

Less accidents, yet increased unsafety on the road

Erik Donkers, Sjoerd Broos · 15 May 2020

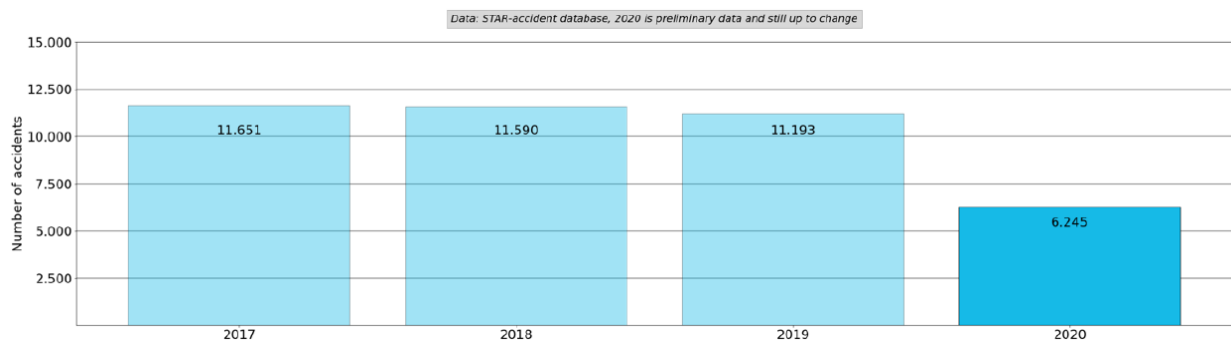
Research on the effects of COVID-19 measures on road safety in the Netherlands.

On request of the police, traffic engineer IT agency VIA investigated the effects of COVID-19 on road safety.

Because of the COVID-19-measures there is way less traffic on the road. VIA investigated the influence of these measures on road safety. Are the measures changing the behaviour of traffic and does this lead to a decrease or increase of risk? To investigate these questions, a comparison is made between the COVID-19 period, week 12 up to and including week 17 2020, and the same period of 2017 up to and including 2019. This research is conducted with the STAR[1]-accident database based on police registration.

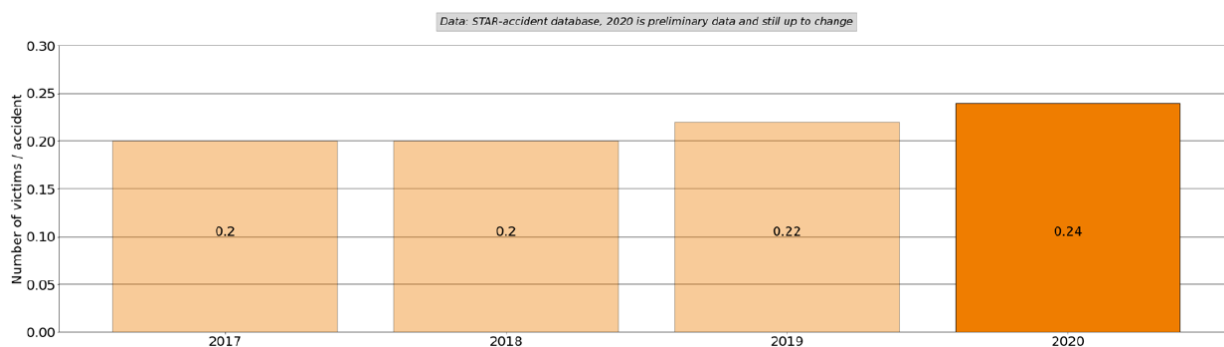
Less accidents

From the start of the COVID-19 measures traffic jams were reduced to almost zero. Soon it was clear that this relation also applied to the number of accidents: a decrease of 50%[2]. Graph 1 shows that 6 weeks later there is still a significant decrease (46%) of accidents in comparison to the average of the last 3 years.



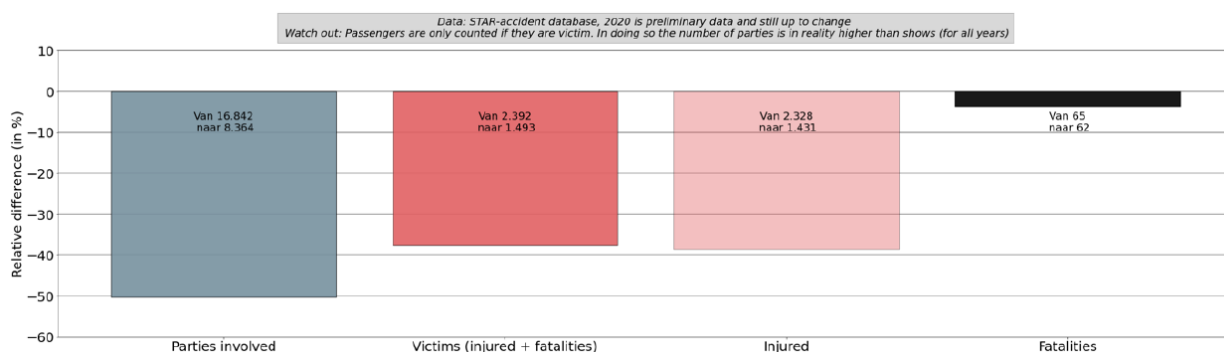
Graph 1: Number of accidents per year before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). 2017: 11,651 — 2018: 11,590 — 2019: 11,193 — 2020: 6,245.

However, Graph 2 shows that the number of (road) victims (injured and fatalities) per accident increased in the period of the COVID-19 measures with 14% in comparison to the average of 2017-2019[3]. This indicates an increased unsafety on the road.



Graph 2: Number of victims per accident per year before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). 2017: 0.2 — 2018: 0.2 — 2019: 0.22 — 2020: 0.24.

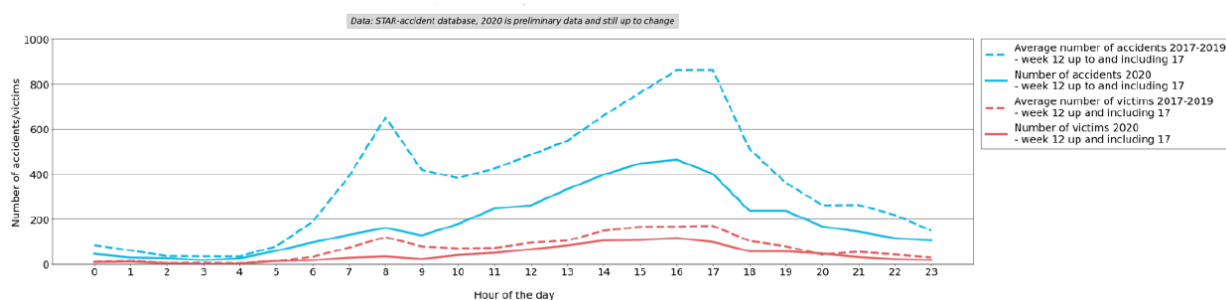
Graph 3 confirms this as the casualties, injured and especially fatalities are not decreasing as much as the parties involved by an accident. The relative difference for parties (50%) is matching the cut in accidents by half. However, for the injured (38%) and the fatalities (3.6%) this is not the case.



