Reducing Bike Theft

Research Report

DNB311 : ID Studio 7 A1

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Abstract

Bike theft affects many people. Encouraging cycling is important for the future as cities are becoming more congested and there is a need for more environmentally sustainable modes of transport. This report explores the current state of bike theft in Australia and around the world and how we might reduce theft.

Existing research was analysed revealing statistics on bike theft across the world showing that it is a serious issue. The findings show that bike thefts are on the rise and will become more of an issue as more people are riding bikes. The research also showed that urban planning can help reduce theft by placing bike parking in high foot traffic areas and places with high activity.

2 surveys were conducted revealing that many people use their bikes for commuting. The research also showed that people had little knowledge of what lock they are using or the security that it provides, showing that people may be using the wrong lock for the wrong situation. Surveys showed that peoples bikes were often stolen when there was no lock attached , revealing that people can often become complacent when it comes to bike security.

Analysing all findings from the literature and research revealed some key areas to focus further design on including bike parking that encourages people to be near or walk close by, locks that can deter thieves by sounding an alarm and bike parking with built in locks for those who may forget theirs.

Introduction

Bike theft is an everyday occurrence in cities worldwide. This research report explores the problem of bike theft in the community and how it may be remedied.

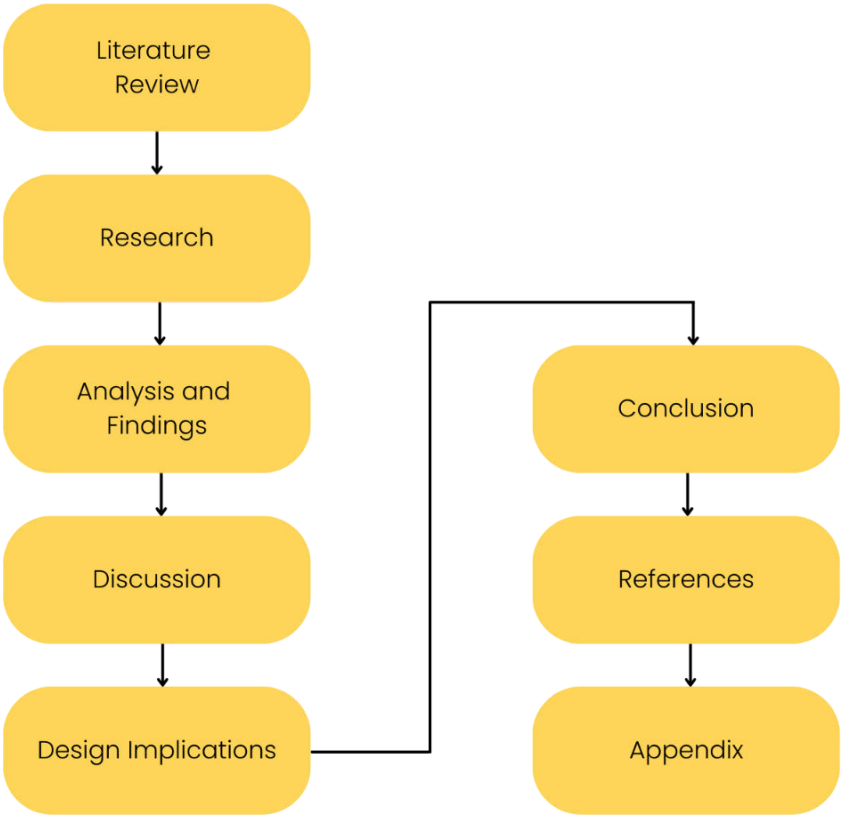
A literature review was conducted to discover what recent research had been carried out in the field. Different topics were reviewed such as the current state of bike theft, showcasing statistics of bike thefts. Why we should encourage cycling, and exploring ways cycling can help reduce pollution and congestion in our cities was also researched. The literature also outlines how urban planning could help in reducing bike theft.

Research methodologies were conducted in the cycling community to better understand the issue and possible interventions. This research was in the form of 2 rounds of surveys. The first to get an overall view of how people use their bikes and interact with bike infrastructure and the second to understand the experience and circumstances around people who had had their bike stolen. Observations were also conducted to understand the local cycling infrastructure such as bike rack locations and types of racks. The observations were also conducted to observe how people interact with the resources available to them especially when there is no bike rack nearby.

