The effect of social distancing on the reproduction number and number of contacts in the UK from a social contact survey
Report for survey week 42

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Report for SPI-M-O and SAGE, 19th January 2021
Data up to 8th of January 2021

Summary

- Mean contacts remain low in all four nations and across the regions of England.
- Mean contacts for adults by age show a small upward movement for work contacts following the end of the Christmas break in working ages. Overall adult contacts are consistent with those seen during the second lockdown.
- Mean contacts for individuals under 18 remain low after having reduced substantially during the school holidays. There has, however, been a modest increase in mean contacts in children - particularly pre-school and primary school-aged children - since the end of the school holidays.
- Overall, mean contacts between age groups appear consistent between the first and current lockdowns (third lockdown). The main differences is that there appears to be more contact between children during this lockdown than there was during the first lockdown. Limited data are available for the third lockdown, and these patterns need further verification.

Mean contacts amongst adults remain low (Figure 1). There is a suggestion of work contacts increasing following the end of the Christmas break. That is, despite the introduction of the third lockdown, work/education contacts for adults appear to be higher now than during the Christmas period. Contacts in the home have remained broadly constant and contacts in the other setting (mostly social and leisure contacts) remain low and at similar levels to the previous lockdown. These patterns are consistent across age groups.

Consistent with last week's report, mean contacts in under 18s remain low after having reduced substantially since school closures for holidays and third lockdown (Figure 2). There may have been small increases in contacts for younger children (pre- and primary-school-aged children) mainly due to a small increase in mean contacts in the educational context.

We have limited data for the current lockdown 5th-8th of January, but early indications suggest mean contacts between age groups is similar to those found during the first lockdown (Figure 3). The main difference is that there appears to be greater contact between younger children (pre- and primary school-aged children) compared with the first lockdown. Estimates of the difference between mean contacts will be improved next week once we have further data available for this lockdown. The overall magnitude of the matrices are similar with the ratio of the dominant eigenvalues being 1.10 (95% CI 1.03 to 1.17).

Contacts between age groups are very similar comparing the third Lockdown and the Christmas period (*23rd December 2020 to 2nd January 2021).* Similar to the comparison with the first Lockdown, the main difference is potentially greater contact between younger children (pre- and primary school-aged children).

Mean contacts for adults remain low across the four nations and English regions from the period of early November up to the beginning of January (Figure 5).

