The effect of school opening or closure on social contacts in England from the CoMix social contact survey
Report for survey week 43a- Updated

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Summary
- Mean contacts remain low in all four nations and across the regions of England.
- Working-aged adults have reported a small increase in mean work contacts following the end of the Christmas break. 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.
- 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 slightly more contact between children aged 0-4 during this lockdown than there was during the first lockdown.
- Comparing the second and third lockdowns, the main difference is school-related contacts amongst children being much higher in the second lockdown.

Mean contacts amongst adults remain low (Figure 1). Work/education contacts have increased slightly but have remained mostly at similar levels to those seen during the Christmas break in working aged adults. 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. Older adults (60+) report fewer contacts than younger adults, mainly due to lower work/education contacts (very few for the 70+ age group), but they also make fewer contacts in the home.

Mean contacts in under 18s remain low (Figure 2). There may have been small increases in contacts for younger children (particularly pre-school-aged children) mainly due to an increase in mean contacts in the educational context (which includes nursery and day care).

Age-patterns of contact remain similar to those found during the first lockdown (Figure 3). There are slightly higher contacts between younger children (pre- and primary school-aged children) compared with the first lockdown. The overall magnitude of the matrices are very similar with the ratio of the dominant eigenvalues being 1.07 (95% CI 1.02 to 1.14). Though this difference appears to be due to the contacts between 0-4 year olds, this is consistent with early-year settings remaining open despite the closure of schools.

Age-patterns of contacts are also similar for adults comparing the second and third lockdown (Figure 4). Contacts for children were much larger in the second lockdown compared to the third as would be expected since school's were open during the former. This resulted in the ratio of the dominant eigenvalues being higher, 2.54 (95% CI 2.41 to 2.70).

