Risk Exposure Report

Cyclist Risk Exposure in the Dublin Metropolitan Area

Action 175 (Government Road Safety Strategy)

Research Department

October 2023

Contents

Executive Summary

This paper provides an overview of a project to determine cyclist risk exposure in the Dublin Metropolitan Area, which also encompasses parts of counties Kildare, Meath, and Wicklow.

Exposure data in road safety reflects the amount of activity taking place by a particular road user, typically measured in vehicle kilometres travelled. While it can be challenging to collect good estimates of exposure data, it has great value in assisting with the interpretation of collision and casualty trends. For example, if the number of collisions rise among a particular road user group, it is important to understand to what extent this increase may be expected. If a higher number of kilometres are being travelled by the road user group in question in a particular location, then this may be able to explain the growing number of collisions. A risk exposure measure, once generated, quantifies the risk of a collision occurring for a particular distance travelled. This study aims to generate an estimate of cyclist risk exposure in the Dublin Metropolitan Area for the period 2016-2019. Typically, the number of collisions, casualties, and an estimate of the number of cyclist kilometres travelled within an area can be used to create a robust risk exposure measure for a given road user group.

The project addresses Action 175 of Ireland's Government Road Safety Strategy 2021-2030. The purpose of this action is to *develop a national risk exposure measure and methodology for cyclists by conducting a pilot study in 2022 to collect cyclist travel pattern data to supplement any data already available, with reference to international best practice*. In addition to Action 175, Action 109 involved establishing a Risk Exposure Liaison Group and Technical Subgroup. The Road Safety Authority (RSA) and the National Transport Authority (NTA) worked closely together to develop a suitable methodology to address Action 175, and the other members of the Subgroup were also involved in this process.

The key objective of the project was to develop a methodology for a risk exposure measure for cyclists and apply this to the available road traffic collision (RTC) data, to further our understanding of the road safety risk for cyclists. Results from the project would then be published and would allow for international comparison.

Data was readily available for the years 2016 to 2019 in the two key methodological inputs that were used, namely cyclist travel pattern data, and collision data. Therefore, it was decided to focus the work of this project on these years. The RSA's RTC data was a key input, and cycle collisions by incident type were summarised for the years of interest in the Dublin Metropolitan Area. As can be seen in the following table, the number of minor injury collisions stayed relatively stable over the course of the four years, whereas the number of serious injury collisions were observed to rise sharply in this time period. An average of three fatal injury collisions occurred each year.

Table 1 – Cycle Collisions by Incident Type

Year	Minor	Serious	Fatal	Total
2016	506	91	2	599
2017	528	130	4	662
2018	497	158	2	657
2019	514	192	2	708
16-19 Average	**511**	**143**	**3**	**657**

The other key input was the NTA's Regional Modelling System (RMS). This system is made up of five regional models, with good coverage of the major cities in Ireland. The East Regional Model (ERM) was used to develop an **estimate** of the total annual cycle km

travelled in the Dublin Metropolitan Area for the four years. As illustrated in the following table, an incremental increase was observed year-to-year.

Table 2 – Total Annual Cycle KM Travelled, Dublin Metropolitan Area

Year	Total Annual Cycle KM
2016	187,161,300
2017*	189,452,097
2018	191,742,895
2019	194,606,447
16-19 Average	**190,740,684**

The data in the above tables was then used to calculate risk exposure rates for the Dublin Metropolitan Area. The figures in Table 3 are expressed in terms of per billion cycle km travelled. The fatal collision risk exposure rate is influenced by the smaller numbers of such collisions, and the increase in the number of these incidents in 2017 causes the rate to jump sharply from 2016 to 2017. However, the average number of fatal collisions per billion cycle km travelled over the entire time period is 13.

While the minor injury risk exposure rates remain relatively consistent across the four years, the serious injury risk exposure rate increases significantly. This increase has occurred despite the fact that the total annual cycle km travelled in this Area increased in a more gradual and incremental fashion. This suggests that cyclist risk exposure for serious injury collisions in the Dublin Metropolitan Area has increased in the years 2016-2019.

Table 3 – Risk Exposure Rate for the Dublin Metropolitan Area, expressed in terms of per billion cycle km travelled.

Year	Minor	Serious	Fatal
2016	2,704	486	11
2017	2,787	686	21
2018	2,592	824	10
2019	2,641	986	10
16-19 Average	**2,681**	**746**	**13**

These findings indicate that the risk of a fatal injury collision involving a cyclist in the Dublin Metropolitan Area is lowest across the three incident types, while the risk of a minor injury collision involving a cyclist is highest. For instance, taking 2016 as an example, there were an estimated 2,704 minor injury collisions for every billion km travelled by cyclists in the Dublin Metropolitan Area, while these estimates drop to 486 and 11 for serious and fatal injury collisions respectively.

Future research will seek to expand upon the work that has been carried out as part of this project. For instance, the development of a national cyclist risk exposure measure could be considered, in addition to exploring the possibility of quantifying risk exposure across other road user groups, such as pedestrians and motorcyclists. The work that has been undertaken as part of this project is significant in the context of the Strategy, and it marks the first attempt to measure the exposure to risk of cyclists in Ireland. The finding in relation to cyclist risk exposure for serious injury collisions is important and may inform the development of evidence-based interventions for cyclists.

