Stay safe together while staying two metres apart
Dr Shane Farrelly MFOM Occupational Health Specialist

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Could the COVID-19 outbreak be stopped by warmer weather? -

The simple answer to this is: we don't know yet.

Not enough is known about the new coronavirus to say that it will disappear, or even have its spread reduced, in Europe & the UK as the temperature increases.

Evidence from similar viruses suggests that the virus may transmit less efficiently in the spring and summer months. Alongside changes in temperature, it is thought that humidity, differences in human behaviour and human immune system functioning also play a role in this pattern.

However, even if it ultimately turns out to be a seasonal virus, it is unlikely to behave like similar viruses in the short term. This is because it is so new that very few people are immune from it.

Seasonal flu occurs because of the persistence of current strains or recently circulating strains of the flu. But because these strains persist in the environment, some people are immune.

But what makes some strains of viruses seasonal isn't clear to scientists.

When it comes to the flu, humidity might contribute to seasonality. When we breathe in and out, virus particles escape, surrounded by a droplet of moisture. During the winter, when there's less humidity in the air, the moisture evaporates and the virus particles remain suspended in the air. In the summer, when the humidity is higher, the droplets keep a lot of that moisture and fall toward the ground

According to Professor Lipsitch, Professor of Epidemiology and Director, Center for Communicable Disease Dynamics, Harvard T.H. Chan School of Public Health while we may expect modest declines in the contagiousness of SARS-CoV-2 in warmer, wetter weather and perhaps with the closing of schools in temperate regions of the Northern Hemisphere, it is not reasonable to expect these declines alone to slow transmission enough to make a big dent.

Myths

Myth 1: In 2003, SARS went away on its own as the weather got warmer.
SARS did not die of natural causes. It was killed by extremely intense public health interventions in mainland Chinese cities, Hong Kong, Vietnam, Thailand, Canada and elsewhere. These involved isolating

cases, quarantining their contacts, a measure of "social distancing," and other intensive efforts. These worked well for SARS because those who were most infectious were also quite ill in a distinctive way — the sick cases were the transmitters, so isolating the sick curbed transmission. In Toronto, SARS resurged after the initial wave was controlled and precautions were discontinued. This resurgence was eventually linked to a case from the first wave. **The resurgence confirms that it was control measures that stopped transmission the first time.**

Myth 2: The "common cold" coronaviruses are seasonal, with little transmission in the summer, so SARS-CoV-2 will be too.

Predicting how a novel virus will behave based on how others behave is always speculative, but sometimes we have to do so when we have little else to go on. So the first problem with this myth is that we don't know whether those coronaviruses, like OC43, HKU1, 229E, and NL63, are good analogies for this virus. Still, it is worth considering the analogy especially to OC43 and HKU1, which are SARS-CoV2's closest relatives among the seasonal coronaviruses. The other reason this is a myth is that seasonal viruses that have been in the population for a long time (like OC43 and HKU1) behave differently from viruses that are newly introduced into the population.

To understand why, it helps to understand what we know about why many respiratory viruses are winter-seasonal in temperate regions like Ireland, the UK and most of the USA.

Scientists have identified four factors that contribute to this phenomenon.

Factor 1: The environment.

In the winter, the outdoor air is colder, and the air is dryer usually both indoors and out. For influenza, it has been shown in the laboratory that absolute humidity — the quantity of water vapor in the air — strongly affects flu transmission, with drier conditions being more favorable. There are no specific studies of the role of humidity for coronaviruses or other respiratory viruses besides flu. Also important: there may be some very humid conditions that also favor flu transmission, especially relevant in the tropics. Still it is safe to say that in temperate countries, dry cold air = favorable conditions for flu transmission. For coronaviruses, the relevance of this factor is unknown.

Factor 2: Human behavior.

In the winter humans spend more time indoors with less ventilation and less personal space than outdoors in the summer. In particular, schools are a site of much infectious disease transmission. School terms have been strongly identified as periods of higher transmission for respiratory viruses including those causing chicken pox, measles, and flu . The 2009 pandemic flu in the United States was very much decreased during the summer, and then came back rapidly in September.