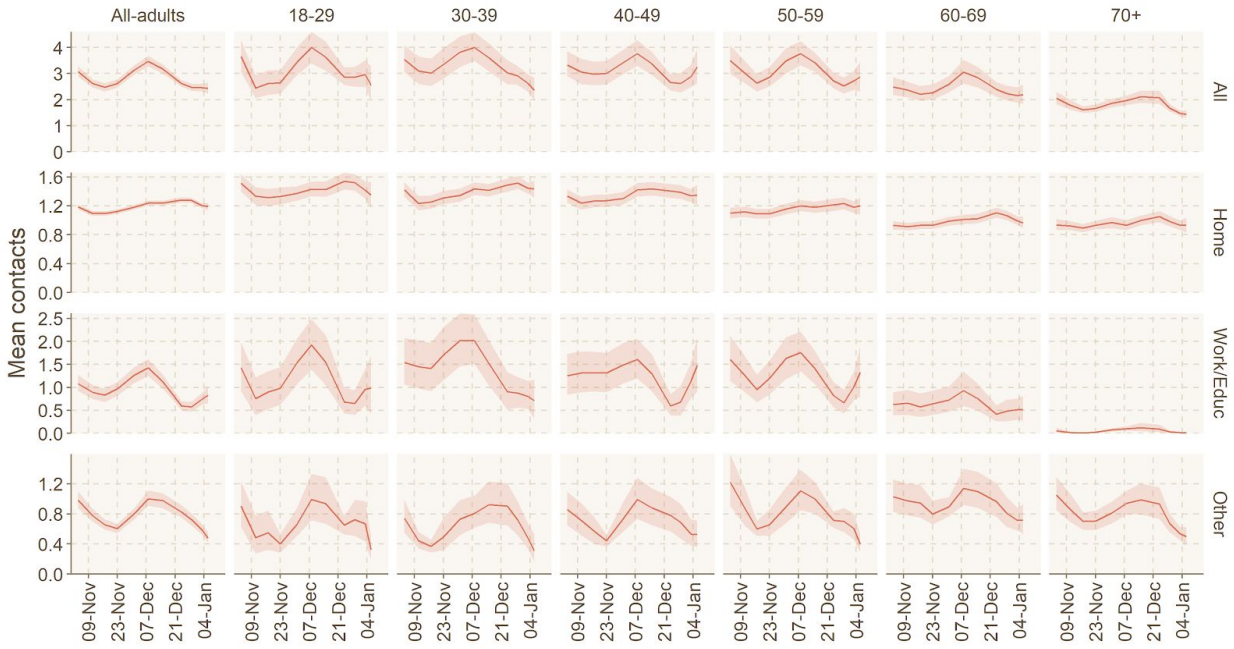

Figure 1: Setting-specific mean contacts by age-group for adults over time. Uncertainty calculated using bootstrapping. Contacts truncated to 50 contacts per participant. Observations are smoothed over two weeks to account for panel effects. Educ = educational setting. Date on x axis refers to the midpoint of the survey period.

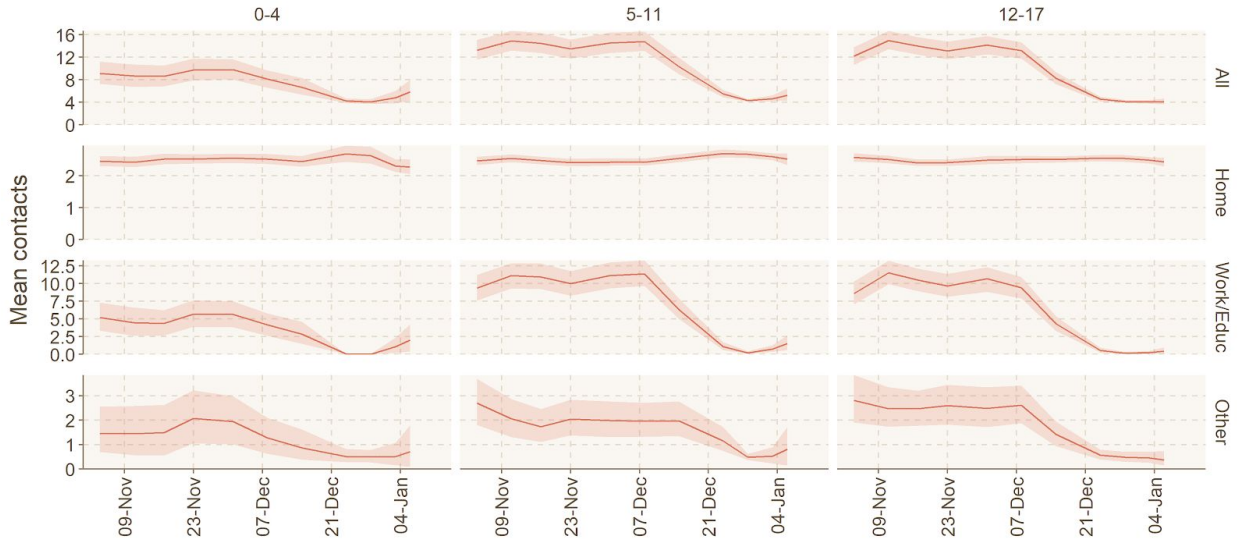

Figure 2: Setting-specific mean contacts by age-group for children over time. Uncertainty calculated using bootstrapping. Contacts truncated to 50 contacts per participant. Observations are smoothed over two weeks to account for panel effects. Educ = educational setting. Date on x axis refers to the midpoint of the survey period.