It must also be acknowledged that there are limitations associated with the datasets used in this study, and these are described in more detail in the report.

Introduction

Government Road Safety Strategy 2021-2030

The Government Road Safety Strategy 2021-2030 was officially launched in December 2021, and it outlines Ireland's road safety priorities for the decade ahead, as we continue our journey towards Vision Zero (i.e., zero deaths and zero serious injuries on Irish roads by 2050). The Strategy will be delivered in three phases, and an Action Plan has been developed for the first phase (2021-2024). Two actions on the subject of risk exposure were developed and have been included in the Phase 1 Action Plan.

109.	Establish a risk exposure liaison group to collaborate with stakeholders to enhance risk exposure data available.	Road Safety Authority	Director - Road Safety, Research & Driver Education	Annual	AGS, DoT, CSO, CCMA / LA's, NTA, TII, HSA
175.	Develop a national risk exposure measure and methodology for cyclists by conducting a pilot study in 2022 to collect cyclist travel pattern data to supplement any data already available, with reference to international best practice.	Road Safety Authority	Director - Road Safety, Research & Driver Education	Q4 2022	AGS, CSO, CCMA / LA's, DoT, NTA, TII

The Risk Exposure Liaison Group, established in the context of Action 109, determined that a Subgroup of experts should be established to develop a national risk exposure measure for cyclists (Action 175). The RSA chaired this Subgroup, starting in June 2022. It was initially foreseen that a pilot study would need to be conducted as part of Action 175. However, over the course of several engagements with the Subgroup, it was determined that a more efficient approach could be taken by using existing datasets.

Exposure data are used in order to obtain risk exposure rates, which are defined as the probability of being involved (or injured) in an RTC and are calculated as the number of collisions (or casualties) divided by the amount of exposure (estimate of person/vehicle kilometres travelled) of a road user population over time. Risk figures may be used for different purposes, such as international comparison, monitoring road safety problems, in-depth road collision analyses and research, road and traffic operations analyses, epidemiological analyses, etc. However, their main use concerns the comparison of safety performance across different road user groups, populations or countries.

While the RSA publishes data on the number of cyclists killed and injured in RTCs on an annual basis, using official statistics provided by An Garda Siochana (AGS), to-date the RSA has not had access to information on cyclist vehicle kilometres travelled to put these collision statistics into context. While the number of cyclists seriously injured in RTCs in police data has grown since 2011, it had not been possible to determine if such a change could be explained by increases in cycling popularity. This project aimed to calculate a risk exposure measure for cyclists in the Dublin Metropolitan Area, thereby determining if a change in injury rates could be explained by increases in cycling km travelled.

Long-term cyclist injury trends at both a national level and for Dublin were reviewed, using the RSA's RTC data. By examining the period from 2011-2021, it was determined that over 50% of cyclists killed and seriously injured in Ireland occurred in Dublin. This was a compelling statistic and was one of the reasons why the project focus was placed on this

geographical region. The tables and graphs in the following sections capture these long-term trends. In addition to this, the NTA's national transport model (i.e., the RMS) contains robust data on cyclist vehicle kilometres travelled in Dublin to facilitate the risk exposure analysis required.

It must be acknowledged that it is not possible to generate 'perfect' data for all cyclist trips, and the duration of these trips in the Dublin Metropolitan Area to develop a precise measure of cyclist km travelled. Therefore, we must rely on **estimates** from available models, in this case the NTA ERM. In interpreting the results of the statistical analysis conducted to generate cyclist risk exposure measures in this report, it is important to emphasise that the calculation of cyclist kilometres travelled in this study, is based on estimates, rather than exact numbers.

