prompts a critical focus on apartments as highlighted in red on the plot, where perceived security from restricted access may paradoxically contribute to the neglect of individual bike safety measures. This false sense of security, combined with the observed financial loss figures—significantly higher than those for commercial or house types—warrants closer scrutiny and targeted theft prevention strategies for cyclists, particularly apartment dwellers. However, though the bar chart effectively highlights significant bike theft losses, particularly in apartments, it glosses over specifics for commercial and residential types and omits detailed loss figures. This being said, a finer geographical analysis would enhance the current broad categorization, offering clearer insights for targeted theft prevention measures. Adding detailed location data and financial loss breakdowns by premises type could substantially improve the analysis.

Fig. 1

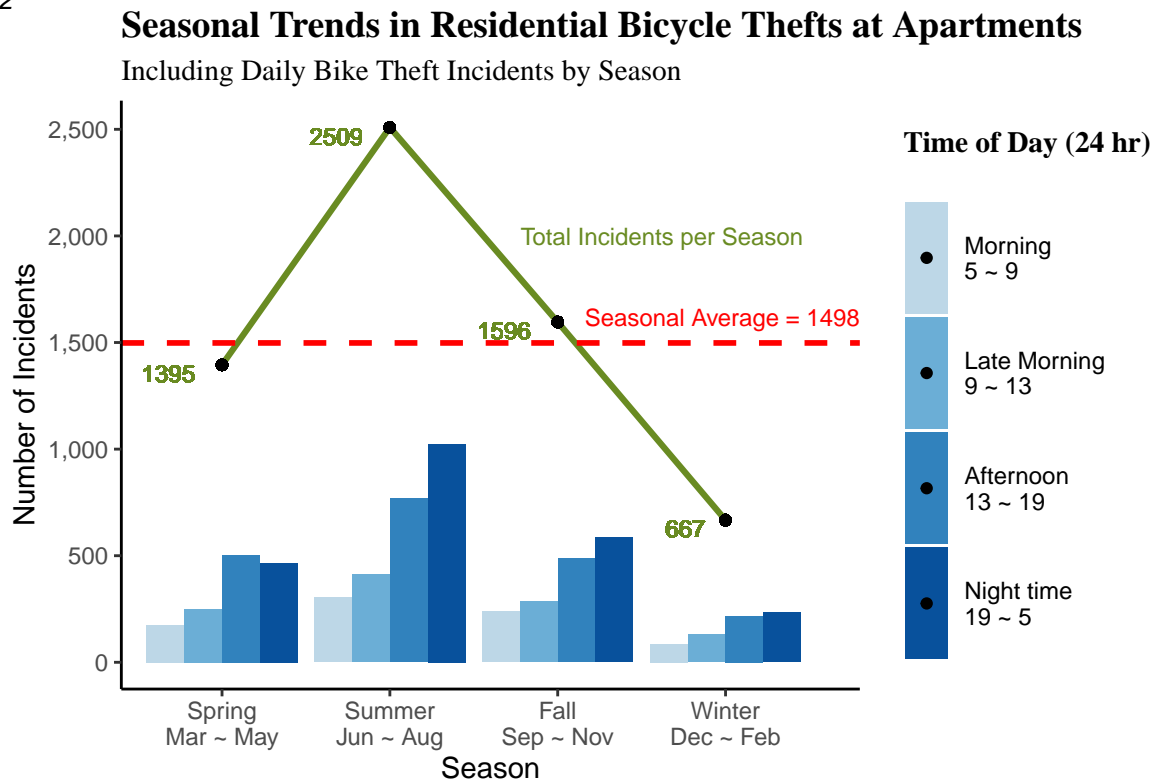


When Are Your Bikes Most at Risk?

Including Seasonal Trends and Daily Comparisons of Apartment Bike Theft Incidents

Exploring bike theft patterns in the top three non-outdoor locations, particularly in apartment settings, underscores the need to investigate intricate temporal trends not obvious from year-over-year comparisons. Analyzing time-specific data—covering both daily and seasonal variations—helps pinpoint peak theft times, facilitating precise intervention by bike owners and external agencies alike. This approach recognizes the significant impact of human behavioural patterns, which fluctuate widely over different times of the day and seasons, on the susceptibility of bikes to theft, which introduces us to the second graph.