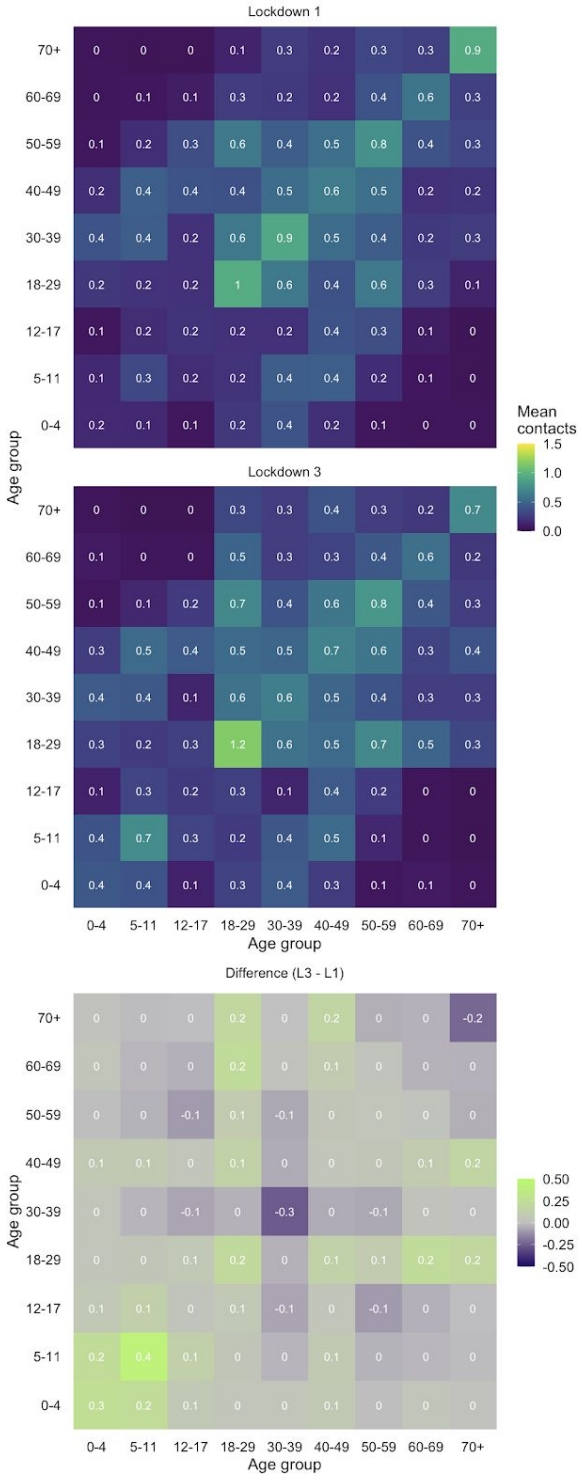

Figure 3: Contact matrix for all contacts by age comparing Lockdown 1 and Lockdown 3 and the absolute difference of the cells of the matrices. Contacts truncated to 50 contacts per participant. *Lockdown 1 data from 23rd of March to 3rd of June 2020 Lockdown 3 data from 5th to 8th of January 2021*