Long-term trends – National

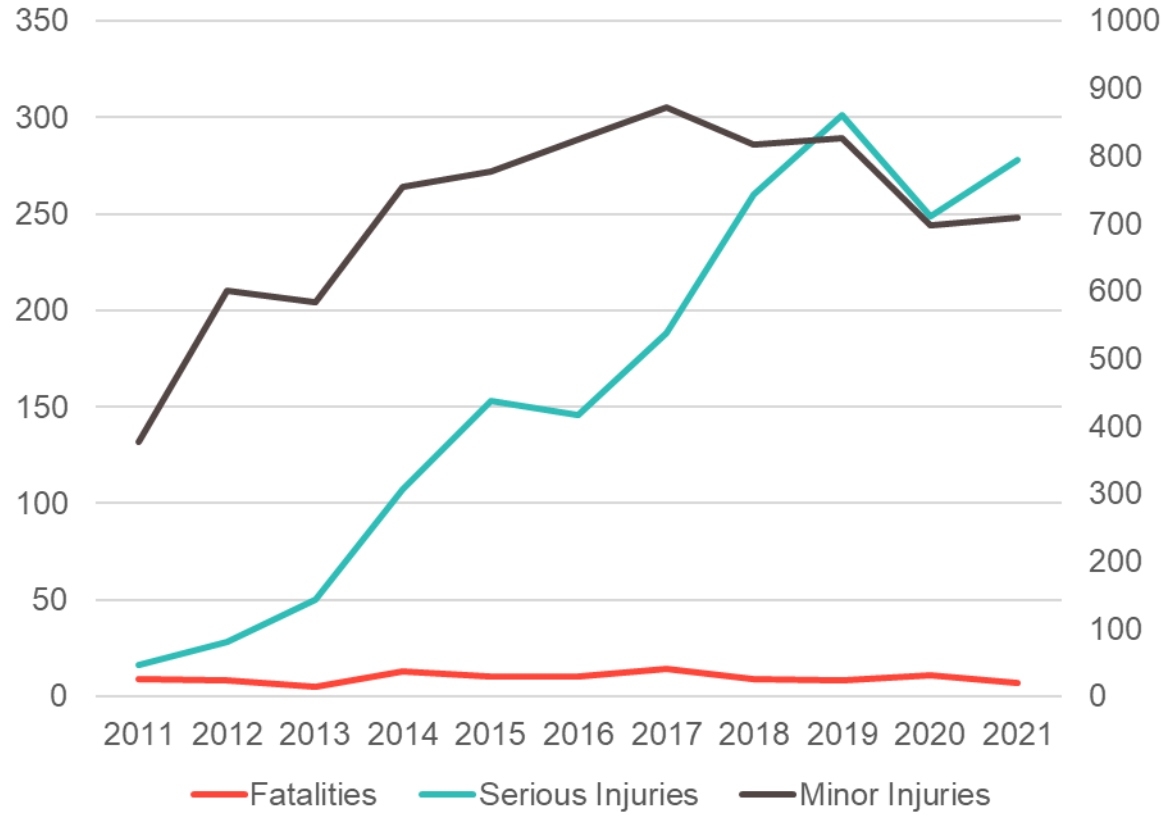
The data presented in Table 4 and Figure 1 were extracted from the RSA's RTC database in May 2022, and this was presented to the Risk Exposure Liaison Group during the first meeting.

Table 4 - National Cyclist Fatalities and Injuries, 2011-2021

	Fatalities	Serious Injuries	Minor Injuries
2011	9	16	376
2012	8	28	601
2013	5	50	584
2014	13	107	755
2015	10	153	778
2016	10	146	825
2017	14	188	872
*2018	9	260	817
*2019	8	301	826
*2020	11	249	697
*2021	7	278	708
Total	**104**	**1776**	**7839**

It must be noted that the increase observed in serious injury collision and casualty numbers may, in part, be due to a change in the way that the RSA received data from AGS in 2014. However, the impact of such a change on this study is likely to be minimal, especially given the fact that the first year being analysed is two years after the change, and the increase is likely to be multi-faceted.

Figure 1 - National Cyclist Fatalities and Injuries, 2011-2021



Note: Data for the years 2018-2021 are provisional and subject to change.

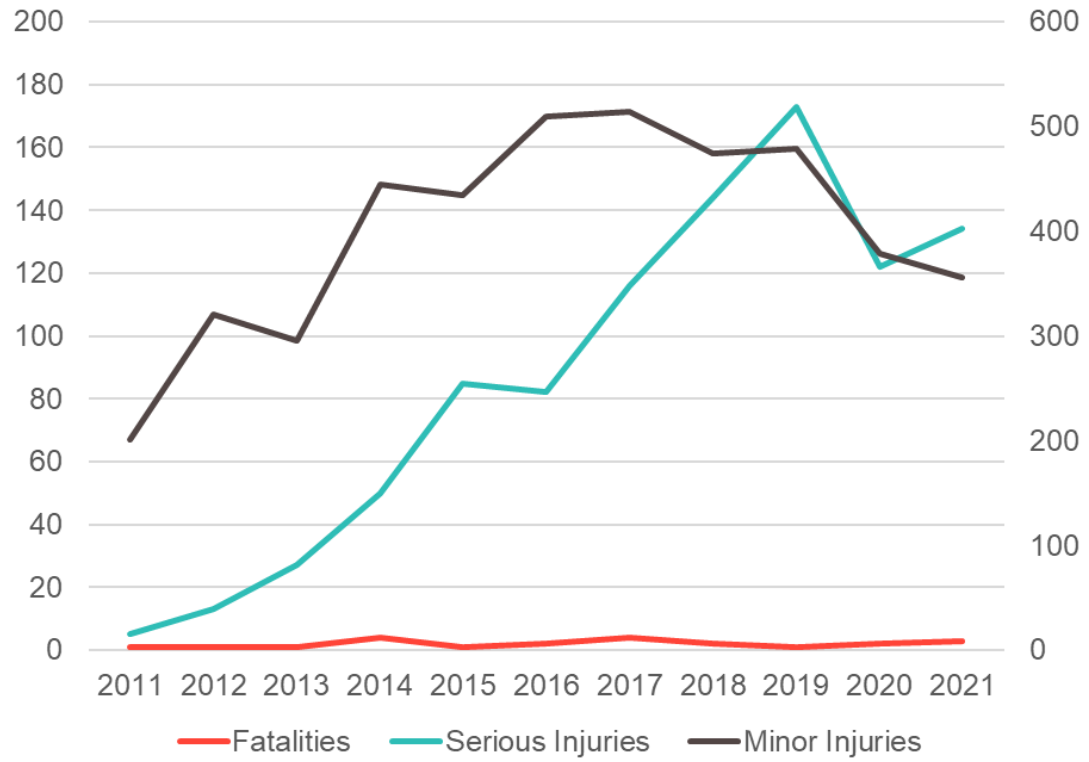
Long-term trends – Dublin

The data presented in Table 5 and Figure 2 were extracted from the RSA's RTC database in May 2022, and this was presented to the Risk Exposure Liaison Group during the first meeting.