An analysis was conducted to show research findings outlining common themes discovered across the various methods. This section also explains the process of how the data was analysed and compared in order to find key trends.

The research and literature was compared in the Discussion, in order to discover potential areas of intervention and to lay out areas that research findings may add knowledge to gaps found during the research phase.

The areas found in the discussion were analysed on how they may be remedies in the form of design interventions. These were implemented into five unique design concepts. The report is summarised by a conclusion, showing findings and suggesting further research and design implementations.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Literature Review

The following section explores the current state of bike theft citing reputable academic and industry research. We explore how bike theft could have an impact on the environment, how urban planning and infrastructure could help prevent theft and case studies on locations where bike theft occurs.

The current state of bike theft.

In the Australian state of Victoria, over 7,000 bikes were stolen in the year 2021. This equates to approximately 19 per day. Current projection predicts that 11,000 bikes per year would be stolen in 2030. The value of the stolen property is approximately $5.8 million. When comparing car and bike theft, bikes are close to the same rate as cars. Bikes are 2 per thousand and cars are 3 per thousand people. The rate of bikes being recovered after being stolen is less than 10% (Bicycle Network, 2022). This data was only available for Victoria however, the figures outlined above show that there is a real impact on the economy and on the Australian population when it comes to bike theft. Bike theft is not limited just to Australia however. Data shows that over 2 million bikes were stolen in North America in 2019 with 1 in 5 thefts being reported (Project 529, 2019). In the UK an estimated 77,000 bikes were stolen in 2021 (Clark, 2023).

How does theft affect the community?

With the above statistics showing the magnitude of bike thefts, how many people does this affect and how could it become worse in the future? Active travel surveys show that around 19% of Australians ride a bike (including e-bikes) every week. Around 60.1% of households in Queensland have at least one working bicycle. Latest findings show an increase in cycling since the COVID-19 pandemic with an increase of 4.4% when compared to pre-pandemic levels. The survey also shows that 1.5% of the population use a personal electric vehicle (e-scooter, e-skateboard, etc.) in a typical week (CWANZ), 2021). With these statistics there appears to be a growing trend in the use of bicycles as a popular mode or transport, which may introduce a rise in bicycle theft in the future.

Why do we need to encourage cycling?

Along with a multitude of physical and mental benefits, cycling has been found to be one of the most sustainable ways to navigate our cities (UN, 2019). Cycling also helps make our cities quieter and cleaner by reducing air and noise pollution as well as easing traffic congestion (Monazzam et al., 2021).

The United Nations has also urged countries to invest portions of their transport budgets to walking and cycling infrastructure. This would assist combating climate change caused by motorised transport (UN, 2016).

There are also large economic benefits to encourage cycling. A Queensland Government survey looked at how bike friendly infrastructure could help local businesses. The results showed that 64% of bike riders stop and visit a business during their ride. 31% of riders visit a business on almost every trip and 49% of people riding were willing to deviate from their typical route to visit a bike friendly business (TMR Queensland, 2023). A large hurdle to encouraging bike use is theft, as studies have shown that the fear of bike theft can discourage bicycle use (Sidebottom et al., 2009).

How can urban planning play a role?

Urban planning is the term used when it comes to designing our cities. When considering what types of bike racks should be used. For example, secure parking may encourage bike parking more than open air racks. However, open-air bike racks are used more when surrounded by streetscape furniture such as bus stops, shops and security cameras. Parking in a high pedestrian traffic area may also provide additional protection against theft and vandalism (Arbis et al., 2015).

The location of bike racks seems rather important with studies showing that bike thefts occur more often in the middle of blocks, compared to near intersections and where more bike racks are installed (Chen et al., 2018). Studies also show that people preferred to park closer to the station entrance to minimise walking (Arbis et al., 2015). This argues a case for lower capacity well placed bike racks.

Key findings show that bike thefts are on the rise and with more people cycling, bike theft will continue to become more of an issue. If more people are to cycle in

the future to reduce congestion in our cities and to adopt a more sustainable means of transportation, bike theft prevention must be mitigated. Careful urban planning can help reduce bike theft by installing a small number of racks in high foot traffic areas and with streetscape furniture surrounding them, like cameras shops and stations.