Graph 3: Relative difference parties, victims, injured and fatalities per year before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). Parties involved: from 16,842 to 8,364 — victims (injured + fatalities): from 2,392 to 1,493 — injured: from 2,328 to 1,431 — fatalities: from 65 to 62.

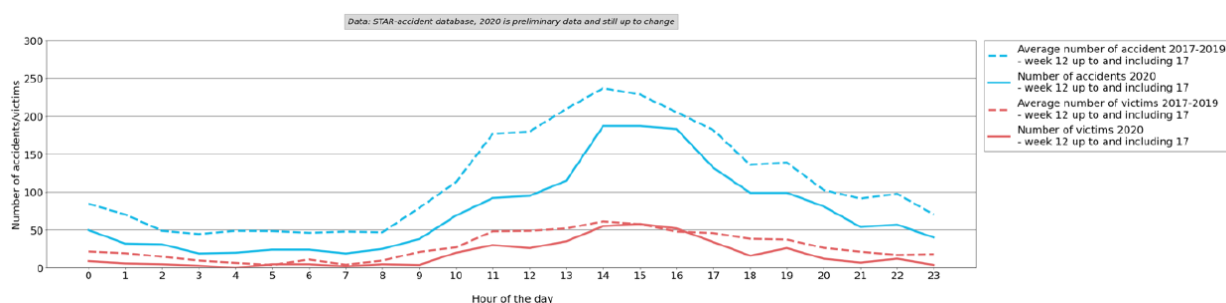
Particularly less accidents in rush hour

It is known that there is a relationship between the traffic intensity and the number of accidents. The profound reduction of traffic intensity in rush hour is visible in the number of accidents and victims. Graph 4 shows that the morning rush hour has (almost) disappeared. As well, the evening rush hour is significantly lower, however, there is a steady increase in both accidents and victims in the afternoon. Most likely this is caused by mainstream traffic (NDW, Bas Turpijn, 29-02-20: Figure 2[4]) separated of commuter traffic.



Graph 4: Number of accidents and victims per hour (working days) before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). Average number of accidents 2017-2019 peaks at about 650 at 8:00 and about 860 at 16:00-17:00; number of accidents 2020 about 160 at 8:00 and about 465 at 16:00. Average number of victims 2017-2019 peaks at about 120 at 8:00 and about 170 at 16:00-17:00; number of victims 2020 about 35 at 8:00 and about 115 at 16:00.

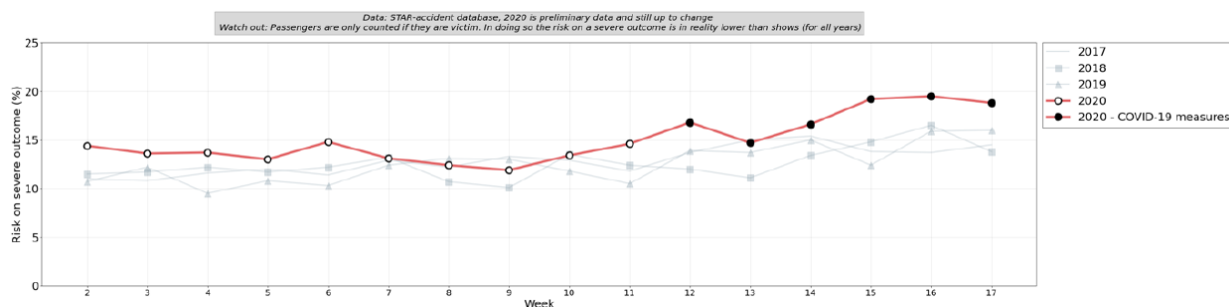
Graph 5 shows the same pattern as Graph 4, it shows the same steady increase of both accidents and victims in the afternoon. Notable is that the number of victims is even higher in the afternoon (between 15:00-16:00h) for the COVID-19 period in comparison to the average of 2017 up to and including 2019.



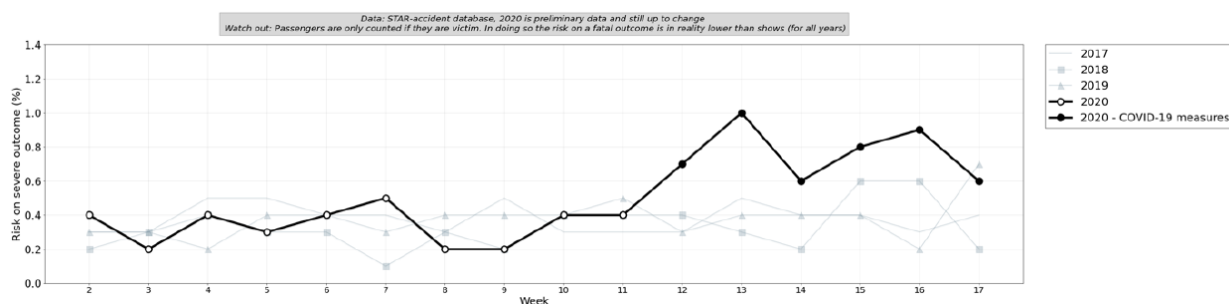
Graph 5: Number of accidents and victims per hour (weekend days) before COVID-19 - week 12 up to and including 17 2020 vs 2017-2019. Average number of accidents 2017-2019 peaks at about 235 at 14:00; number of accidents 2020 about 187 at 14:00-15:00. Average number of victims 2017-2019 about 60 at 14:00; number of victims 2020 about 57 at 15:00 and about 52 at 16:00.

Increasing risk on severe outcome

Striking is the risk (= victim share per involved party) of a severe outcome (see Graph 6 that shows the risk to be a victim when you are involved in an accident) that increased from the first week (week 12) of the COVID-19 measures. After a small decrease in week 13, there is an increase in risk of 30.5% in the weeks 15 up to and including 17 of 2020 in comparison to the average of 2017 up to and including 2019. We see the same pattern with the risk of death in Graph 7[5].