Table 5 - Dublin Cyclist Fatalities and Injuries, 2011-2021

	Fatalities	Serious Injuries	Minor Injuries	% KSI
2011	1	5	201	24%
2012	1	13	321	39%
2013	1	27	295	51%
2014	4	50	445	45%
2015	1	85	434	53%
2016	2	82	509	54%
2017	4	116	514	59%
*2018	2	144	474	54%
*2019	1	173	479	56%
*2020	2	122	379	48%
*2021	3	134	356	48%
Total	**22**	**951**	**4407**	**52%**

Figure 2 - Dublin Cyclist Fatalities and Injuries, 2011-2021



Note: Data for the years 2018-2021 are provisional and subject to change.

Other relevant publications

In addition to the analysis conducted on the long-term trends, other relevant national publications were also consulted as part of the work of the Group. These publications included the National Travel Survey 2019, published by the Central Statistics Office (CSO); the National Household Travel Survey (NHTS) 2017, published by the NTA; and the Bike Life Report 2019, produced by Sustrans (in partnership with the NTA).

The CSO's National Transport Survey is a household survey on the travel behaviour of respondents, and it was conducted in the fourth quarter of 2019. This publication includes a chapter dedicated to cycling, where respondents were asked if they take any journeys by bicycle and the frequency. Some of the key findings from the 2019 survey are as follows:

- 15% of over 18s take a journey by bicycle.
- The average distance of a typical journey by bicycle was 9.5km.
- Enjoyment of cycling and keeping fit are the main reasons why people cycle.
- Safer cycling routes would encourage more cycling.

The NTA's NHTS 2017 captured robust data on the travel behaviour of the Irish public throughout the country on a typical weekday and at weekends. It was a nationally representative study of Ireland's travel habits. Data was gathered through two sources – a CAPI administered survey of each household and a 3-day travel diary of each person over 4 years old in that household. In total nearly 6,000 households were surveyed. From these households, over 10,000 diaries were completed, and these diaries captured over 62,000 trips. The following are some of the key findings for cyclists in Dublin City:

- 9% of trips were taken by bicycle.
- 13% of trips taken for the purpose of work or business were done by bicycle.
- 49% of bicycle trips took between 15 to 29 minutes.
- The highest proportion of trips taken by bicycle were made by people aged 18 through to 34.

Bike Life is an assessment of cycling in urban areas across the UK and Ireland, and it reports every two years. The 2019 edition features the first report from Dublin. The information in the report comes from local cycling data, modelling, and an independent, demographically representative survey of more than 1,100 residents (aged 16 or above) from across the Dublin Metropolitan Area, whether they cycled or not. One of the key relevant findings from this study is that a reported cycle injury occurs once every **665,000 kilometres** cycled around the Dublin Metropolitan Area. It must be noted that the methodology used in Bike Life differs from the approach taken in the project being outlined in this paper. As a result, the findings from the two analyses are not directly comparable.

Project Objectives

The Risk Exposure Technical Subgroup was created from the main Group and was comprised of members who held relevant exposure-related data and/or relevant technical expertise. During the meetings of the Subgroup, the project objectives were refined. Ultimately, the main aim of the project was to develop a methodology for a risk exposure measure for cyclists and apply this to the available collision data. The results would then be published in line with the requirements of the Strategy and would also allow for international comparison.

It was decided that the RSA and the NTA would lead on the development and implementation of the methodology, with regular feedback being provided by members of the Subgroup during meetings. The main reason for this was because both organisations held datasets that were highly relevant from the perspective of satisfying the project objectives.

This project focused on the Dublin Metropolitan Area for the years 2016-2019. The study approach involved using the NTA's ERM to estimate the total cycle kilometres within the geographical areas of interest, and also using RTC data from the RSA to calculate cycle collision rates. Both of these datasets contained relevant, high-quality data for the years 2016 to 2019, and it was decided to focus the analysis on these years as a result. In the following section, more details about these data sources will be provided.