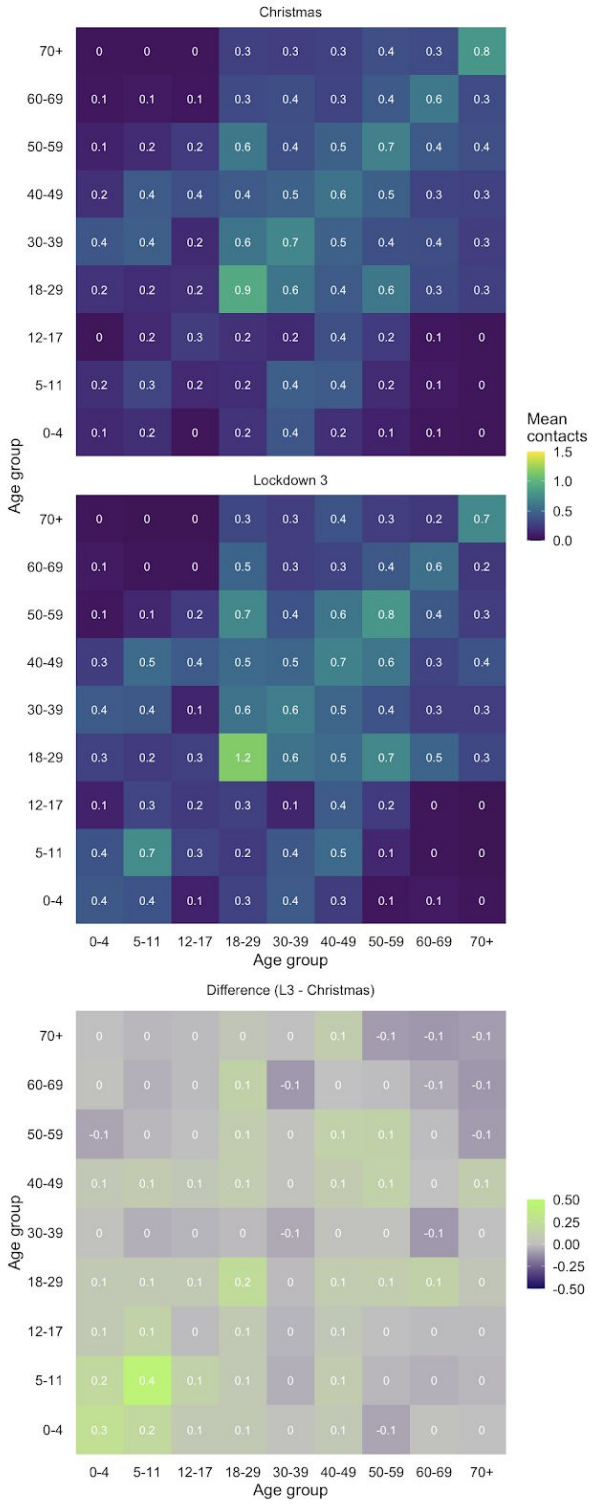

Figure 4: Contact matrix for all contacts by age comparing Christmas period and Lockdown 3 and the absolute difference of the cells of the matrices. Contacts truncated to 50 contacts per participant. Christmas data from *23rd December 2020 to 2nd January 2021 of December 2020 Lockdown 3 data from 5th to 8th of January 2021*