More research needs to focus on the circumstances surrounding thefts such as where the bike rack was located and how the bike was locked.

Research

To explore more about bike theft and to gain insight into who and how people use bikes 2 different types of research were conducted.

Firstly, surveys were used as an efficient way to gather the knowledge of people in the cycling community. Surveys are a series of questions asked to users to gain specific data on a user group. The surveys were posted online and users were prompted to answer a series of short answer and multiple choice questions.

Two rounds of surveys were conducted to gain a deeper insight of the problem area. The first survey contained questions about the users cycling habits and how and where they most often lock their bike. The survey also asked if the user had difficulty finding places to lock their bike and if they were concerned about theft. The second survey focused solely on bike theft. Asking people who had had their bike stolen about the circumstances surrounding the theft.

Observations were also conducted as a means to gain knowledge of the topic area in the local areas. Observations are a hands off approach used to observe a user group interacting in their natural setting.

Survey 1

Survey 1 aimed to discover what for, where are how often people use their bikes. The survey also asked what type of bike security they used, asking where they parked their bike and what type of lock they used. Finally the survey also asked if they had any trouble finding places to lock their bike and where these places might be. These questions were asked to a random sample of people and attracted 9 responses.

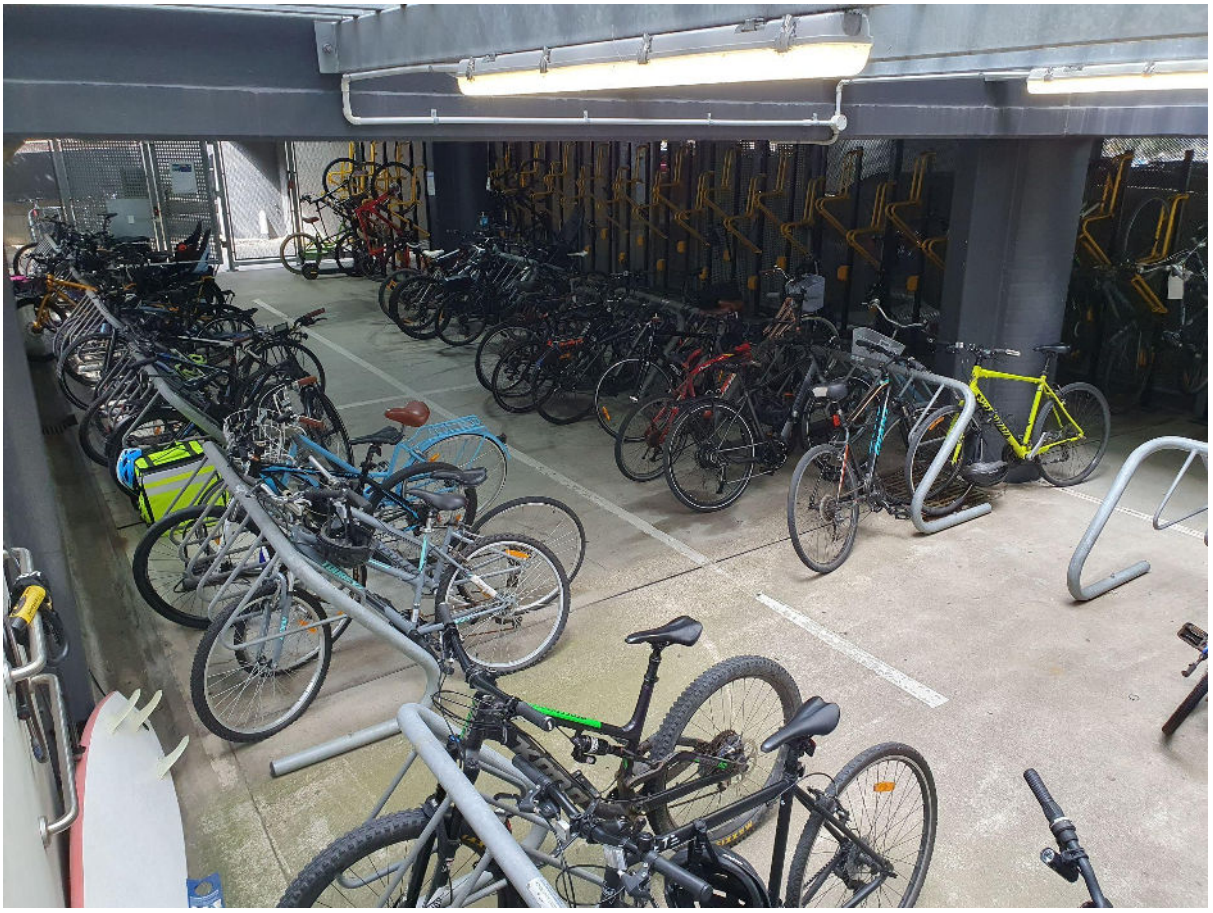