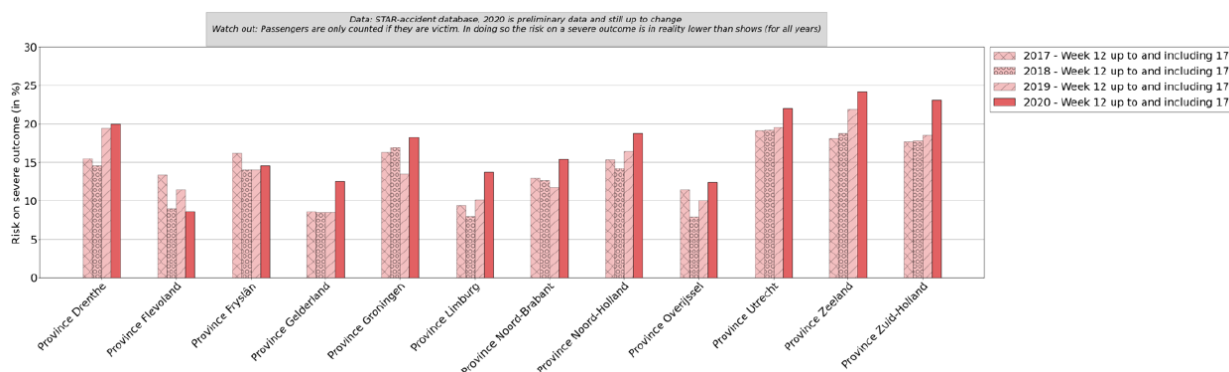
Graph 6: Risk on severe outcome when involved in accident per week before and after COVID-19 (week 2 up to and including 17 2020 vs 2017-2019). 2020, in %, approximately: week 2: 14.4 — 3: 13.6 — 4: 13.7 — 5: 13.0 — 6: 14.8 — 7: 13.1 — 8: 12.4 — 9: 11.9 — 10: 13.4 — 11: 14.6 — 12 (COVID-19 measures): 16.8 — 13: 14.7 — 14: 16.6 — 15: 19.2 — 16: 19.5 — 17: 18.8. In 2017-2019 the weekly risk lies between about 9.5 and 16.5.



Graph 7: Risk fatal outcome when involved in accident per week before and after COVID-19 (week 2 up to and including 17 2020 vs 2017-2019). 2020, in %: week 2: 0.4 — 3: 0.2 — 4: 0.4 — 5: 0.3 — 6: 0.4 — 7: 0.5 — 8: 0.2 — 9: 0.2 — 10: 0.4 — 11: 0.4 — 12 (COVID-19 measures): 0.7 — 13: 1.0 — 14: 0.6 — 15: 0.8 — 16: 0.9 — 17: 0.6. In 2017-2019 the weekly risk lies between 0.1 and 0.7.

What explains the risk increase?

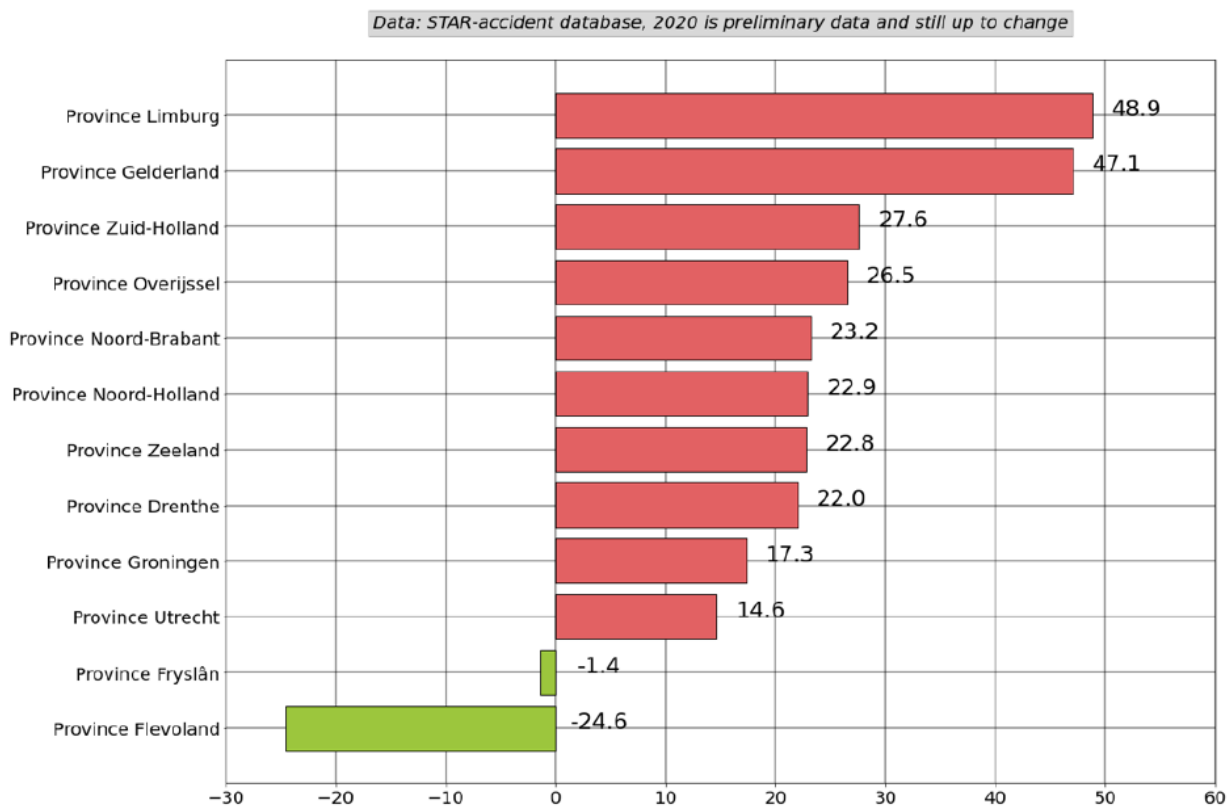
Graph 8 shows the risk per year and province. It shows that, despite the overall increase in severe outcome, not all provinces have an increase in risk on severe outcome.



Graph 8: Risk on severe outcome when involved in accident per year per province before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). 2020, in %, approximately: Drenthe 20.0 — Flevoland 8.6 — Fryslân 14.5 — Gelderland 12.5 — Groningen 18.2 — Limburg 13.7 — Noord-Brabant 15.4 — Noord-Holland 18.7 — Overijssel 12.4 — Utrecht 22.0 — Zeeland 24.1 — Zuid-Holland 23.1.