The relevance of school terms is important but unknown for the SARS-CoV-2. Few children have been identified as cases. This may mean they do not get easily infected and don't do much transmitting. Or it may mean only that they don't get severe symptoms when they are infected, and transmit nonetheless. Or something in between.

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Factor 3: The host's immune system.

It is possible that the condition of the average person's immune system is systematically worse in winter than summer. One hypothesis has focused on melatonin which has some immune effects and is modulated by the photoperiod, which varies seasonally. Another with more evidence is that vitamin D levels, which depend in part on ultraviolet light exposure (higher in summer) modulate our immune system in a positive way). The best evidence for the relevance of this hypothesis is that vitamin D supplementation reduces the incidence of acute respiratory infection, according to a meta-analysis of randomized trials. On the other hand, Professor Lipsitch found that this effect was unlikely to be a large factor in the variation in influenza incidence between summer and winter..

Factor 4: Depletion of susceptible hosts.

Even without any seasonal variability, infectious disease epidemics rise exponentially, level off, and decline because when many individuals are susceptible, each case infects more than one new case ($R_{eff} > 1$). Then as the proportion of susceptible contacts declines, the epidemic peaks ($R_{eff} = 1$), and eventually declines ($R_{eff} < 1$). When there is some factor (like any or all of #s 1-3) varying seasonally, and when new susceptibles appear in the population over time (for example through births) this process interacts with the seasonal factors to produce recurrent epidemics typically at the same time each year.

This leads to the last point: **Even seasonal infections can happen "out of season" when they are new.**
New viruses have a temporary but important advantage – few or no individuals in the population are immune to them. Old viruses, which have been in the population for longer, operate on a thinner margin — most individuals are immune, and they have to make do with transmitting among the few who aren't. In simple terms, viruses that have been around for a long time spread through the population — only when the conditions are the most favorable, in this case in winter.

The consequence is that new viruses — like pandemic influenza — can spread outside the normal season for their longer-established cousins. For example in 2009, the pandemic started in April-May (well outside of flu season), quieted in the summer (perhaps because of the importance of children in transmission of flu, and then rebounded in September-October, before the start of normal flu season. Seasonality does not constrain pandemic viruses the way it does old ones.

So in summary:

For the novel coronavirus SARS-CoV-2, we have reason to expect that like other betacoronaviruses, it may transmit somewhat more efficiently in winter than summer, though we don't know the mechanism(s) responsible. The size of the change is expected to be modest, and not enough to stop transmission on its own. Based on the analogy of pandemic flu, we expect that SARS-CoV-2, as a virus new to humans, will face less immunity and thus transmit more readily even outside of the winter season. Changing seasons and school closures may help, but are unlikely to stop transmission.

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Previously it was thought children were not easily infected with SARS-CoV-2. Recent evidence from Shenzhen suggests that children may be infected and shed detectable virus at about the same rate as adults — so now the only question is whether they transmit as readily. It seems likely the answer is yes, but no data yet.

Whatever the effect of temperature is on SARS-CoV-2, we will still need to take precautions

1. Self –Isolation as required, following Public Health Protocol in your country
2. Social-distancing
3. Regular Handwashing for at least 20 seconds
4. Regular disinfection of homes and work surfaces

The US Centres for Disease Control and Prevention states that “at this time, it is not known whether the spread of COVID-19 will decrease when the weather becomes warmer”. It also says that, whilst seasonal viruses like the common cold and flu spread more in the winter, it is still possible to catch these illnesses in other months.

The WHO reiterates the advice that “The most effective way to protect yourself against the new coronavirus is by frequently cleaning your hands with alcohol-based hand rub or washing them with soap and water and social distancing

Based on the above evidence spending an hour outdoors daily in your garden or on your balcony on a sunny day whilst maintain social distancing may be helpful but the most important preventative measures remain:

- **Self –Isolation as required, following Public Health Protocol in your country**
- **Social-distancing**
- **Regular Handwashing with soap and water for at least 20 seconds**
- **Regular disinfection of homes and work surfaces**