Mean contacts for adults remain low across the four nations and English regions from the period of early November up to the middle of January (Figure 5).
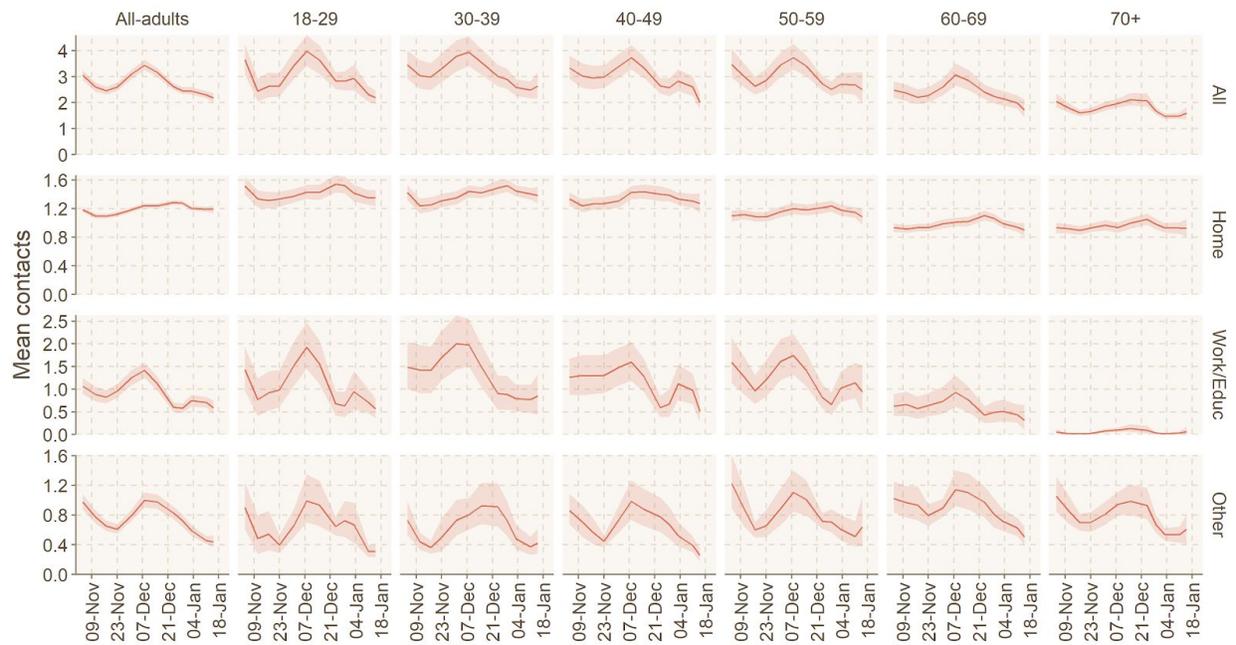
Figure 1: Setting-specific mean contacts by age-group for adults over time. Uncertainty calculated using bootstrapping. Contacts truncated to 50 contacts per participant. Observations are smoothed over two weeks to account for panel effects. Educ = educational setting. Date on x axis refers to the midpoint of the survey period.
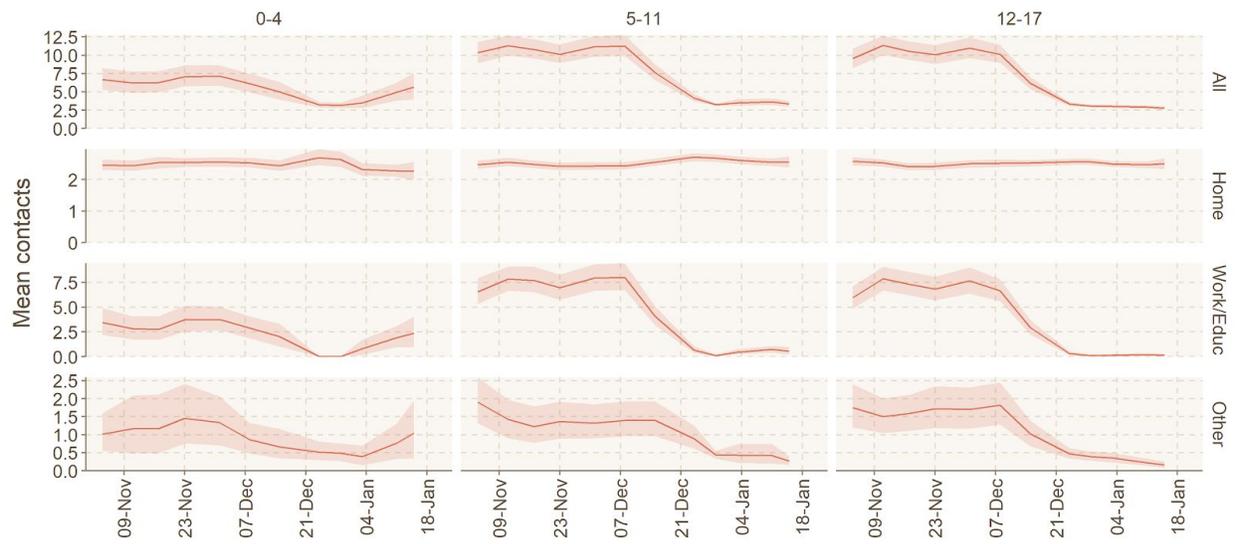
Figure 2: Setting-specific mean contacts by age-group for children over time. Uncertainty calculated using bootstrapping. Contacts truncated to 50 contacts per participant. Observations are smoothed over two weeks to account for panel effects. Educ = educational setting. Date on x axis refers to the midpoint of the survey period.
