Government limits the use of guns, but shooting incidents are still not in well-controlled

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Government's regulations did not control the cases.

INTRODUCTION

The dataset we use below includes all shooting incidents, which are defined as shootings and firearm discharges, cases reported in the Toronto Police Service. For a densely populated city in Canada, any gun discharge or shooting is a threat to people's safety. Despite the restrictions on gun wearers in Canada, shootings and gun discharges continue to be a frequent occurrence, according to news and statistics from previous years. Here, we define the shootings,"[a]ny incident in which a projectile is discharged from a firearm as defined under the Criminal Code of Canada and injures a person. This excludes events such as suicide and police involved firearm discharges."(**cite?**); we define firearm discharges, "[a]ny incident where evidence exists that a projectile was discharged from a firearm (as defined under the Criminal Code of Canada) including accidental discharge (non-police), celebratory fire, drive-by etc." (**cite?**). Even though the Canadian government limits the users of firearms (**cite?**), we can still hear gun sounds from the street. Therefore, this study we are interested in whether the shooting incidents are in well-controlled, which we define the well-controlled is no more injuries.

DATA

The major dataset we use is the Shooting and Firearm Discharges (**cite?**), which is acquired from the Open Data Toronto, retrieved using the opendatatoronto package and R packages. The dataset contains some basic information about the shooting incidents from 2004 to the end of 2023, such as offense number, offense date, the number of injuries, etc. It consists of 6051 rows which are relevant to each individual cases. For the summary, in order to get what we are interested in, there should be a line graph about the annual number of injuries to

Table 1: **?(caption)**

```
# A tibble: 6 x 2
  case_year number_of_injuries
      <dbl>              <dbl>
1      2004                  1
2      2004                  0
3      2004                  2
4      2004                  1
5      2004                  0
6      2004                  0
```

show the annual changes. More data information are shown below, which are formatted using ggplot2 (**cite?**).

As the first 6 rows of the original dataset shows below, there are a lot of columns inside the table, in order to make a neater table which we want, we make a new dataset which is just a neater dataset of the original one, as shown below with the first 6 rows. And in our cleaned dataset, we keep two columns with the year of offenses and the number of injuries.

MODEL

As the cleaned dataset we create above, we then use it to explore the data information we are interested in the study.
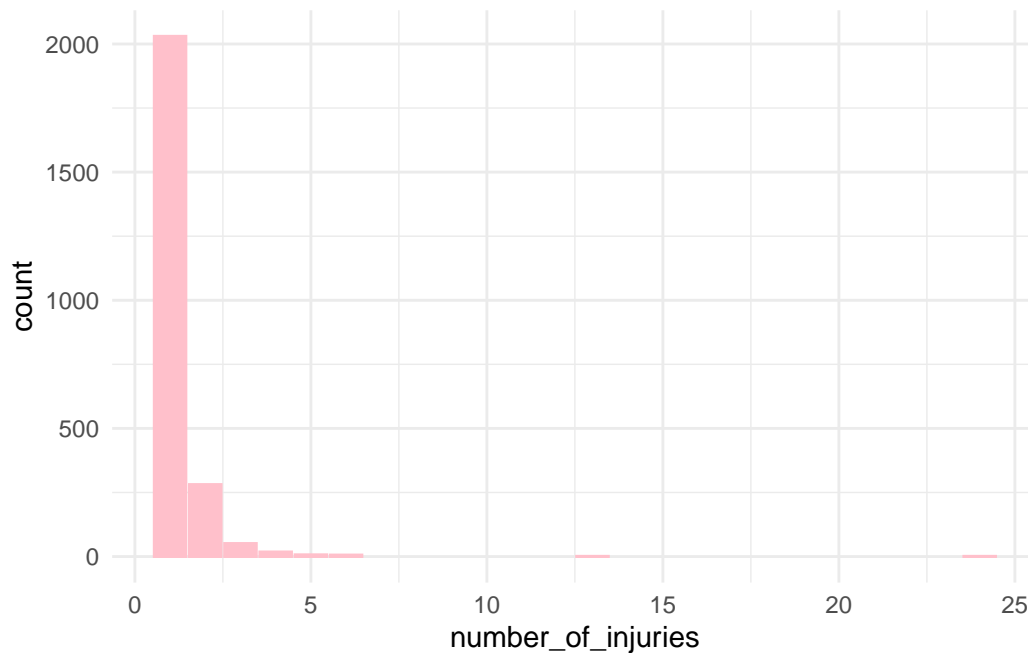
RESULTS