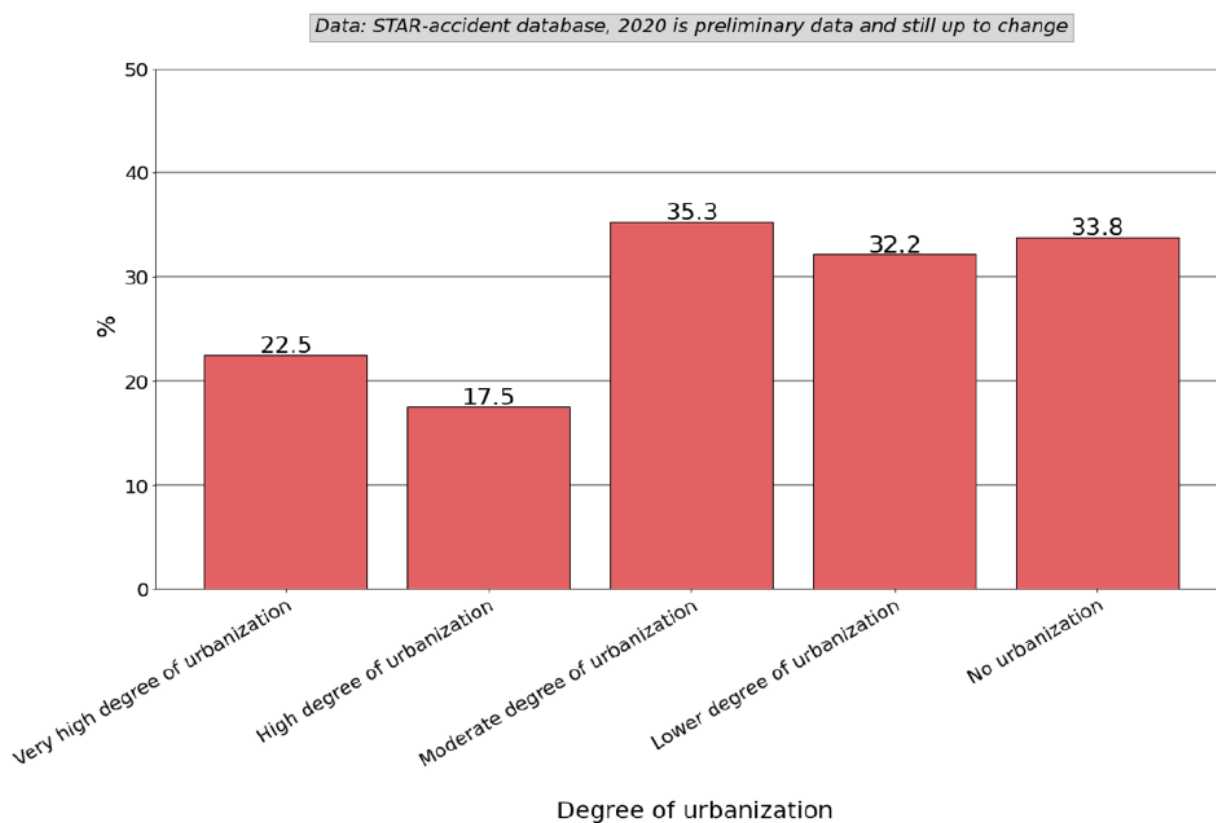
Remarkable, because the COVID-19 measures were introduced nationwide. Especially the provinces Limburg and Gelderland show a steep increase of risk. On the other hand, Flevoland and Fryslân show a

decrease (Graph 9).



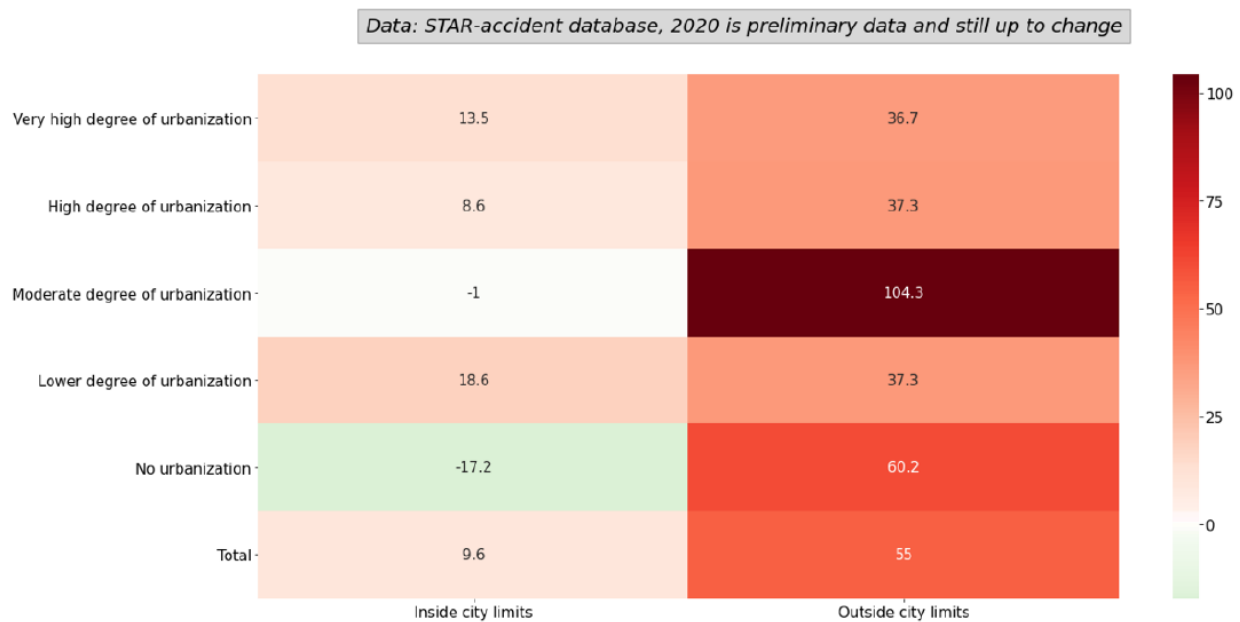
Graph 9: Percentage increase or decrease of the risk in severe outcome when involved in accident per province in comparison to baseline before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). Limburg +48.9% — Gelderland +47.1% — Zuid-Holland +27.6% — Overijssel +26.5% — Noord-Brabant +23.2% — Noord-Holland +22.9% — Zeeland +22.8% — Drenthe +22.0% — Groningen +17.3% — Utrecht +14.6% — Fryslân -1.4% — Flevoland -24.6%.

One of the reasons seems to be the degree of urbanization (CBS[6]). Graph 10 shows a clear difference between a (very) high degree of urbanization and the low(er) degrees of urbanization.



Graph 10: Percentage increase or decrease of the risk on severe outcome when involved in accident per degree of urbanization in comparison of baseline before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). Very high degree of urbanization +22.5% — high +17.5% — moderate +35.3% — lower +32.2% — no urbanization +33.8%.

This difference can be explained by the high risk on severe outcome outside the city limits (built-up area) (Graph 11). Notable is the steep increase in the moderate degree of urbanization.