Survey 2

On the back of the first survey, the second survey was designed to focus more on individuals who had experienced or know someone who has had their bike stolen. The participants were asked where their bike was locked when it was stolen along

with what type of lock was fitted to the bike if any. A very important question was also raised during this survey, asking whether the respondent had purchased another bike after theirs was stolen. This survey was also presented to a number of people, attracting a total of 18 respondents.

Observations

The observations were conducted to learn more about the current infrastructure in the area and how everyday people interact with it. Observations looked at the current state of bike racks, locking solutions and utilisation of bike racks at major centres (shops, cafes, unis, public transit stations). Observations also looked at features of bike racks like types of racks, locations, amenities, security, also how people lock their bikes and types of bikes. Any evidence of bike theft, broken locks, damaged racks.



A large secured bike facility located at Queensland University of Technology, Gardens Point.

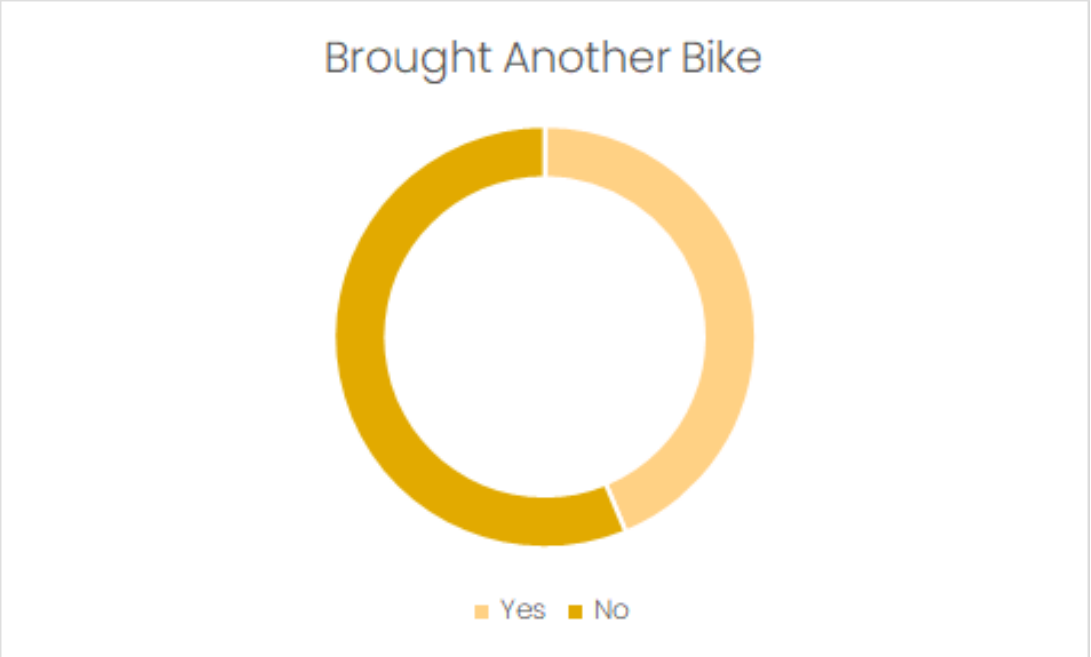
Analysis and Findings

To analyse the survey, which consisted of short answer and multiple choice questions, qualitative and quantitative data analysis tools were used. Most of the survey data used nominal and ordinal approaches for analysis. Sentence analysis was used to identify themes and keywords in short answer responses. For the observations common themes and areas of interest were noted and analysed using quantitative data tools. Affinity diagramming was used to discover recurring themes in the observations.

