

1.5 meter Monitor

FACTSHEET 30 APRIL 2021

To mitigate the spread of the Covid-19 virus, the Dutch government urges people to stay at home as much as possible and keep 1.5 meter distance to others in public. To what extent do people comply with these measures? How crowded are the streets of Amsterdam and do people keep 1.5-meter distance?

Based on footage of municipal surveillance cameras, we report monthly the status of social distancing and crowding on the streets of Amsterdam. We show developments during the day and over weeks. With this fourth factsheet, we add an additional eight weeks to the data we presented previously. Now the period of investigation covers March 5, 2020 to March 27, 2021.

Method

We use video recordings made by 57 municipal surveillance cameras in Amsterdam (see Figure 1 for the location of these cameras). We obtained these recordings from the Amsterdam police with the permission of the Dutch Public Prosecutor. The research was approved by the Ethics Committee for Legal and Criminological Research (CERCO) at Vrije Universiteit Amsterdam.

Video footage of the 57 cameras was recorded on all Thursdays and Saturdays from 9:00 to 20:00, in the period of investigation (March 2020 to March 2021). Between July 23rd and August 29th 2020, no data was stored due to organizational issues. At each full hour of the available footage, a still frame was taken for every camera, resulting in a total of 50.469 still frames. To automatically detect people in these still frames and to measure the number of contact moments, defined as instances where an individual keeps less than 1.5 meter distance from another individual, a computer vision based algorithm was used that is developed in additional ongoing research. The algorithm successfully passed performance tests, also on videos recorded during darkness, against a subsample of still frames observed and coded by human coders that we used as benchmark.

For technical reasons, some intended observation points are missing from the data. These reasons include occasional camera failure and video conversion failures. To optimize the available information and reduce bias, we used a statistical approach known as multiple imputation to compute outcome measures for the missing data points.



This project is part of the COVID-19 research program funded by ZonMw. See https://corona-compliance.org/

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Figure 1: Placement of the municipal surveillance cameras used for the study

Results

Figure 2 shows the observed number of people on the street (circles) and the observed number of contact moments (triangles) over the course of the day, on Saturdays and Thursdays. The number of people on the street, as well as the number of 1.5-meter contact moments, were higher on Saturdays (in red) compared to Thursdays (in blue). On both days, it appeared to be relatively busy between 12:00 and 18:00, although on Thursdays, the peak was considerably lower. The number of 1.5- meter contact moments correlates strongly with the number of people on the street (r = 0.81 throughout the study period), which is visualized in the parallel development of these measures over time in Figures 2 and 3. This strong correlation could signal a causal relationship: it might be more difficult for people to keep their distance in relatively crowded settings.



Figure 2: Number of people on the street and 1.5 meter contact moments on Thursdays and Saturdays

In Figure 3, the average number of people on the street per week (circles) and the average number of contact moments per week (triangles) are presented for the period between March 5, 2020 and March 27, 2021. There are notable fluctuations throughout the year, for both the number of people on the street and the number of contact moments.

To contextualize these fluctuations, the background colour of the figure represents the level of measures during this period. Here, we distinguished five different levels: 'none or very few measures' (e.g., the Prime-Minister asking us to not shake hands), 'mild measures' (mandatory closing times for bars, limitations to the allowed number of visitors indoors), 'strict measures' (certain sectors closed down, limitations to sport events), 'lockdown' (schools closed, flow locations closed), and 'hard lockdown' (all non-essential shops closed). Figure 4 presents average temperatures per week for the same period (March 5, 2020 to March 27, 2021) to provide context to the numbers in Figure 3 as well.







Figure 4: Average temperatures per week

Source: KNMI (www.knmi.nl)

The first noticeable drop in the number of people on the street and the number of contact moments in Figure 3 is in the week of March 23, 2020. At this time, the first lockdown was enforced by the government. After this initial drop, we see that the level of crowding and contact moments slowly increases over the following weeks until it reaches an average of 8.5 people on the streets per still frame at the end of the lockdown (the week of May 11, 2020). The average number of people on the street remains quite high until a second drop in October, which is potentially related to a national holiday period.

A third noticeable drop appears in the week of December 14, 2020, a week after the so-called *hard lockdown* was enforced by the government. After this drop, the crowding and contact levels increased slowly over the following weeks. However, at the end of February there is a sudden increase, in which the number of people on the street is at the same level as late July and early September. At the time of this sudden increase in the number of people on the street, there was also an increase in temperature (Figure 4). The levels of crowding and contact moments drop after two weeks, which coincides with the drop in temperature. It seems plausible that the rise and drop in temperature play a role in the increase and later decrease of the number of people on the street and the number of contact moments.

The current data also gives us the opportunity to look at the three lockdown periods (starting March 2020, November 2020 and December 2020) to see to what extent they are similar in crowding and contact moments. What we can see from Figure 3 is that overall, crowding and contact moments are low at the beginning of the first lockdown in March 2020 and third lockdown in December 2020, but slowly increase as these lockdowns continue. This is not the case for the second, shorter lockdown in November 2020, where levels of crowding and contact moments decrease over the two weeks the lockdown lasted.

When we look at the first (March 2020 – May 2020) and third (December 2020- April 2021) lockdown more closely, we see an almost similar pattern in crowding and contact moments over time. In the first lockdown, which lasted 7 weeks, the average number of people on the street per week started at almost 6 and increased to approximately 8.5 at the end of the lockdown (May 2020). In the third lockdown, which lasted almost 20 weeks, the average number of people was approximately 7 at the start, dropped to 5.5 and is around 9 at the end of March. The average numbers of contact moments follow the same patterns. Overall, this shows that the levels of crowding and contact moments do not differ a lot in the third lockdown compared to the first. One big difference however, is the sudden increase in crowding as well as contact moments in February 2021, which, as we argued earlier, is possibly related to the increase in temperature since the numbers dropped back to their original levels after the weather changed.

Discussion

Possible explanations for the established patterns in the number of people on the street and the number of contact moments are numerous and beyond the scope of this factsheet. Our current research focuses on providing explanations for the trends. The main point of interest in the current factsheet is the comparison of behavioral patterns across lockdown periods. This comparison is pure descriptive, and not statistically tested yet. Public debates indicate that people are 'corona tired' and may, therefore, be less willing to comply with government measures. From our observations of street behavior, we find no evidence for this idea. In the third lockdown that is just about to end, people followed distancing directives as good (if not better) as they did the first lockdown a year earlier, despite the lockdown period being substantially longer. People might be tired of corona measures in general but that is not reflected in the trends in their behavior in public space.



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