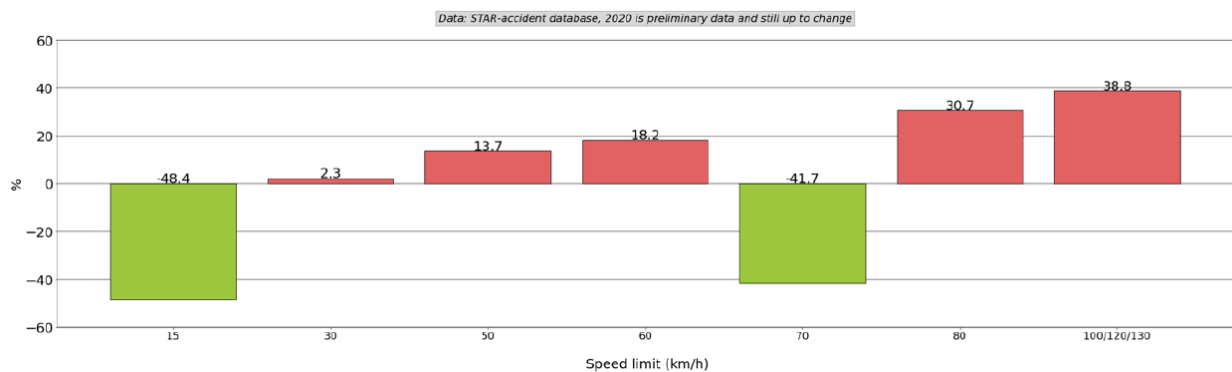


Graph 11: Percentage increase or decrease of the risk on severe outcome when involved in accident per degree of urbanization and city limits before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). Inside / outside city limits: very high degree of urbanization +13.5% / +36.7% — high +8.6% / +37.3% — moderate -1% / +104.3% — lower +18.6% / +37.3% — no urbanization -17.2% / +60.2% — total +9.6% / +55%.

We can conclude that on average, the risk on a severe outcome is the highest outside the city limits (built-up area). This may be due the higher speed limits[7] (80-130 km/h) (Graph 12) in combination with the steep decrease of commuting traffic (NDW, Bas Turpijn, 29-02-20: Figure 2[8]).

It is important to mention that with the tremendous reduction of traffic jams the number of accidents with exclusively material damage disappeared. Next to that, by chance the speed limits on Dutch highways of Rijkswaterstaat[9], were reduced to 100 km/h as one of the nitrogen measures. The effects of these measures are yet unknown but will most likely play a part in the explanation of the increase of severe risk.

Looking at Graph 12 again, the decrease on 70 km/h roads (mostly city beltways within the city limits) most likely can be explained by the steep decrease of commuting traffic who mostly uses these roads. Notable is the reduction in 15 km/h roads (residential yards). The following rule seems to apply: less traffic, more safety.

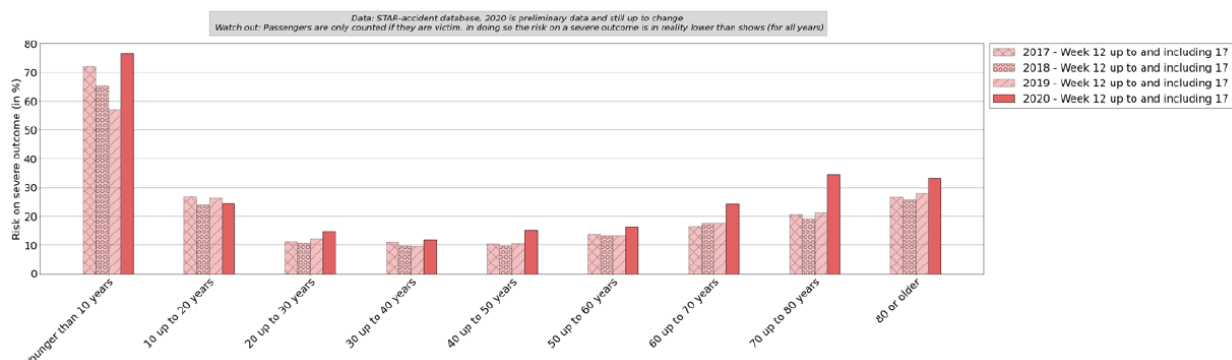


Graph 12: Percentage increase or decrease of risk on severe outcome when involved in accident per speed limit before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). 15 km/h -48.4% — 30 km/h +2.3% — 50 km/h +13.7% — 60 km/h +18.2% — 70 km/h -41.7% — 80 km/h +30.7% — 100/120/130 km/h +38.8%.

Is the risk equally for everyone?

It looks like that (especially) roads with high speed limits results in a higher risk. Police reports “coronaracers” (AD, Rachel van Kommer, 22-04-20[10]) which confirms this initial reasoning. This conclusion give rise to the question if the risk is equal for all ages. Or is the risk, for example, higher for starting drivers ([AutoBlog.nl](#), Ruben Priest, 06-04-20[11])?

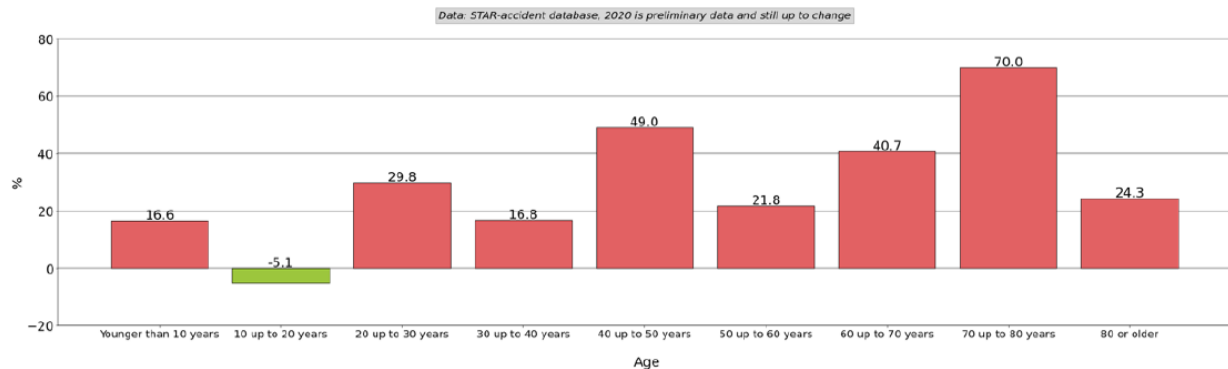
Graph 13 shows the risk per age category on a severe outcome[12] per year. The risk is increasing the most for the age group “70 to 80 years”. Furthermore, we see a clear shape in the Graph. The shape shows a reduction of risk up and including “30 to 40 years” and an increasing risk afterwards. This can be explained by the vulnerability of the age group and the mode of transport (SWOV[13]).