Surveys findings show that 66.7% of respondents use their bike for commuting and shopping. All respondents lock their bike at the place they commute to. When asked what lock is used and what lock a bike was secured with when stolen, 80% of respondents were using a low quality lock or no lock. In 50% of cases the bike had no lock and 50% had their lock cut. The respondents whose bike was stolen were asked if they purchased another bike after theirs was stolen. Over 56% reported they did not purchase another bike following the theft. When asked what would have prevented the theft, 25% thought a better lock might help and 45% thought higher security bike parking could prevent the theft.

People at university tend to prefer using secure bike parking to open air racks. People at the suburban train station preferred the open air racks to the secure parking. The process of accessing the facility may be unintuitive and this could be a reason why it is under utilised. Open racks in the CBD were heavily used, especially near dedicated bike lanes and restaurants. Where racks were not present people tended to lock their bikes to railing and posts in high foot traffic areas.

The research was successful in revealing how people use bikes and their approach to theft and bike security in general. It seems to be common knowledge that bike theft is a serious problem, however when it comes to locking bikes people can become complacent and forget that it may be a serious threat until they are the victim of a theft themselves.



Above data sets based on survey participants' responses.

Discussion

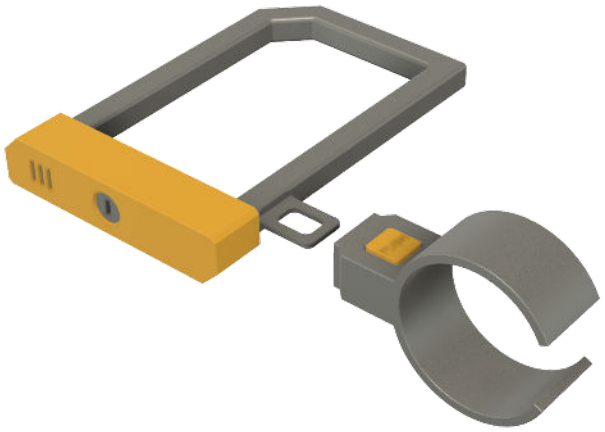
The identified literature outlines some key areas that may reduce bike theft. Concepts theorised in the literature, such as bike parking in high foot traffic areas and near streetscape furniture, was found to be preferred by users in the city identified during observations. Bikes were parked on busy streets and main thoroughfares even when specific bike parking was not available, suggesting that users feel more safe leaving their bike in these places. User research revealed that many users may not consider bike theft to be a concern until they are the victim of the theft themselves. This is shown by users not using a lock or by using a lock that may be easily cut or broken. This research could also explain why bikes are stolen so often as thieves may see them as an easy target, especially if a lock is not present. Secure bike parking was heavily used at universities when compared with open air bike rack, however the inverse was true at a suburban train station. This could be an access issue or the fact that the open air racks may be in a more visible location. The research helps identify missing research on specific circumstances surrounding where and how bikes were stolen, however more data would be useful in better understanding thefts.