As the tables show below, it shows that the shooting incidents are still out of control, since there still exist injuries in the cases recently.

```
  number_of_injuries number_of_cases
1                  1            2030
2                  2             281
3                  3              51
4                  4              18
5                  5               7
6                  6               6
7                 13               1
8                 24               1
```

Table 2: Distribution of the annual shooting incidents

Year	Annual shooting incidents
2004	191
2005	262
2006	215
2007	207
2008	238
2009	252
2010	259
2011	227
2012	219
2013	204
2014	177
2015	288
2016	407
2017	392
2018	427
2019	492
2020	462
2021	409
2022	380
2023	343

Table 3: Annual number of injuries by shooting incidents

Number of injuries	Number of cases
0	3656
1	2030
2	281
3	51
4	18
5	7
6	6
13	1
24	1

```
# A tibble: 6 x 2
  case_year number_of_injuries
      <dbl>              <dbl>
1      2023                  0
2      2023                  0
3      2023                  0
4      2023                  0
5      2023                  0
6      2023                  3
```

LIMITATIONS

To protect the privacy of the persons involved in the cases, the locations of the crimes were deliberately offset to the nearest road intersection nodes. Due to the offsetting of crime locations, figures by precinct and neighborhood may not accurately reflect the number of reported crimes in these geographic areas.

References

```
To cite R in publications use:
```

```
R Core Team (2023). _R: A Language and Environment for Statistical
Computing_. R Foundation for Statistical Computing, Vienna, Austria.
<https://www.R-project.org/>.
```

A BibTeX entry for LaTeX users is

```
@Manual{,
    title = {R: A Language and Environment for Statistical Computing},
    author = {{R Core Team}},
    organization = {R Foundation for Statistical Computing},
    address = {Vienna, Austria},
    year = {2023},
    url = {https://www.R-project.org/},
}
```

We have invested a lot of time and effort in creating R, please cite it
when using it for data analysis. See also 'citation("pkgname")' for
citing R packages.

To cite ggplot2 in publications, please use

```
H. Wickham. ggplot2: Elegant Graphics for Data Analysis.
Springer-Verlag New York, 2016.
```

A BibTeX entry for LaTeX users is

```
@Book{,
    author = {Hadley Wickham},
    title = {ggplot2: Elegant Graphics for Data Analysis},
    publisher = {Springer-Verlag New York},
    year = {2016},
    isbn = {978-3-319-24277-4},
    url = {https://ggplot2.tidyverse.org},
}
```

To cite package 'knitr' in publications use:

```
Xie Y (2023). _knitr: A General-Purpose Package for Dynamic Report
Generation in R_. R package version 1.45, <https://yihui.org/knitr/>.

Yihui Xie (2015) Dynamic Documents with R and knitr. 2nd edition.
Chapman and Hall/CRC. ISBN 978-1498716963
```

  Yihui Xie (2014) knitr: A Comprehensive Tool for Reproducible
  Research in R. In Victoria Stodden, Friedrich Leisch and Roger D.
  Peng, editors, Implementing Reproducible Computational Research.
  Chapman and Hall/CRC. ISBN 978-1466561595

To see these entries in BibTeX format, use 'print(<citation>,
bibtex=TRUE)', 'toBibtex(.)', or set
'options(citation.bibtex.max=999)'.

To cite package 'opendatatoronto' in publications use:

  Gelfand S (2022). _opendatatoronto: Access the City of Toronto Open
  Data Portal_. R package version 0.1.5,
  https://github.com/sharlagelfand/opendatatoronto/,
  <https://sharlagelfand.github.io/opendatatoronto/>.