Graph 13: Risk on severe outcome when involved in accident per age category before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). 2020, in %, approximately: younger than 10 years 76.5 — 10 up to 20 years 24.3 — 20 up to 30 years 14.6 — 30 up to 40 years 11.7 — 40 up to 50 years 15.1 — 50 up to 60 years 16.2 — 60 up to 70 years 24.2 — 70 up to 80 years 34.5 — 80 or older 33.2.

Looking at Graph 14, we see almost in every age group an increase in risk. Striking is the irregularity between groups. There is a decrease in the age group “10 to 20 year”, this can be explained by the measure of closing schools. This group doesn’t need to travel (independent) to school (as a pedestrian and/or cycling). A far less logical increase is the bar with the age group “70 to 80 years”. After all this

group doesn't need to go work anymore.



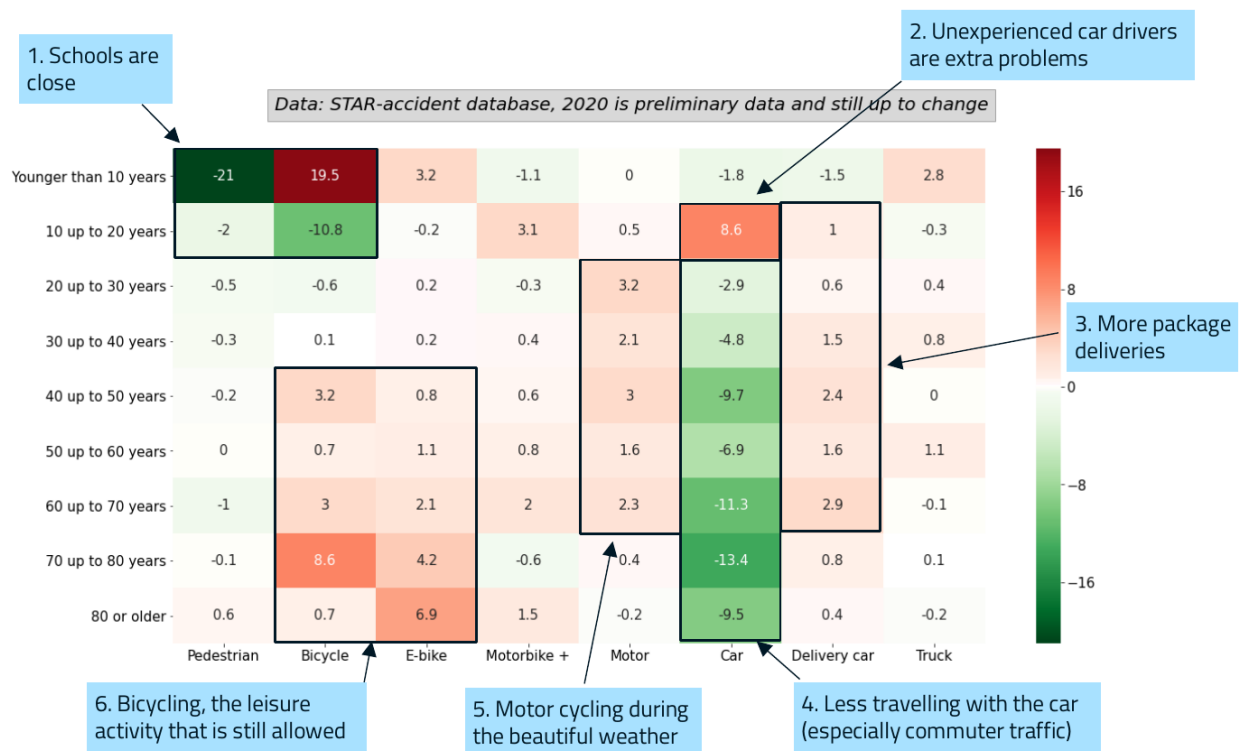
Graph 14: Percentage increase or decrease of risk on severe outcome when involved in accident per age class before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). Younger than 10 years +16.6% — 10 up to 20 years -5.1% — 20 up to 30 years +29.8% — 30 up to 40 years +16.8% — 40 up to 50 years +49.0% — 50 up to 60 years +21.8% — 60 up to 70 years +40.7% — 70 up to 80 years +70.0% — 80 or older +24.3%.

Pattern of behaviour defining for risk on severe outcome

Giving a simple explanation for the increase in risk is not possible. Often this can only be explained by multiple components. By combining the age groups and the ways of transportation of the involved parties (we explicitly selected parties and not victims because of the low number of victims), looking at the analysis, Graphs above and searching for patterns in the data we see clusters.

Graph 15 shows the results:

1. By closing schools, this group has a completely different traffic behaviour. It looks like that this group, normally walking to school, is now cycling and playing in the neighbourhood.
2. It seems that young inexperienced car drivers do not know how to behave with the new situation (less traffic).
3. The increase in the share of delivery cars is probably related to the increase of online shopping (Thuiswinkel waarborg[14]).
4. A clear decrease in the share of (more experienced) car drivers is visible. This can be (mostly) explained in the reduction of commuting traffic. Especially the elderly people seem to choose the bicycle over the car.
5. The beautiful weather in the weeks and especially during weekends in the COVID-19 period leads again to an increase of the share of motorcycles parties.
6. Elderly people are during the COVID-19 period mostly cycling. Other recreation activities (e.g. visiting a museum, the terrace or visiting a friend) are not allowed anymore. The bicycle trips, mostly outside the city, seem to explain the earlier found increase outside city areas, especially in non-rural areas.



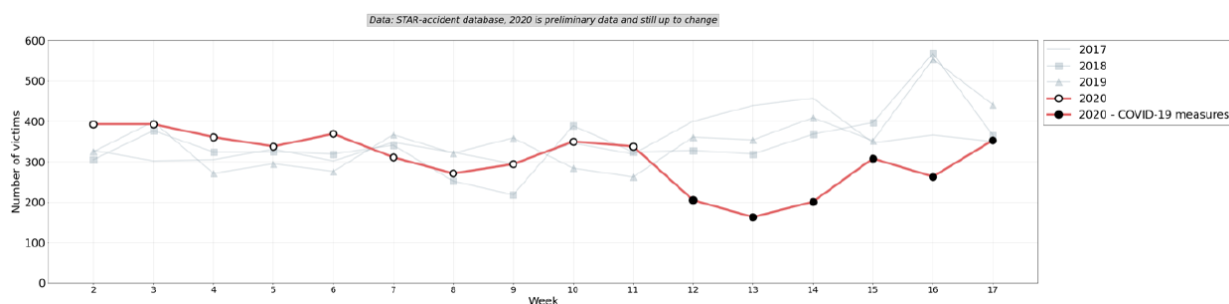
Graph 15: Difference in share of parties involved per transport mode and age category during COVID-19 (week 12 up to and including 17 2020 vs average 2017-2019). A matrix of age groups (younger than 10 years up to 80 or older) by transport mode (pedestrian, bicycle, e-bike, motorbike +, motor, car, delivery car, truck), with six marked clusters: 1. Schools are close (younger than 10 years: pedestrian -21, bicycle +19.5; 10 up to 20 years: pedestrian -2, bicycle -10.8). 2. Unexperienced car drivers are extra problems (car, 10 up to 20 years: +8.6). 3. More package deliveries (delivery car, 10 up to 70 years: +0.6 to +2.9). 4. Less travelling with the car, especially commuter traffic (car, 20 years and older: -2.9 to -13.4). 5. Motor cycling during the beautiful weather (motor, 20 up to 70 years: +1.6 to +3.2). 6. Bicycling, the leisure activity that is still allowed (bicycle and e-bike, 40 years and older, up to +8.6 for cyclists aged 70 up to 80 years).