Design Implications

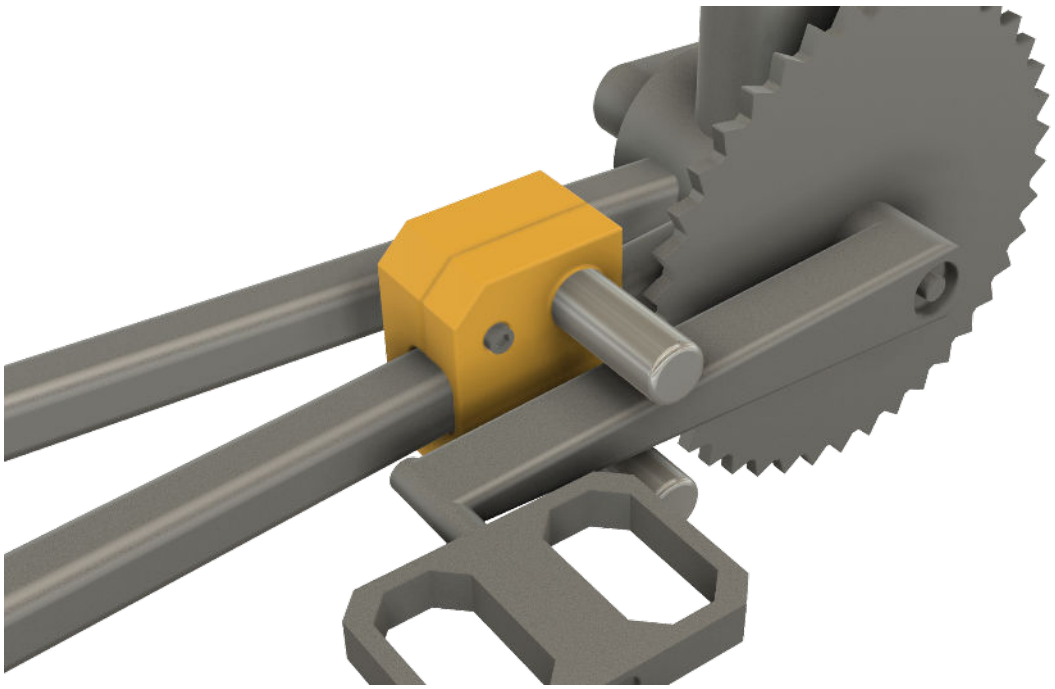
The findings outlined above show some key insights that may inform the design. There are many different approaches that could be taken that could remedy some problems identified. The main sections where designs could be implemented are bike rack infrastructure and bike locking. Research and literature revealed that locking a bike in high traffic areas with many people and interaction points around can deter thieves. Design that encourages people to be near bike racks could help with theft. Research also showed that people also did not use a lock and the problem could be forgetting their lock. Designing a lock that could easily attach to a bike and be less likely to be forgotten could help with this issue. Observations showed that people tended to lock their bike wherever they could if a bike rack was not present. Designing a lock that could be used in more places could help cyclists find places to lock their bike when there is no other option.

Design 1 is modular bike rack street furniture. The bike rack is surrounded by high use items found in public like bins and benches. The user's bike would be constantly surrounded by people deterring thieves and providing a more safe space for bike parking.

Design 2 is a secure all in one bike lock and rack device. The user would attach the locking arm to the top bar of the frame and enter a code on the screen. This would help in situations where users forget their lock or don't want to carry one around.



Design 3 is a secure D lock with smart features. The lock has a hardened shackle and a secure key lock. It also features an anti tamper alarm that would sound when a thief is attempting to move or cut the lock. The attached bike lock mount features a quick release to get the lock on and off the bike without hassle and accommodation for an AirTag device for tracking.



Design 4 is a frame mounted lock that locks the crank arms of the bike in place so a thief cannot ride the or move the bike without carrying it. This is a low security approach best used with other locks.

Design 5 is a lock that can attach to a variety of existing street furniture, including bollards, posts and railings. The lock is fitted to the top tube of the bike frame and the flexible cable is placed around the desired object and placed into the ratchet mechanism in the lock body.

Conclusion

This research explored in the literature the current state of bike theft in Australia, revealing that bike theft is very much an issue, and not only but in other countries as well. The literature also showed how bike thefts will impact more people as bikes are being ridden more around the world. There is also a need to encourage cycling more and it is better for the environment and also reduces pollution and congestion in cities. There are also great economic benefits to biking. Bike infrastructure could play a key role in preventing bike theft as studies show that placement on bike racks reduce theft. Research showed that people tend to be complacent with their locking habits in general and may not always use a lock when leaving their bikes unattended. Analysing the literature and research revealed some key trends that can be applied to design solutions. These are that placing bike parking in high traffic areas may reduce theft, making locking bike easier and more convenient will encourage more users to lock their property.

