The impact of banning sporting events and other leisure activities on the COVID-19 epidemic.

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11th March 2020

Background
There is currently much interest in banning mass gatherings as a way to mitigate the COVID-19 epidemic. We assessed the likely impact of these measures.

Methods
We use the LSHTM age-structured stochastic transmission dynamic model. We look at the impact of 2 different policies:
1) Banning all major sporting events.
2) Reducing all leisure-related contacts (pubs and bars, restaurants, cinema, etc) by 75%.

To estimate the impact of banning sporting events, we used estimates of the cumulative attendance at these events across the UK in 2019 (https://twocircles.com/gb-en/articles/uk-named-world-capital-of-live-sport-following-new-attendance-analysis/). The average person in the UK makes 10.9 contacts per day, 3.7 of which are "other", of which 1.8 are "leisure" (Mossong et al 2008). Given a UK population of 67,530,172 in 2019 (same year as sports analysis), this means there are 250,536,938 "other" contacts per day. Attendance at UK sporting events is 75,100,000 per year, which works out to 205,753 per day. If individuals make 5 contacts per event, this is 1,028,767 contacts per day. Accordingly, banning sporting events should reduce "other" contacts by 1,028,767 / 250,536,938 = 0.41 %. We reduced "other" contacts by this amount for the "banning spectator sports" scenario.

Conversely, reducing "leisure" contacts by 75% should reduce "other" contacts by (0.75*1.79)/3.71 = 36.2%. We reduced "other" contacts by this amount for the "clampdown on leisure activities" scenario.

Both of these strategies are applied to:

a) An uncontrolled epidemic.
b) A partially mitigated epidemic in which case isolation and cocooning of the elderly (65+) are in place for 7 months, starting from mid March.

Results
The figure below shows the impact of the different measures. Banning attendance of sporting events has an imperceptible impact on the epidemic.
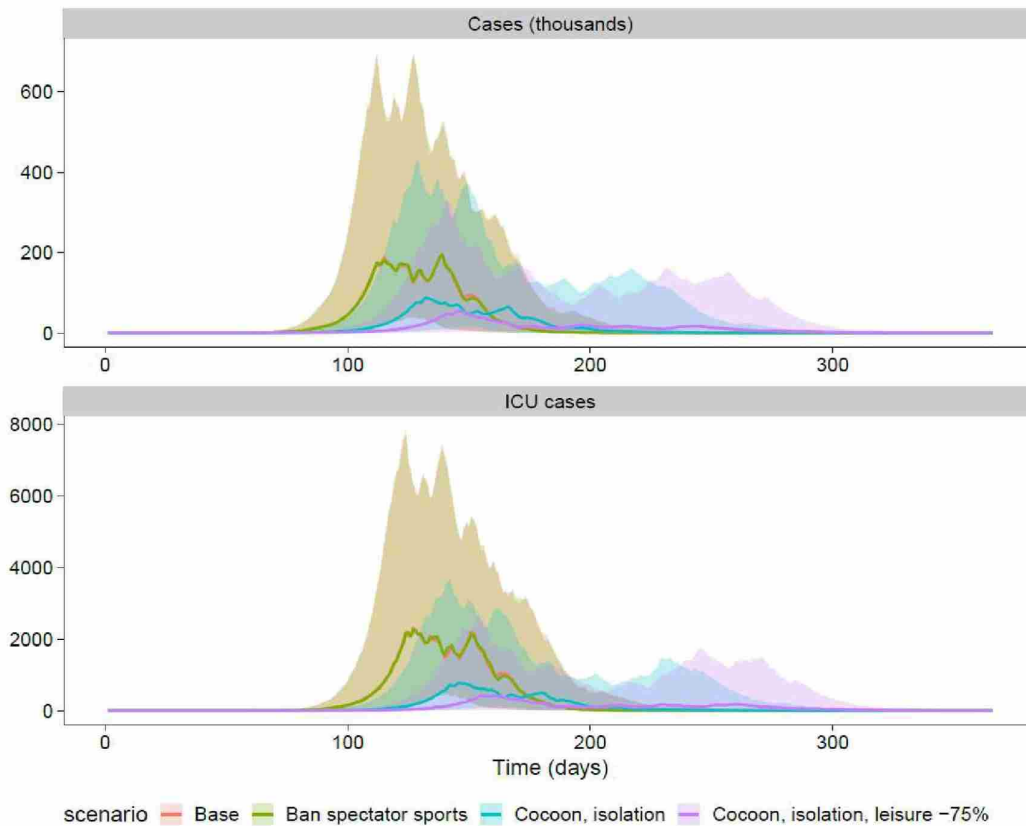
Figure 1. Impact of different measures. Median epidemic lines are given by solid lines, for the different scenarios, and shaded areas give associated CIs.

The table below shows the impact of the different policies. It is clear that there is a negligible impact of banning attendance at sporting events, but that a reduction in leisure activities can reduce peak height and total numbers of cases.

table	scenario	Median (IQR)
Peak week: cases	Base	20 (17-24)
Peak week: cases	Ban spectator sports	20 (17-24)
Peak week: cases	Cocoon, isolation	23 (20-33.5)
Peak week: cases	Cocoon, isolation, leisure -75%	25.5 (20-36.5)
Peak week: icu	Base	21 (19-25.8)
Peak week: icu	Ban spectator sports	21 (19-25.8)
Peak week: icu	Cocoon, isolation	25 (22-34.8)
Peak week: icu	Cocoon, isolation, leisure -75%	27.5 (22-37.8)
Peak height: cases	Base	5440K (2880-6650)
Peak height: cases	Ban spectator sports	5430K (2860-6630)
Peak height: cases	Cocoon, isolation	2820K (2050-4980)

Peak height: cases	Cocoon, isolation, leisure -75%	2370K (1870-3690)
Peak height: icu	Base	55900 (29900-72900)
Peak height: icu	Ban spectator sports	55400 (30000-72800)
Peak height: icu	Cocoon, isolation	21300 (14800-37300)
Peak height: icu	Cocoon, isolation, leisure -75%	21700 (15400-27400)
Total: cases	Base	26400K (22100-28400)
Total: cases	Ban spectator sports	26400K (22100-28400)
Total: cases	Cocoon, isolation	20500K (19100-24200)
Total: cases	Cocoon, isolation, leisure -75%	20600K (19400-21200)
Total: icu	Base	287000 (226000-325000)
Total: icu	Ban spectator sports	286000 (225000-326000)
Total: icu	Cocoon, isolation	165000 (157000-197000)
Total: icu	Cocoon, isolation, leisure -75%	175000 (157000-192000)

Discussion

Banning sporting events has a negligible impact on the epidemic. Reducing all leisure contact, which mainly occurs in pubs/bars, restaurants and cinemas would have a much larger (though still modest) impact on the epidemic. Many individuals are likely to choose to avoid such settings anyway, as they perceive them to be risky (Sadique et al. 2007)

References

Mossong J, Hens N, Jit M, Beutels P, Auranen K, Mikolajczyk R, Massari M, Salmaso S, Tomba GS, Wallinga J, Heijne J, Sadkowska-Todys M, Rosinska M, Edmunds WJ. Social contacts and mixing patterns relevant to the spread of infectious diseases. PLoS Med. 2008 Mar 25;5(3):e74.

Sadique MZ, Edmunds WJ, Smith RD, Meerding WJ, de Zwart O, Brug J, Beutels P. Precautionary behavior in response to perceived threat of pandemic influenza. Emerg Infect Dis. 2007 Sep;13(9):1307-13.