Conclusion

Despite less accidents as a result of less traffic, we see an increase in the number of victims per accident. It seems like that the number of victims is increasing faster than the number of travelled kilometres (DAT.mobility, NPV-Graph: Distance per panel member per transportation mode[15]).

Where the number of victims is reaching the same levels as before the COVID-19 measures (Graph 16), the distance per car ride are still far below the baseline. This tells us that we need to watch out that with less traffic the number of victims should not go to the same or even higher levels than before the COVID-19 measures.

Less traffic does not automatically result in safer roads. The consequences of uncommon and unexpected behaviour are quite big in this period, possibly because people do not expect this under these circumstances. We conclude by: "Less accidents, yet increased unsafety on the road".



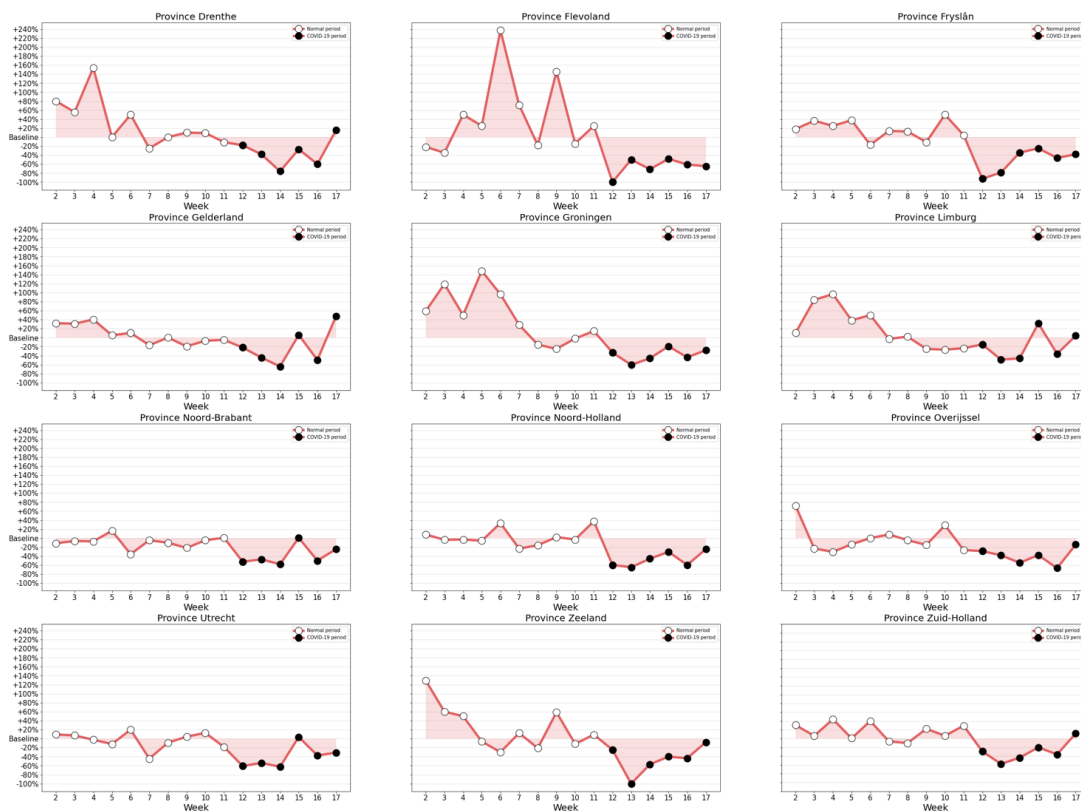
Graph 16: Number of victims per week before and after COVID-19 (week 2 up to and including 17 2020 vs 2017-2019). 2020, approximately: week 2: 393 — 3: 393 — 4: 361 — 5: 338 — 6: 370 — 7: 311 — 8: 271 — 9: 295 — 10: 350 — 11: 338 — 12 (COVID-19 measures): 205 — 13: 163 — 14: 201 — 15: 308 — 16: 264 — 17: 354. In 2017-2019 weeks 12 to 17 range from about 320 to 570.

Appendices



Appendix 1a: Percentage increase or decrease of the number of parties involved in comparison to baseline before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). One weekly line chart per province (week 2 to 17), normal period versus COVID-19 period.

Data: STAR-accident database, 2020 is preliminary data and still up to change

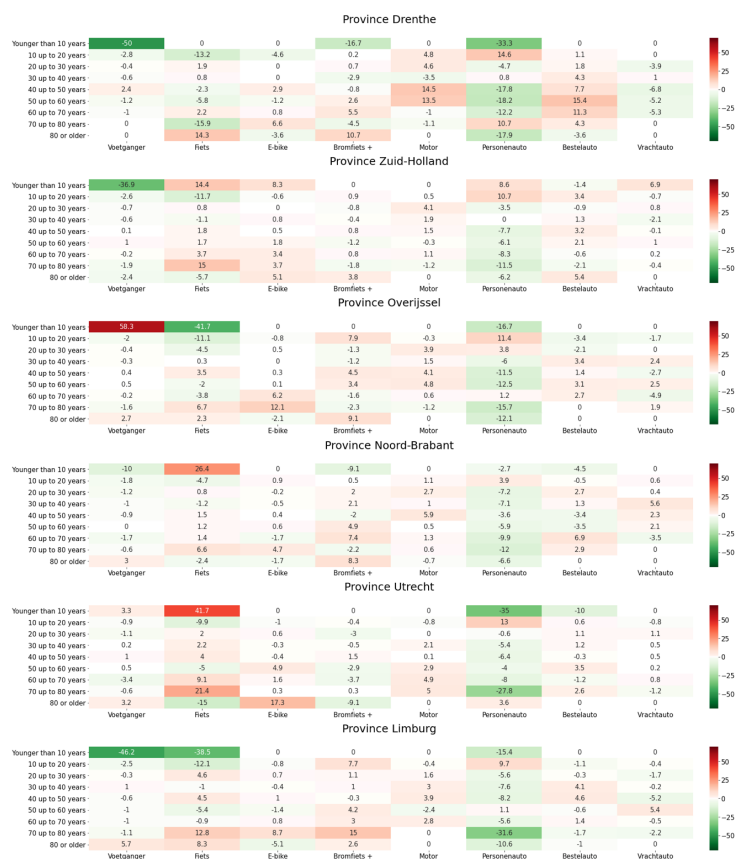


Appendix 1b: Percentage increase or decrease of the number of victims in comparison to baseline before and after COVID-19 (week 12 up to and including 17 2020 vs 2017-2019). One weekly line chart per province (week 2 to 17), normal period versus COVID-19 period.