Data Sources

NTA Regional Modelling System (RMS)

The NTA's RMS is one of the main sources being used as part of the methodology. This system is comprised of 5 regional models, focused on the travel to work areas of Dublin, Cork, Galway, Limerick and Waterford. The RMS was developed using a wide range of data sources to ensure that it provides the best possible representation of travel demand and patterns throughout Ireland. Data collected includes:

- The National Household Travel Survey
- The GDA Education Survey
- The Airport Travel Survey

Data used includes:

- Public Transport Network Data
- Public Transport Surveys
- Port Passenger Data
- Bus Stop Database
- Traffic Signal Data from Urban Traffic Control Systems
- Journey Time Data
- Over 6,000 traffic counts from NTA, TII, and Local Authorities
- The Geo Directory
- Road Network Data
- MyPlan Land Use Database
- The CSO Census
- CSO HGV Data
- The Valuations Office Parking Data

Typically, the regional model networks include all national, regional and local roads, as well as pedestrian-only and cycle-only links, such as the Sean O'Casey Bridge a pedestrian and cycle bridge close to the Docklands in Dublin. As a result of all of these points, the road/cycle network for the Dublin Metropolitan Area is well represented in the NTA's ERM. A more comprehensive overview of this modelling system will be provided in the methodological section of the report.

RSA RTC Data

The other main source being used as part of the methodology is the RSA's RTC data. The Research Department of the RSA receives record level RTC data from the PULSE database of AGS via electronic transfer. The records received are a subset of the total available records on the PULSE system. Only those records designated as Traffic Collision Fatal, Traffic Collision Serious, Traffic Collision Non-Serious, Traffic Collision Material Damage Only, and Traffic Collision No Injury No Damage are available to the RSA and released to the RSA database. The data is based on collisions reported to AGS that have occurred on a public road.

- **Fatal Collision**: where at least one person is killed as a result of the collision and death occurs within 30 days.
- **Serious Injury Collision**: where there are no deaths, but a person or persons are seriously injured. The definition of "serious injury" is an injury for which the person is detained in hospital as an 'in-patient', or any of the following injuries whether or not detained in hospital: fractures, concussion, internal injuries, crushings, severe cuts and lacerations, severe general shock requiring medical treatment.
- **Minor Injury Collision**: where there are no deaths or serious injuries. The definition of a "minor injury" is an injury of a minor character such as a sprain or bruise.
- **Material Damage Collision**: where no deaths or injuries occur but damage is caused to a vehicle or property.
- **No Injury No Damage Collision**: where no deaths or injuries occur, and no damage is caused to a vehicle or property.

The RSA used internal geographic information system software and a shape file (containing geographic location and associated attribute information) provided by the NTA to identify the following records from the database:

- Injury collisions involving at least one cyclist in the Dublin Metropolitan Area for the years 2016-2019.

- Cyclists involved in injury collisions in the Dublin Metropolitan Area for the years 2016-2019.

More details on this process will be presented in the methodological section of the document. These two datasets were then used to calculate risk exposure rates.

Methodology

Overview

The approach adopted to calculate risk exposure rates involved establishing the total annual number of collisions involving cyclists, categorised by the type of collision, within the study area and comparing these to the total annual kilometres cycled in that area. The formula to calculate the collision rates is as follows:

Total N of collision by type / Total Annual Cycle Vehicle Kilometres

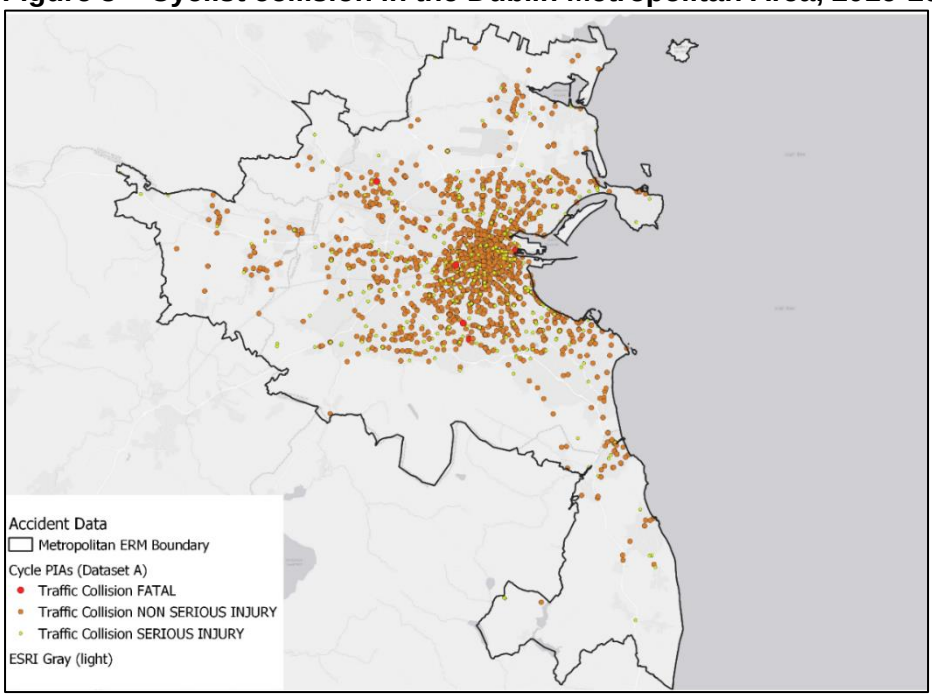
Separate collision rates were calculated for each type of collision, which included fatal, serious, and minor collisions. Finally, the collision rates were expressed as the number of collisions per million kilometres cycled, and per billion kilometres cycled, so that this data can be easily compared to existing Irish vehicle collision statistics (usually expressed in terms of million vehicle kilometres) and with European statistics (usually expressed in terms of billion vehicle kilometres).