Fig. 2



Data Source: <https://data.torontopolice.on.ca/pages/bicycle-thefts>

Figure 2 presents a bar chart with dual dimensions: seasonal variation and time of day, across four seasons, further divided into four daily periods. The chart categorizes the four seasons, each subdivided into four daily intervals of bike theft incidents along the x-axis. This very grouping of time and deliberate visual arrangement are designed to reveal the intricacies of temporal patterns while preserving an overarching temporal view, with additional employment of colour intensity on the bar to encode the time of the day, with darker tones for later hours, enhancing the chart's clarity on when thefts occur. This approach effectively reveals a trend of increasing bike theft from morning to night, peaking at night. This suggests bikes left unsecured overnight are at the highest risk, possibly due to lower pedestrian traffic and reduced visibility. Afternoon incidents may occur as bikes are left unattended when residents are away for work, whereas morning incidents coincide with heightened bike use, reducing theft opportunities. In addition, the line graph set at

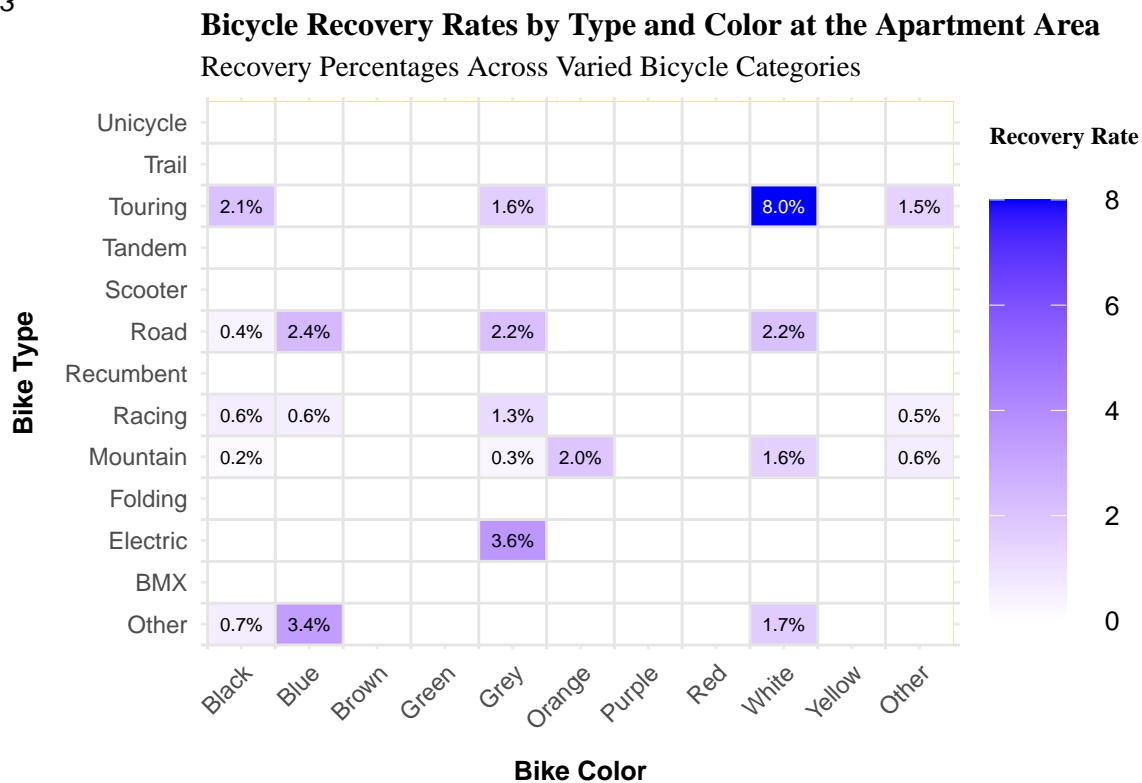
the top highlights seasonal theft trends, showing a summer peak with 2,509 reported thefts, well above the seasonal average of 1,498 incidents. Autumn sees a slight decrease to 1,596 incidents, but is still above average, while spring and winter fall below, with winter at 667 incidents—the lowest. The contrast between summer and winter suggests warmer weather increases bike usage and exposure to theft, whereas colder weather likely leads to more bikes being secured indoors, reducing theft risks. Upon closer inspection of the temporal categorization, the visual analysis methodically segments bike theft incidents at apartments by season and daily intervals, yet the division into daily intervals—while reflective of typical daily activities—may not uniformly represent the data, potentially masking subtler trends within each period. This could be remedied by a finer temporal resolution that could provide a more precise identification of peak theft times.