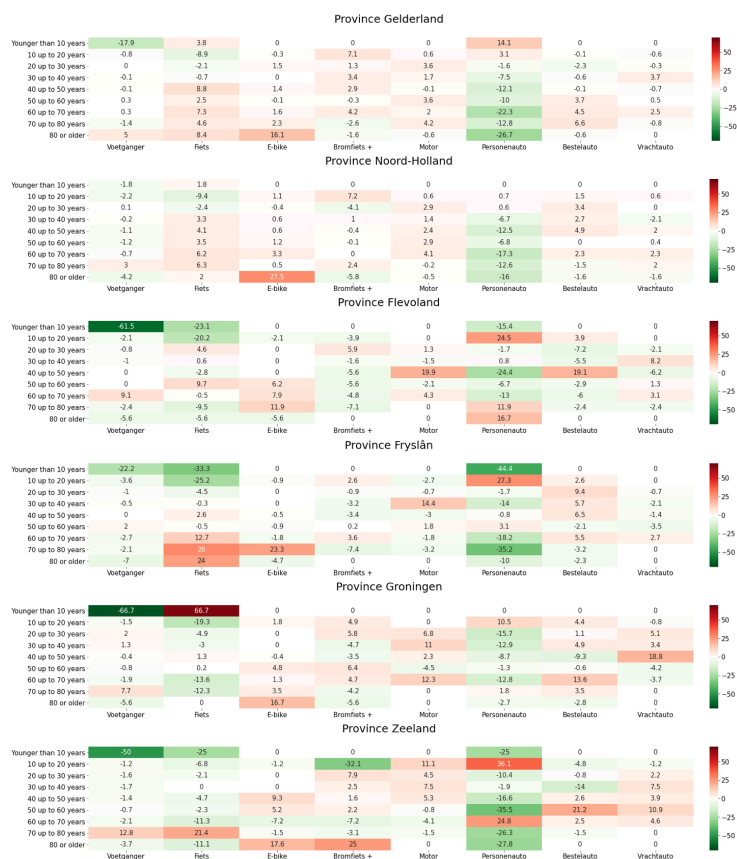
Data: STAR-accident database, 2020 is preliminary data and still up to change



Appendix 2: Difference in share of parties involved per transport mode and age category for each degree of urbanization during COVID-19 (week 12 up to and including 17 2020 vs average 2017-2019). Five matrices of age group by transport mode: very high, high, moderate, lower and no urbanization.



Appendix 3 (part 1): Difference in share of parties involved per transport mode and age category for each province during COVID-19 (week 12 up to and including 17 2020 vs average 2017-2019). Matrices of age group by transport mode for Drenthe, Zuid-Holland, Overijssel, Noord-Brabant, Utrecht and Limburg.



Appendix 3 (part 2): Difference in share of parties involved per transport mode and age category for each province during COVID-19 (week 12 up to and including 17 2020 vs average 2017-2019). Matrices of age group by transport mode for Gelderland, Noord-Holland, Flevoland, Fryslân, Groningen and Zeeland.

Data: STAR-accident database, 2020 is preliminary data and still up to change. Watch out: passengers are only counted if they are victim. In doing so the number of parties is in reality higher, and the risk on a severe or fatal outcome in reality lower, than shown in the graphs (for all years).

Notes

1. STAR (Smart Traffic Accident Reporting) is an initiative of the police, union of insurances and traffic engineer IT agency VIA. The mission of STAR is to build a reliable database of relevant accidents by means of collaboration. A collaboration where we want to involve as many data sources, professionals and citizens as possible. The results will be shared with all stakeholders. In this way we want to stimulate a policy based on facts to, in the end, increase traffic safety without traffic victims. For more information: www.star-traffic-accidents.eu.

2. <https://www.linkedin.com/feed/update/urn:li:activity:6647813112449777664>

3. Because of less accidents with only material damage there was still enough time to deal with all alerts for regular registration, despite of the extra efforts of the police in the COVID-19 period.

4. https://www.ndw.nu/blog/bekijk/26/update_29-4_i_effecten_van_corona_op_verkeer_en_vervoer/

5. It is important to mention that the numbers can still change. After all, if someone dies within 30 days of an accident, they still count for the day they had the accident. If later on the death turns out to be a suicide or incapacitation this number will not count (anymore) as an accident case.

6. <https://www.cbs.nl/nl-nl/dossier/dossier-verstedelijking/hoofdcategorieen/wat-is-verstedelijking->

7. Speed limits can change over time whereby the share of road length per speed limit per year can differ. As well, the used speed limit translation maps might be outdated or incomplete.

8. https://www.ndw.nu/blog/bekijk/26/update_29-04_i_effecten_van_corona_op_verkeer_en_vervoer/

9. <https://www.rijkswaterstaat.nl/wegen/wetten-regels-en-vergunningen/verkeerswetten/maximumsnelheid/index.aspx>

10. <https://www.ad.nl/utrecht/automobilisten-trappen-gaspedaal-in-door-mooi-weer-en-lege-wegen-coronaracers-massaal-op-de-bon~ac09dffa/?referrer=https://www.autoblog.nl/nieuws/politie-heeft-het-druk-met-coronaracers-150113>

11. <https://www.autoblog.nl/nieuws/beginnend-bestuurder-met-219-km-u-over-de-a28-147405>

12. It should be noted that parties, when involved by an accident, are only counted if they are injured by the accident. This results in lower risk in reality than we see in the Graph. Besides the limited ways of transportation between age groups is different causing in less drivers. For example, a person in the age group “younger than 10 years” cannot be a driver of a (safer) motorized vehicle, but only has access to vulnerable ways of transportation such as cycling or being a pedestrian. This explains the higher risk for this age group.

13. https://www.swov.nl/sites/default/files/publicaties/gearchiveerde-factsheet/nl/factsheet_kwetsbare_verkeersdeelnemers_gearchiveerd.pdf

14. <https://www.thuiswinkel.org/consumenten/corona/corona-en-online-winkelen>

15. <https://www.dat.nl/nvp/>