The remainder of this section will provide more details on the methodology used to establish total annual cyclist collisions and total annual kilometres cycled.

Establishing Annual Collisions

A data file illustrating the location and type of cycling collision (categorised by fatal, serious, and minor) occurring within the study area for each year assessed (2016-2019) was provided to the NTA by the RSA. The following figure illustrates the data provided for this study area for 2016:

Figure 3 – Cyclist collision in the Dublin Metropolitan Area, 2016-2019



Analysis of the dataset provided the total cycle collisions, by collision type, for each year as outlined in the following table:

Table 6 – Cyclist Collisions by Incident Type

Year	Minor	Serious	Fatal	Total
2016	506	91	2	599
2017	528	130	4	662
2018	497	158	2	657
2019	514	192	2	708
16-19 Average	**511**	**143**	**3**	**657**

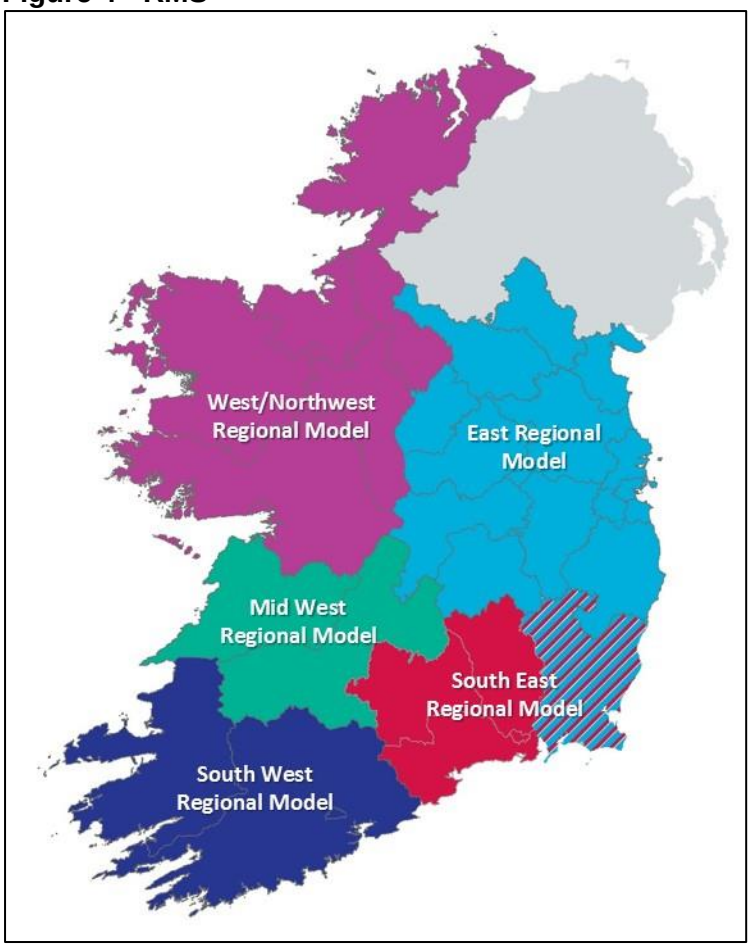
Estimating Kilometres Cycled

The total annual kilometres cycled within the study area were estimated using outputs from the NTA's ERM. The ERM is part of the NTA's RMS for Ireland. The RMS is comprised of several component models and tools, including:

1. National Demand Forecasting Model (NDFM)
2. Five Regional Models (RMs), which are large-scale, detailed, multi-modal regional transport models
3. Secondary Analysis and Appraisal (SAA) Tools

The following figure provides a depiction of the RMS:

Figure 4 - RMS



The regional models include:

- Full geographic coverage of each region
- Detailed representations of all major surface transport modes, including active modes, road and public transport networks and services
- Representation of travel demand for five time periods

The RMS encompasses behavioural models that predict changes in trip destination and mode choice in response to changing traffic conditions, transport provision and/or policies which influence the cost of travel. The RMS has been calibrated to 2016 Census (POWSCAR) and Household Travel Survey data, and, therefore, provides a good representation of the overall level of transport demand in the relevant model areas.

These attributes make the RMs particularly well-suited for this study, as the total level of cycle trip demand for the study area is well represented in the ERM and has been calibrated to match observed cycling modal share at a model zone level using 2016 Census data.