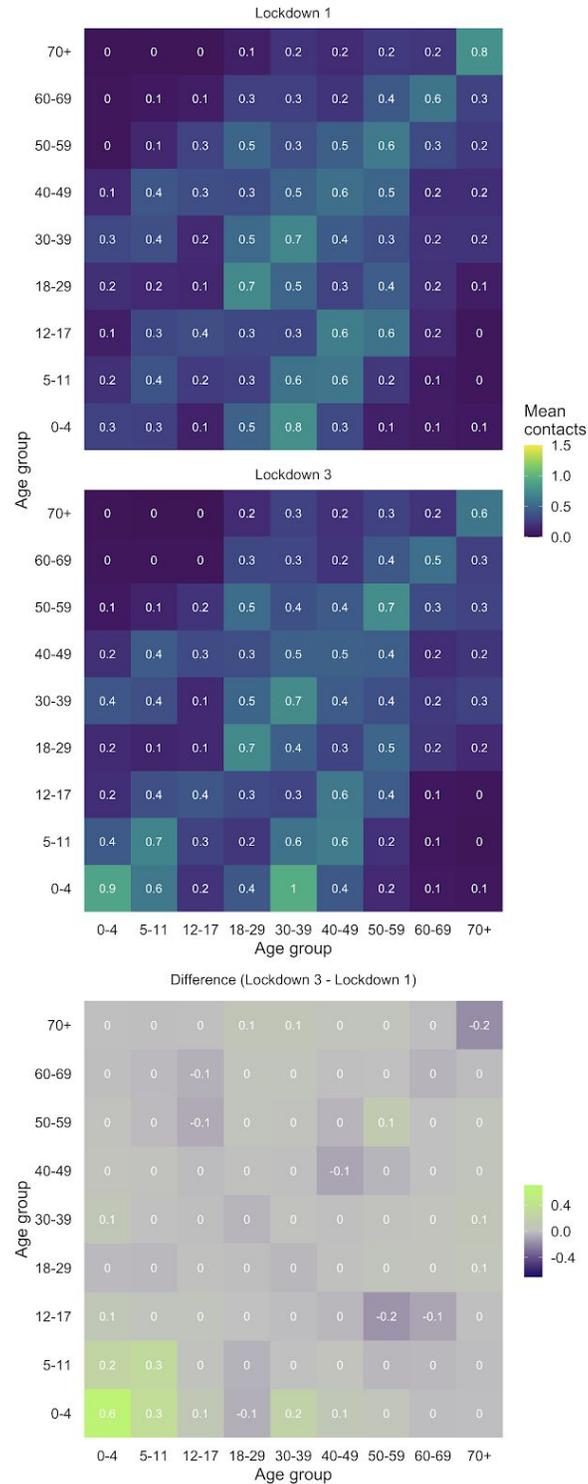
Figure 3: Contact matrix for all contacts in England by age comparing Lockdown 1 and Lockdown 3 and the absolute difference of the cells of the matrices. Contacts truncated to 50 contacts per participant. *Lockdown 1 data from 23rd of March to 3rd of June 2020 Lockdown 3 data from 5th to 18th of January 2021*
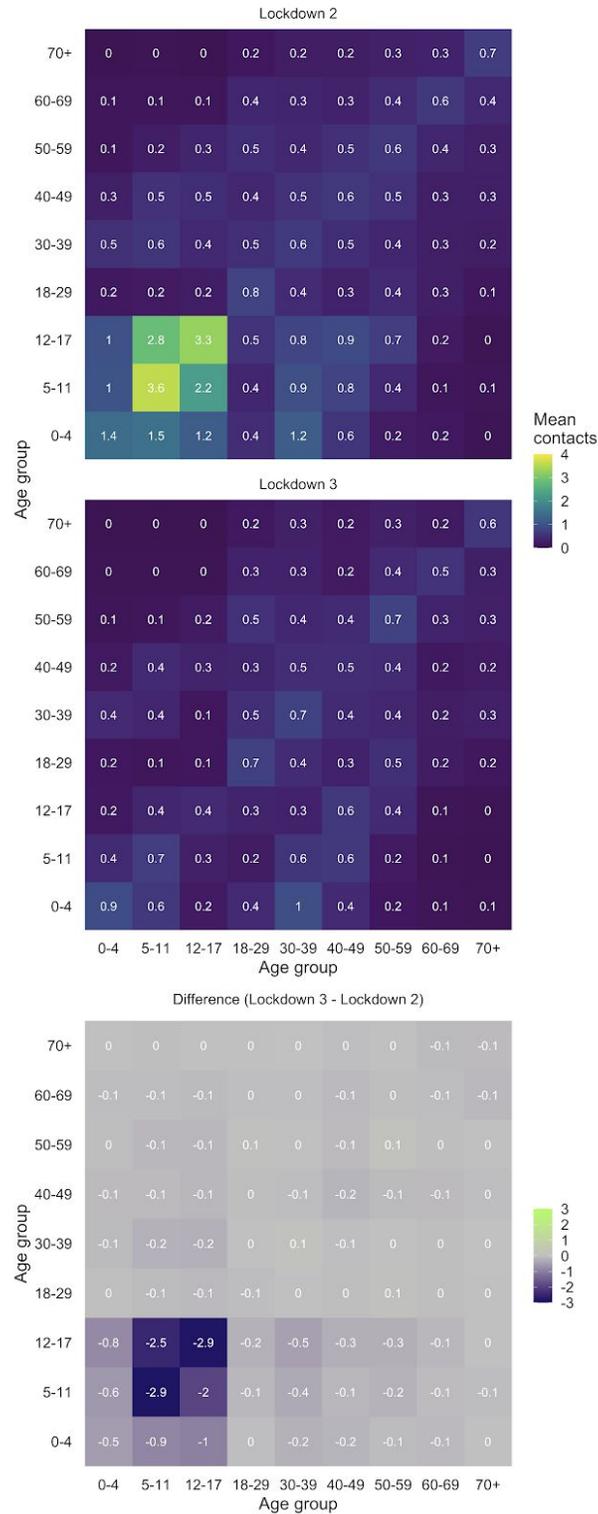
Figure 4: Contact matrix for all contacts in England by age comparing Lockdown 2 and Lockdown 3 and the absolute difference of the cells of the matrices. Contacts truncated to 50 contacts per participant. Lockdown 2 data from *5th November to 2nd December 2020 and Lockdown 3 data from 5th to 18th of January 2021*
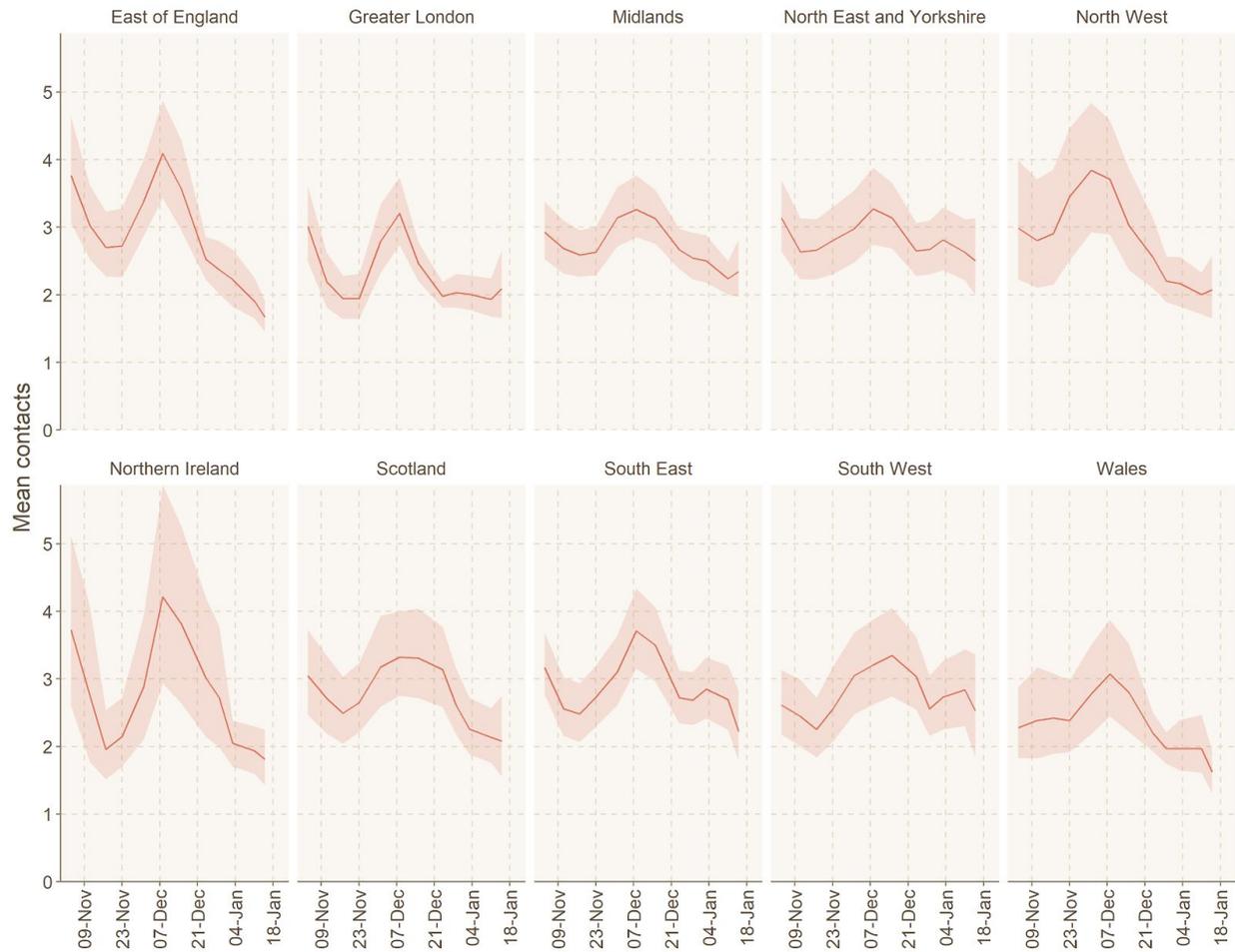
Figure 5: Mean contacts in all settings in adults for UK nations and English regions over time. Uncertainty calculated using Bootstrapped accounting. Contacts truncated to 50 contacts per participant. Observations are smoothed over two weeks to account for panel effects. Date on x axis refers to the 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 with a weighting consistent with the age distribution of contacts for the participants' own age, according to the polymod survey[3]. 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 are the matrix for the second lockdown using data from the period of 5th November until 2nd December 2020. We created the matrix for the third lockdown using data from the 5th to the 8th of January. Individual element absolute differences of the matrices were calculated as well as the ratio of the dominant eigenvalues. A similar analysis was performed comparing the third and second lockdown without the ratio of the dominant eigenvalues.

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.