Which Stolen Bikes Find Their Way Home?

Bicycle Recovery Rates Across Varied Types and Colors at the Apartment Area

Indeed, the analysis of temporal factors underscores the critical need for cyclists, particularly those living in apartments, to exercise increased vigilance and implement strong bike security measures, especially during nighttime and the summer months. This emphasis on time and setting naturally extends the inquiry to the characteristics of the bikes themselves and their influence on recovery rates. Understanding which features of a bike correlate with higher or lower recovery rates can provide essential insights for owners on enhancing security measures or modifying bike features to make them less appealing to thieves or easier to recover. Motivated by this, an investigation into the residential bicycle recovery rates by type and colour was undertaken.

Fig. 3



Data Source: <https://data.torontopolice.on.ca/pages/bicycle-thefts>

Figure three’s heatmap, which delineates bicycle recovery rates by type and color, reveals that recovery percentages vary significantly across different bike categories. This disparity is most pronounced in the 8% recovery rate for white touring bikes, markedly surpassing other combinations of bike type and colour. This outlier suggests that white touring bikes possess unique attributes conducive to their recovery, such as high visibility, distinctive features, or robust community support for reporting thefts and facilitating recovery. However, the hypothesis that colour directly contributes to recovery success faces challenges, notably the absence of recoveries for red or yellow bikes—colours traditionally considered highly visible and thus presumed to draw more attention from thieves. The data showcases distinct variations in recovery rates among bike types, with touring, road, and electric bikes exhibiting higher rates for specific colours. This pattern suggests that the likelihood of recovery is influenced by a bike’s type and, to a more uncertain extent, its colour, given the noted contradictions regarding colour visibility. Despite these insights, it’s crucial to acknowledge that even the highest recovery rates do not exceed 10%, with the second highest falling below 4%. This reality, coupled with the fact that most combinations of bike type and colour result in non-recovery, highlights a sobering truth: the overwhelming majority of stolen bikes are never recovered. Indeed, a closer examination reveals a significant limitation: the oversimplification of colour categories, which may obscure the true granularity of bike colours and lead to potential miscategorization, skewing the analysis. This aggregation could also explain the unexpected absence of recoveries for typically high-visibility colours like red and yellow, questioning the presumed influence of colour on recovery rates. Therefore, a remedy would be to adopt a more granular colour classification system, enhancing the precision of the analysis and potentially clarifying the role of colour visibility in bike theft recoveries.

How Fast Should You Report?

Report Durations (log scale) by Bike Cost and Recovery Status (Missing vs. Recovered)

The analysis brings to light two notable findings: the high recovery rates for white touring and grey electric bikes. The inconsistent patterns associated with colour suggest a more fruitful investigation of bike types, the potential influence of price, especially considering that [touring](#) and [electric](#) bikes typically reside in a higher price bracket compared to other types. Price reflects not just the market value but also the design sophistication of a bike, factors that extend beyond simple colour and type considerations and may affect a bike’s allure to thieves. However, considering the limited success in recovery observed in previous analyses, it becomes pertinent to investigate the efficacy of reporting thefts to the police and the optimal timing for such reports in enhancing the chances of recovery, to rebuild the confidence of bike owners when facing stolen situations. Thus, exploring the interplay between a bike’s price, the timing of theft reporting, and the recovery outcomes for these more expensive bike types offers a compelling next step in our research.