Calculating Annual Cycle Kilometres

As mentioned previously, the RMs produce data for five time periods, which are representative of a typical midweek day. of the time periods are:

- AM Peak Hour
- Lunch Time (LT): average inter-peak hour for the 10am to 1pm period
- School Run (SR): average inter-peak hour for the 1pm to 4pm period
- PM Peak Hour
- Off Peak Period

For this exercise, it was necessary to calculate total annual cycle kilometres within the study area. Therefore, factors had to be calculated and applied to the 1-hour model assignments in order to arrive at the annual total. This was done in a number of steps, as follows:

- **Step 1**: within the ERM, model peak-to-period factors are applied to produce 24-hour Average Annual Weekday Traffic (AAWT) totals.
- **Step 2**: the AAWT values for each link in the study area were multiplied by the link distance to get the total kilometres cycled on that link on an average day.
- **Step 3**: this value of total kilometres cycled was then summed across all links in the study area to produce a total.
- **Step 4**: a factor was calculated to go from AAWT to Annual Average Daily Traffic (AADT), which is the average 24-hour traffic flow across an entire year (total yearly traffic divided by 365).
- **Step 5**: finally, the estimate of total cycle vehicle kilometres is then multiplied by 365 to produce an estimate of total cycle vehicle kilometres for the year in question across the study area.

The following table provides an overview of the AAWT, AADT, and total annual cycle kilometres calculated for each year in the study area:

Table 7 – ERM Outputs

Year	Total Cycle AAWT Vehicle KM	Total Cycle AADT Vehicle KM	Total Annual Cycle Vehicle KM
2016	675,587	512,771	187,161,300
2017*	683,856	519,047	189,452,097
2018	692,125	525,323	191,742,895
2019	702,462	533,168	194,606,447
16-19 Average	**688,508**	**522,577**	**190,740,684**

**Please note that as no ERM model for 2017 was available at the time, the AAWT, AADT, and Total Annual Cycle Kilometres for that year were interpolated using values from the 2016 and 2018 ERM. For 2018 and 2019, the demand is based on demographic estimates for those years. An assumption was made that growth in demographic forecasts is linear (i.e., roughly the same percentage increase in population every year).*

Risk Exposure Rates

Following the establishment of total collision numbers and total annual cycle kilometres travelled, as outlined in this section, the relationship between the two figures was obtained to establish risk exposure rates for each collision type.

In the EU and the UK, it is typical for risk exposure rates such as these to be reported in terms of per billion kilometres travelled. In Ireland, due to its smaller size, collision statistics are more usually reported in terms of per million kilometres travelled.

To establish these risk exposure rates, each years' total number of collision type was first multiplied by 1 billion (or 1 million) and then divided by the Total Annual Cycle Vehicle Km. The results of this calculation are displayed in the below tables.

The relatively small number of fatal collisions impacts the associated rate quite considerably. It can be seen that an increase of 2 such incidents in 2017 causes the rate to almost double when compared to 2016. However, over the four years, the average number of fatal collisions per billion cycle km travelled is 13.

The minor injury risk exposure rates are quite consistent across the time period analysed. In contrast to this, the serious injury risk exposure rate increases dramatically. It can be noted that this dramatic increase has happened even though the total annual cycle km travelled in the Area increased in a very gradual and incremental manner. This trend indicates that cyclist risk exposure for serious injury collisions in the Dublin Metropolitan Area has increased in the years 2016-2019.

Table 8 Risk Exposure Rate for the Dublin Metropolitan Area, expressed in terms of per billion cycle km travelled.

Year	Minor	Serious	Fatal
2016	2,704	486	11
2017	2,787	686	21
2018	2,592	824	10
2019	2,641	986	10
16-19 Average	**2,681**	**746**	**13**

These estimates suggest that the risk of a fatal injury collision involving a cyclist in the Dublin Metropolitan Area is lowest across the three incident types, while the risk of a minor injury collision involving a cyclist is highest. For instance, when considering the four years of the study, there were, on average, an estimated 2,681 minor injury collisions for every billion km travelled by cyclists in the Dublin Metropolitan Area, while these average estimates drop to 746 and 13 for serious and fatal injury collisions respectively.

Table 9 Risk Exposure Rate for the Dublin Metropolitan Area, expressed in terms of per million cycle km travelled.

Year	Minor	Serious	Fatal
2016	2.70	0.49	0.01
2017	2.79	0.69	0.02
2018	2.59	0.82	0.01
2019	2.64	0.99	0.01
16-19 Average	**2.68**	**0.75**	**0.01**

In future iterations of this project, consideration will be given to reporting the rates as 3-year rolling averages. The benefit of this approach is that it would smooth out the fatal collision rate, which is being influenced by small cell sizes.

Caveats and Limitations

The following limitations must be taken into account when interpreting the findings from this study, as outlined in the methodological section:

1. The sample size in relation to fatal cyclist collisions is low.
2. The methodology that has been developed does not address the likely underreporting of serious injury collisions involving cyclists, particularly when these are single cyclist collisions. The RSA is currently working on a project which allows for access to Hospital In-Patient Enquiry (HIPE) data. Analysis of this dataset may lead to the issue of underreporting being addressed in a future iteration of the project.
3. The cycle kilometre estimates are produced by the ERM, which has not been subject to detailed, link level, calibration, and validation against surveyed cycle flows. However, as mentioned in the methodology section of the report, the ERM has been calibrated to match observed cycling modal share by model zone using data from the 2016 Census. Demand forecasts for subsequent years are based on forecast model runs. The primary determinant of travel demand will be population growth forecasts. These have been based on a straight line interpolation between the 2016 observed population and 2040 NPF forecast population targets.

