Physical Distancing: Literature Review as of September 16, 2020

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The impact of physical distancing is difficult to quantify from the literature for several reasons. Many times, physical distancing is very broadly defined with no specific parameters. It often includes interventions such as isolation and quarantine of positive and exposed contacts, but also ill-defined parameters such as "reduction of community contacts by 50%" or working from home. We have not identified any studies that measure the outcomes from staying specifically 6 feet apart from one another in any environment.

In general, social distancing or physical distancing is based upon the notion that droplets travel about three to six feet maximum which was determined decades ago using what may be considered outdated science today.[1] Reviews about the aerosol nature of SARS-CoV-2 suggest this idea is an oversimplification and argue that aerosol transmission should be considered as a route of transmission, in addition to the current droplet and fomite routes.[2–4] If aerosols play a large role, physical distancing may be less effective, especially in smaller rooms with more people and poor ventilation. Among the points made in these reviews is the possibility of asymptomatic or presymptomatic transmission without coughing or sneezing through regular respiration and conversation. Additionally, SARS-CoV-2 was shown to have similar properties in laboratory aerosol experiments to SARS-CoV-1, remaining viable in aerosols for up to 3 hours.[5] Setti et al. highlight several studies that show that SARS-CoV-2 virus in aerosol forms have the potential to travel more than 6 feet distance, perhaps as far as 10 to 13 feet or even further with the right conditions. They emphasize that using the 6 foot social distancing rule must be coupled with the wearing of masks to counter the effects of aerosols.[4]

Presented below is a concise summary of articles attempting to measure the impact of physical distancing. A targeted search of the literature was conducted in PubMed and other sources to identify studies.

Evidence of Physical Distancing Benefits

A systematic review examining workplace social distancing showed that interventions such as reducing contacts by 50% and being able to work from home resulted in a median reduction of 23% of influenza infection. Workplace physical distancing works better when combined with other measures, while the benefit of workplace physical distancing declines with increasing basic reproduction number (R0), especially above 1.9.[6] Additionally, a recent meta-analysis found that physical distancing of only 1 meter is enough to reduce the odds of transmission by 82%. They also conclude that there is a dose-response for increasing the physical distance, where every additional meter of distance decreased the risk of transmission further.[7]

Recent analysis of case data across the globe has demonstrated empirical evidence for the benefits of social distancing measures imposed by governments. Using a pretest/posttest comparison approach, Siedner et al. found the rate of cases decreased by 0.9% per day from

the fourth day after social distancing measures commenced, dropping from a rate of 30.8% prior to the measures to 12.7% by 21 days post-measures.[8] Though not a direct measure of COVID-19 cases, one study compared several common childhood illnesses in Massachusetts during the same weeks in 2019 to 2020, finding substantial declines in almost all diagnoses following implementation of social distancing. The effects of reduction in seeking care was cross checked through the fact that not typically contagious urinary tract infections were not substantially impacted from one year to the next, and flu diagnoses were increased in 2020 compared to 2019 which mirrors national data.[9] Yet another study looking at global COVID-19 cases used an interrupted time series analysis with Poisson regression and found implementing any social distancing measure decreased cases by 13%.[10]

Conclusion

The concept of social or physical distancing specifically of 6 feet is largely based on what is known about how droplets travel through air. Current knowledge about SARS-CoV-2 suggests that it is similar to SARS-CoV-1 in aerosol form and can potentially travel further than the standard 6 feet range. However, analysis of COVID-19 data and governmental policies is demonstrating that social/physical distancing measures such as school closures or banning large gatherings are beneficial in reducing the incidence of the infection.

1. Jones NR, Qureshi ZU, Temple RJ, Larwood JPJ, Greenhalgh T, Bourouiba L. Two metres or one: what is the evidence for physical distancing in covid-19? *BMJ*. 2020;370. doi:10.1136/bmj.m3223

2. Anderson EL, Turnham P, Griffin JR, Clarke CC. Consideration of the Aerosol Transmission for COVID-19 and Public Health. *Risk Anal Off Publ Soc Risk Anal*. 2020;40(5):902-907. doi:10.1111/risa.13500

3. Bahl P, Doolan C, de Silva C, Chughtai AA, Bourouiba L, MacIntyre CR. Airborne or droplet precautions for health workers treating COVID-19? *J Infect Dis*. Published online April 16, 2020. doi:10.1093/infdis/jiaa189

4. Setti L, Passarini F, De Gennaro G, et al. Airborne Transmission Route of COVID-19: Why 2 Meters/6 Feet of Inter-Personal Distance Could Not Be Enough. *Int J Environ Res Public Health*. 2020;17(8). doi:10.3390/ijerph17082932

5. Van Doremalen N, Bushmaker T, Morris D, et al. Aerosol and surface stability of HCoV-19 (SARS-CoV-2) compared to SARS-CoV-1. Published online 2020. doi:10.1101/2020.03.09.20033217

6. Ahmed F, Zviedrite N, Uzicanin A. Effectiveness of workplace social distancing measures in reducing influenza transmission: a systematic review. *BMC Public Health*. 2018;18(1):518. doi:10.1186/s12889-018-5446-1

7. Chu DK, Akl EA, Duda S, et al. Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. *The Lancet*. 2020;395(10242):1973-1987. doi:10.1016/S0140-6736(20)31142-9

8. Siedner MJ, Harling G, Reynolds Z, et al. Social distancing to slow the US COVID-19 epidemic: Longitudinal pretest–posttest comparison group study. *PLOS Med*. 2020;17(8):e1003244. doi:10.1371/journal.pmed.1003244

9. Hatoun J, Correa ET, Donahue SMA, Vernacchio L. Social Distancing for COVID-19 and Diagnoses of Other Infectious Diseases in Children. *Pediatrics*. Published online September 1, 2020. doi:10.1542/peds.2020-006460

10. Islam N, Sharp SJ, Chowell G, et al. Physical distancing interventions and incidence of coronavirus disease 2019: natural experiment in 149 countries. *BMJ*. 2020;370. doi:10.1136/bmj.m2743