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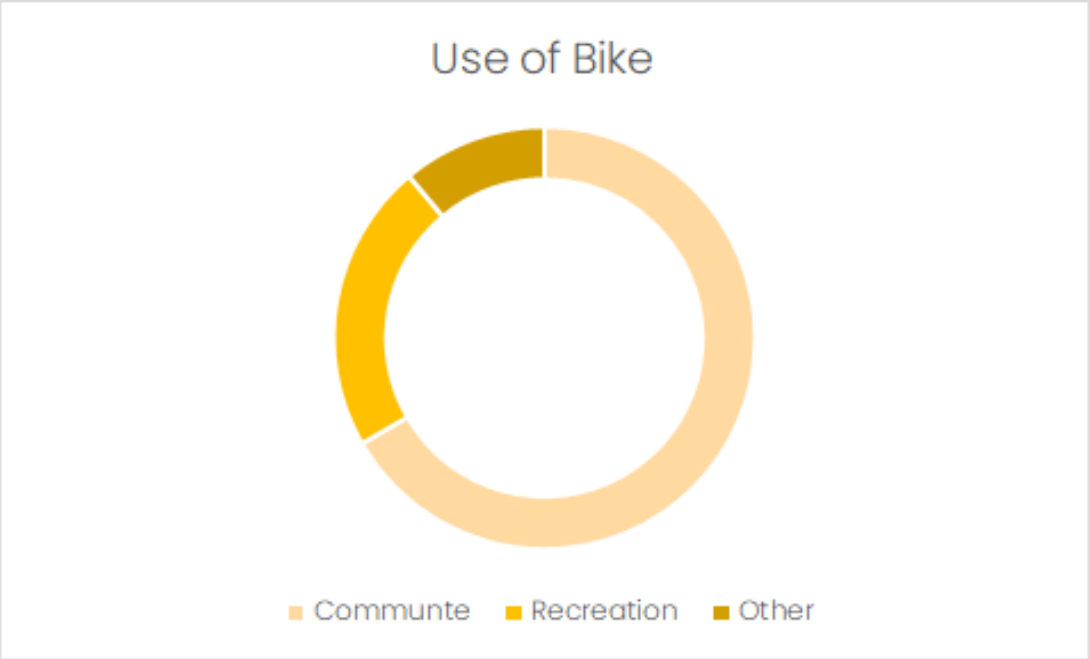
Appendix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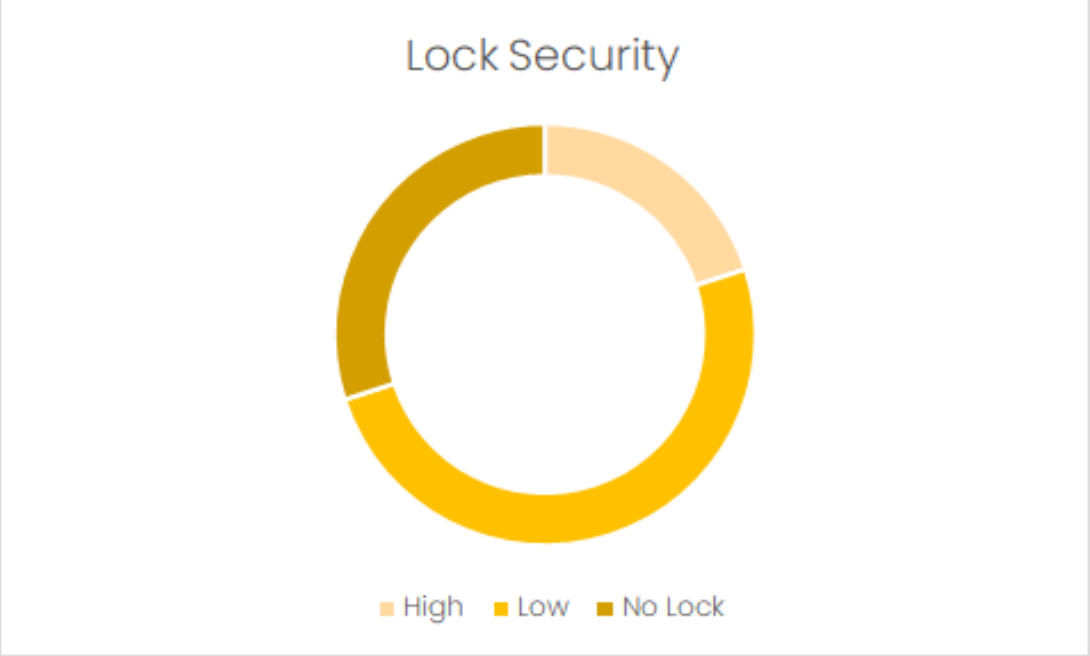
Lock Security
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