International Comparisons

Overview

A desktop study has been carried out to establish the risk exposure rates for cyclists in other UK and European cities in order to see how those rates compare to those calculated for Dublin. It must be acknowledged that these comparisons focus only on the Dublin Metropolitan Area from an Irish perspective, as a national rate has yet to be calculated.

This desktop exercise found comparable statistics from the following countries. It should be noted that statistics on fatal collision rates are more readily available than statistics for other types of collisions.

- Austria
- Belgium
- Denmark
- Germany
- Finland
- Netherlands
- Sweden
- UK

European Countries

The primary source of this information was The European Transport Safety Council's (ETSC) 2020 report 'How Safe Is Walking and Cycling in Europe?' and the results are summarised in the following table.

The findings from this Irish study, in the context of Action 175 of the Strategy, estimated that the fatal cycle collision rate per billion kilometres cycled in the Dublin Metropolitan Area was 13 for the years 2016-2019. This rate is close to those estimated for a number of other European countries, such as Germany, the Netherlands and Sweden. However, it must be pointed out that different methodological approaches are being used across the countries.

Table 10 Cycle fatal collision rates for different European countries.

Country	Fatal Cycle Collision Rate Per Billion Kilometres Cycled	Years for Fatal Cycle Collision Data	Years for Cycle Kilometres Data
Austria	24	2013-2015	2014
Belgium	13	2015-2017	2016
Denmark	10	2016-2018	2016-2018
Germany	12	2016-2018	2018
Finland	16	2015-2017	2016
Netherlands*	13	2015-2017	2015-2017
Sweden	13	2014-2016	2014-2016
UK	19	2016-2018	2016-2018

** In the Netherlands more recent data has also produced a lower figure of 11 fatal collisions per billion kms cycled, and this was calculated based on 2019 deaths and 2018 kms cycled (CBS.nl, 2020).*

UK

Cycle collision rates for UK-wide fatal cycle collisions per billion km travelled (obtained from Allan, 2019, converted from miles travelled) are outlined in the following tables. These provide a year-by-year comparison with the Dublin results for 2016 to 2018. This analysis indicates that for serious injury collisions, the Dublin results were similar to the UK average, whereas the Dublin rates were somewhat lower than the UK with regards to fatal injury collisions.

Table 11 Cycle fatal collision rates per billion km travelled, Dublin vs UK.

Year	Dublin	UK
2016	10.7	18.6
2017	21.1	19.3
2018	10.4	18.0
3 Year Average	**14.1**	**18.6**

Table 12 Cycle serious injury collision rates per billion km travelled, Dublin vs UK.

Year	Dublin	UK
2016	486	610
2017	686	702
2018	824	690
3 Year Average	**665**	**667**

Proportion of population that cycles

According to the *Walking and Cycling Index 2021: Dublin Metropolitan Area* published by the NTA and Sustrans, 25% of Dublin Metropolitan Area residents cycle at least once a week. The following table compares this with the proportion of the population cycling per week in selected European countries, taken from the 2020 *ESRA E-Survey of Road Users Attitude: Cyclists*, and the fatalities per million vehicle kilometres.

Table 13 Proportion of selected countries populations that cycle at least once per week.

Country/Area	Proportion cycling at least once a week	Cycle fatal collision rate per billion km cycled*
Ireland	15%	Data Not Currently Available
UK	12%	19
Germany	28%	12
Sweden	28%	13
Netherlands	49%	13

** Source: ETSC Report, referenced above*
*** Source: NTA and Sustrans (2022) Walking and Cycling Index 2021: Dublin Metropolitan Area*

When taken separately from the rest of Ireland, Dublin has levels of cycling close to Sweden and Germany. Sweden and Germany also have rates of fatal cycle collisions per billion kilometres very close to the value of 13 that was calculated for Dublin in this study.

Although the risk of fatal cycle collisions calculated in this study is lower than that for the UK, the UK (taken as a whole) has much lower levels of cycling compared to Dublin.

Conclusions

Annual collision data for cyclists, along with estimates of total annual kms by cyclists (as output from the ERM), were used to establish risk exposure rates in the Dublin Metropolitan Area from 2016 to 2019.

The results presented earlier in the report produce an average risk of a fatal collision from cycling in the Dublin Metropolitan Area roughly equivalent to that of the Netherlands and lower than that for the UK.

The risk exposure rate varies considerably across the three incident types, with the risk of a fatal injury collision involving a cyclist in the Dublin Metropolitan Area being the lowest and the risk of a minor injury collision involving a cyclist being the highest.

The findings from this study suggest that the rates of cycling collisions, particularly serious injury collisions, are increasing in the Dublin Metropolitan Area for the years of interest. However, there does not seem to have been a dramatic increase in the number of kms travelled by cyclists in this Area, based on the **estimated** total annual cycle km for these years. The serious injury collision rate has more than doubled in the four years, while the annual cycle kms have only risen by about 4%. This indicates that cyclist risk exposure for serious injury collisions in the Dublin Metropolitan Area has increased in the years 2016-2019.

Future research will seek to expand the scope to include a larger national spread, other road user groups, etc. The feasibility of addressing some, or all, of the limitations outlined in this report will also be assessed.

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