Fig. 4

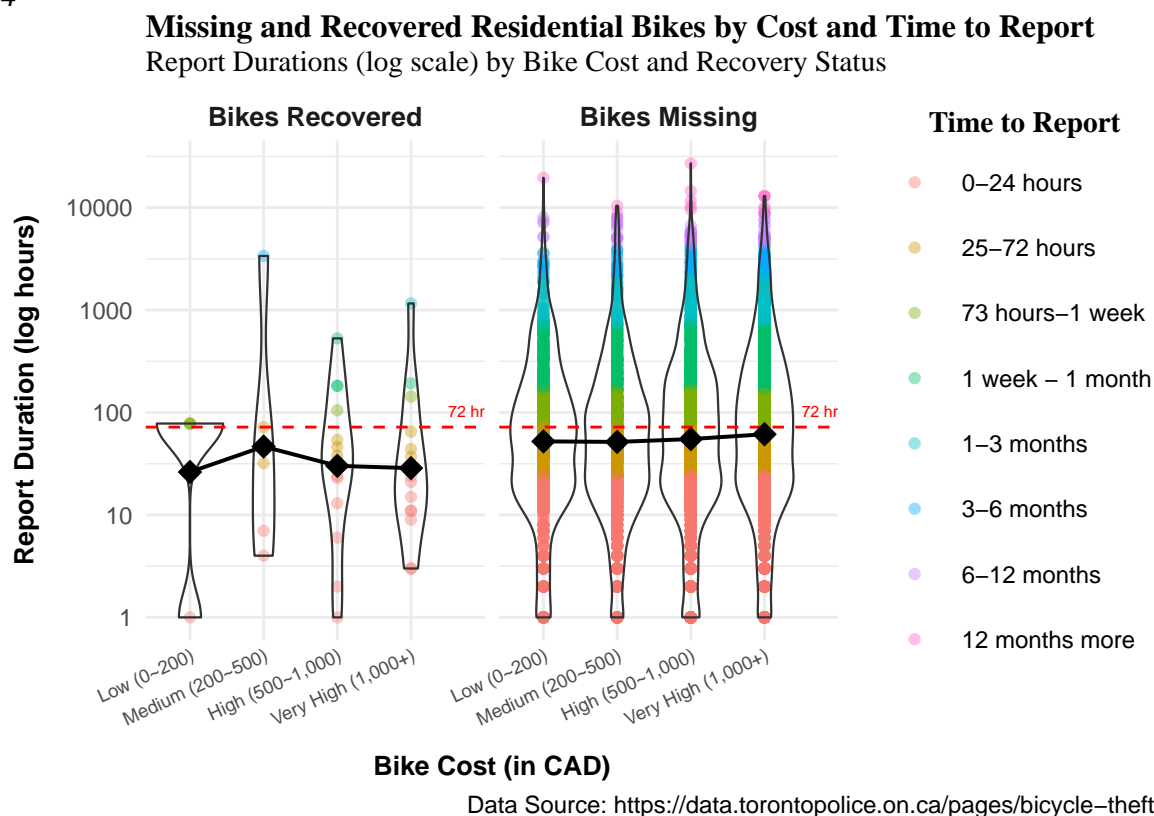


Figure four presents a violin plot with a scatter plot overlay, reinforcing the observation from previous graphs that most bikes remain missing after being reported. The logarithmic scale on the y-axis captures a wide range of reporting times, from immediate to significantly delayed reports post-theft. A notable feature is the 72-hour benchmark, underscoring a critical window for timely reporting, which is essential for recovery. The recovered bikes tend to cluster at the lower end of the report duration scale, indicating that swift reporting is a common factor in successful recovery cases, as illustrated by the broader bases of the violins in these categories. Conversely, the violins for missing bikes demonstrate a dispersed distribution across the report duration scale, suggesting a more erratic reporting timeframe. Interestingly, there is a subtle upward trend in the average report time for unrecovered bikes as the cost increases, defying expectations that higher-value bikes would be reported stolen more quickly. This counterintuitive trend might stem from various factors, including the need for owners to compile comprehensive documentation for high-value bikes, which could delay the reporting process. Indeed, this very analysis might not fully capture the individual and situational factors affecting theft report timings, particularly for high-value bikes, which are reported missing later than expected. To mitigate this, integrating qualitative data through owner surveys or interviews could reveal underlying causes for these reporting delays.

The last visual analysis suggests that despite a limited sample size for recovered bikes, the data yields a valuable insight: promptly reporting a bike as missing significantly enhances the probability of recovery, regardless of the bike's value. Although the likelihood of recovery is limited as suggested by previous analysis, the data indicates that the opportunity for successful retrieval does indeed exist.

Conclusion

In conclusion, navigating bike safety in Toronto is a journey of awareness and action. The data we have explored offers crucial insights for cyclists in Toronto, illuminating the risks and offering strategies to safeguard their cherished rides. Our analysis has shed light not only on the seasonal and daily peak times for theft but also on the urgency for timely theft reporting and heightened protection, particularly for apartment dwellers. With this valuable knowledge in hand, cyclists can navigate with increased confidence, take proactive measures during high-risk periods, and advocate for improved security in vulnerable areas. Together, we can foster a safer cycling environment and a stronger, more vigilant community in Toronto.