A BibTeX entry for LaTeX users is

```
  @Manual{,
    title = {opendatatoronto: Access the City of Toronto Open Data Portal},
    author = {Sharla Gelfand},
    year = {2022},
    note = {R package version 0.1.5,
https://github.com/sharlagelfand/opendatatoronto/},
    url = {https://sharlagelfand.github.io/opendatatoronto/},
  }
```


To cite package 'janitor' in publications use:

  Firke S (2023). _janitor: Simple Tools for Examining and Cleaning
  Dirty Data_. R package version 2.2.0,
  https://sfirke.github.io/janitor/,
  <https://github.com/sfirke/janitor>.

A BibTeX entry for LaTeX users is

```
  @Manual{,
    title = {janitor: Simple Tools for Examining and Cleaning Dirty Data},
    author = {Sam Firke},
    year = {2023},
    note = {R package version 2.2.0,
```

```
https://sfirke.github.io/janitor/},
    url = {https://github.com/sfirke/janitor},
  }
```

To cite lubridate in publications use:

  Garrett Grolemund, Hadley Wickham (2011). Dates and Times Made Easy
  with lubridate. Journal of Statistical Software, 40(3), 1-25. URL
  https://www.jstatsoft.org/v40/i03/.

A BibTeX entry for LaTeX users is

```
@Article{,
    title = {Dates and Times Made Easy with {lubridate}},
    author = {Garrett Grolemund and Hadley Wickham},
    journal = {Journal of Statistical Software},
    year = {2011},
    volume = {40},
    number = {3},
    pages = {1--25},
    url = {https://www.jstatsoft.org/v40/i03/},
  }
```

To cite package 'tidyverse' in publications use:

  Wickham H, Averick M, Bryan J, Chang W, McGowan LD, François R,
  Grolemund G, Hayes A, Henry L, Hester J, Kuhn M, Pedersen TL, Miller
  E, Bache SM, Müller K, Ooms J, Robinson D, Seidel DP, Spinu V,
  Takahashi K, Vaughan D, Wilke C, Woo K, Yutani H (2019). "Welcome to
  the tidyverse." _Journal of Open Source Software_, *4*(43), 1686.
  doi:10.21105/joss.01686 <https://doi.org/10.21105/joss.01686>.

A BibTeX entry for LaTeX users is

```
@Article{,
    title = {Welcome to the {tidyverse}},
    author = {Hadley Wickham and Mara Averick and Jennifer Bryan and Winston Chang and Lucy |
    year = {2019},
    journal = {Journal of Open Source Software},
    volume = {4},
    number = {43},
    pages = {1686},
```

```
    doi = {10.21105/joss.01686},
  }
```

To cite package 'dplyr' in publications use:

```
  Wickham H, François R, Henry L, Müller K, Vaughan D (2023). _dplyr: A
  Grammar of Data Manipulation_. R package version 1.1.4,
  https://github.com/tidyverse/dplyr, <https://dplyr.tidyverse.org>.
```

A BibTeX entry for LaTeX users is

```
  @Manual{,
    title = {dplyr: A Grammar of Data Manipulation},
    author = {Hadley Wickham and Romain François and Lionel Henry and Kirill Müller and Davis
    year = {2023},
    note = {R package version 1.1.4, https://github.com/tidyverse/dplyr},
    url = {https://dplyr.tidyverse.org},
  }
```

To cite package 'tidyr' in publications use:

```
  Wickham H, Vaughan D, Girlich M (2023). _tidyr: Tidy Messy Data_. R
  package version 1.3.0, https://github.com/tidyverse/tidyr,
  <https://tidyr.tidyverse.org>.
```

A BibTeX entry for LaTeX users is

```
  @Manual{,
    title = {tidyr: Tidy Messy Data},
    author = {Hadley Wickham and Davis Vaughan and Maximilian Girlich},
    year = {2023},
    note = {R package version 1.3.0, https://github.com/tidyverse/tidyr},
    url = {https://tidyr.tidyverse.org},
  }
```