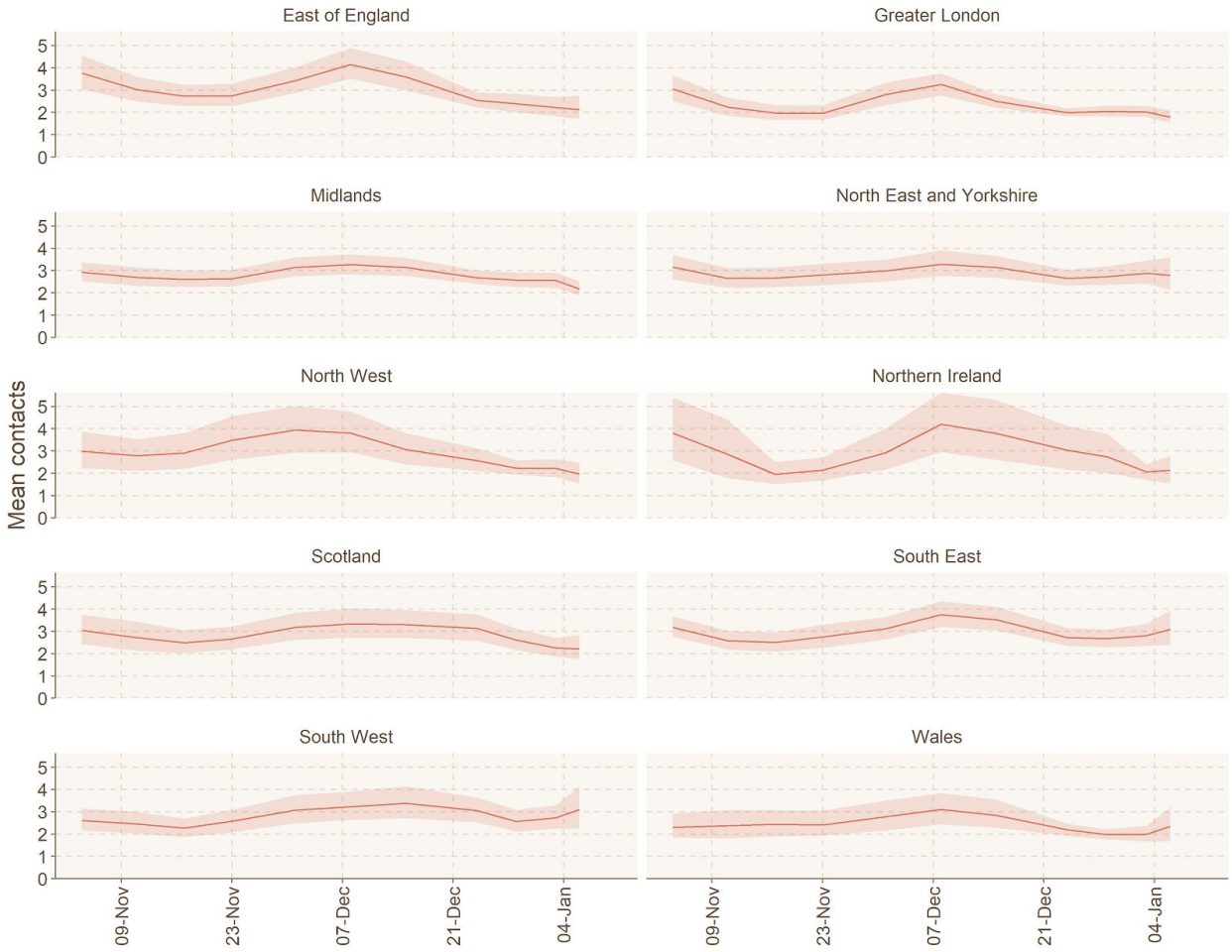

Figure 5: Mean contacts in all settings in adults for UK nations and English regions over time. Uncertainty calculated using Bootstrapped accounting. Contacts truncated to 50 contacts per participant. Observations are smoothed over two weeks to account for panel effects. Date on x axis refers to the midpoint of the survey period.

Methods

CoMix is a behavioural survey, launched on 24th of March 2020. The sample is broadly representative of the UK adult population. Participant's are invited to respond to the survey once every two weeks. We collect weekly data by running two alternating panels. Parents complete the survey on behalf of children (17 years old or younger). Participants record direct, face-to-face contacts made on the previous day, specifying certain characteristics for each contact including the age and sex of the contact, whether contact was physical (skin-to-skin contact), and where contact occurred (e.g. at home, work, while undertaking leisure activities, etc). Further details have been published elsewhere[2]. The contact survey is based on the POLYMOD contact survey[3].

We calculated the mean contacts using 1000 bootstrap samples. Bootstrap samples were calculated at the participant level, then all observations for those participants are included in a sample to respect the correlation structure of the data. We collect data in two panels which alternate weekly, therefore we calculated the mean smoothed over the 2 week intervals to give a larger number of participants per estimate and account for panel effects. We calculated the mean number of contacts in the settings home, work and school (including all educational establishments, including childcare, nurseries and universities and colleges), and "other" (mostly leisure and social contacts, but includes shopping). We look at the mean contacts by age, country, and region of England. The mean number of contacts is influenced by a few individuals who report very high numbers of contacts (often in a work context). The means shown here are calculated based on truncating the maximum number of contacts recorded at 50 per individual per day.

We constructed age-stratified contact matrices for nine age-groups (0-4, 5-11, 12-17, 18-29, 30-39, 40-49, 50-59, 60-69, and 70+). For children participants and contacts, we did not have exact ages and therefore sampled from the reported age-group uniformly. We fitted a truncated negative binomial model to calculate the mean contacts between each participant and contact age-groups. To find the population normalised symmetrical contact matrix, we multiplied the columns of the matrix by the mean-normalised proportion of the UK population in each age-group.

We created the matrix for the first lockdown using data from the period of 23rd of March until 3rd of June. We created the matrix for the third lockdown using data from the 5th to the 8th of January. Individual element absolute difference of the matrices were calculated as well as the ratio of the dominant eigenvalues. A similar analyse was performed comparing the third lockdown to the christmas period.

Note that graphs present data smoothed over two weeks where mean contacts are aligned to the middle time point of each survey round and therefore include data up to one week before and after date stated in graphs.

References

1. Full list of local restriction tiers by area. [cited 21 Dec 2020]. Available: https://www.gov.uk/guidance/full-list-of-local-restriction-tiers-by-area

2. Jarvis CI, Van Zandvoort K, Gimma A, Prem K, CMMID COVID-19 working group, Klepac P, et al. Quantifying the impact of physical distance measures on the transmission of COVID-19 in the UK. BMC Med. 2020;18: 124.

3. Mossong J, Hens N, Jit M, Beutels P, Auranen K, Mikolajczyk R, et al. Social contacts and mixing patterns relevant to the spread of infectious diseases. PLoS Med. 2008;5: e74.