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See **Online** for video

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SARS-CoV-2 transmission via speech-generated respiratory droplets

During a pandemic, identifying modes of transmission is paramount to devise effective and practical mitigation strategies. Mohamed Abbas and Didier Pittet[1] challenge the conclusions of our reports that normal speaking might be an important mode of transmission for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), involving small particles that remain airborne for minutes.[2,3] Whereas the opening remarks in Abbas and Pittet's correspondence are irrelevant to our work, we eagerly welcome an intellectual debate on the scientific merits of our research. In their correspondence, they claim that our "findings have no immediate implications".[1] Nothing could be further from the truth. While we refer readers to the appendix (pp 1–5) for a detailed response to all issues raised, we here address two of Abbas and Pittet's more pertinent concerns.

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Abbas and Pittet contend that our work is flawed by a lack of generalisability because the published results involved only a single speaker.[1] Their implication that the generation of speech droplets might be idiosyncratic discounts the well understood physics of speech droplet formation. Speech-generated acoustic waves involve high-speed passage of air, pressurised by the lungs, past the mucosal epithelial layers of the vibrating vocal folds.[4] The sounds generated are further modulated by travel of this air through narrow passages between the tongue, lips, and teeth, dislodging oral fluid at all of these locations.[4] Emission of droplets is inextricably linked to the physics of speech generation[5] and unlikely to differ much from one individual to another. As shown in the appendix (p 6) and video in the supplementary materials, all speakers spit. Fortunately, when exiting the mouth, such droplets are still fairly large and easily blocked from entering the atmosphere by a generic cloth mask.[2]

Abbas and Pittet also raise the criticism that the size of the box used for observing the shrunken, dried-out nuclei of speech droplets was small, thereby limiting the physical distance such nuclei could travel. Indeed, our measurements only established that, even in a quiescent environment, droplet nuclei require many minutes to descend to the bottom of the box. The extent to which dehydrated speech droplets can travel before reaching the ground in real-life situations depends crucially on factors such as air convection and ventilation. Physics dictates that air movement will carry such particles over considerable distances, fully analogous to the dispersion of cigarette smoke throughout a room.

The medical community has long acknowledged infection via speech-generated respiratory droplets, including droplet nuclei that might stay airborne for an extended time.[5] The importance of symptomless transmission of SARS-CoV-2 (ie, in the absence of coughing or sneezing), whether retrospectively identified as asymptomatic, presymptomatic, or even oligosymptomatic, has also been well established,[6,7] despite claims to the contrary by Abbas and Pittet. With high viral titres in the oral fluid of such carriers well documented and a substantial proportion of speech droplets of oral fluid now shown to remain airborne for many minutes, inhalation of such particles represents a direct route to the nasopharynx. Retrospective analyses of indoor superspreader events further support the role of speech droplets in airborne transmission.[8]

We declare no competing interests.

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Willingness to vaccinate against COVID-19 in Australia

More than half of the world's population faces long-term restrictions as the new normal to prevent the

spread of COVID-19. If a vaccine becomes available, it might be possible to develop herd immunity and protect those who are most vulnerable to serious consequences of COVID-19. The population coverage required to achieve herd immunity through vaccination varies across diseases and is dependent on the basic reproduction number (R_0).[1] Modelling estimates R_0 to be around 2·5 for severe acute respiratory syndrome coronavirus 2 when no restrictions or physical distancing measures are in place,[2] and R_0 reached almost 4·0 in Wuhan in early-mid January, 2020.[3] Vaccination uptake for herd immunity would need to be at least 67% with an R_0 of 3·0.[1] In their Comment, the COCONEL Group reported that 26% of French adults would not accept a COVID-19 vaccine.[4] We similarly explored this question among a diverse sample of Australian adults.

We conducted an online survey of 4362 Australians aged 18 years and older during April 17–21, approximately 4 weeks after lockdown measures had been activated in Australia and at a time when potential deaths and health system capacity were still of great concern. We asked participants about actions or intentions toward the flu vaccine ("I have or I will get the flu vaccine this year") and a potential COVID-19 vaccine ("If a COVID-19 vaccine becomes available, I will get it").

In this sample, 630 (14·4%) participants said they would not get the flu vaccine this year, 394 (9·0%) were indifferent, and 3338 (76·5%) said they have or will get the flu vaccine this year. For a COVID-19 vaccine, 213 (4·9%) said they would not get the vaccine, 408 (9·4%) were indifferent, and 3741 (85·8%) said they would get the vaccine if it became available. Individuals who said they would not get a COVID-19 vaccine were more likely to believe the threat of COVID-19 has been exaggerated (43·7% [93/213]) than those who said they would get the vaccine if it became available (11·5% [429/3741]) and those who were indifferent (19·9% [81/408]). Inadequate health literacy and lower education level were significantly associated with a reluctance to be vaccinated against both influenza and COVID-19 ($p<0·001$; appendix). Notably, a high proportion overall were confident in the state (75·4% [3288/4362]) and federal (65·2% [2845/4362]) government's response.

In Australia, attitudes towards a COVID-19 vaccine appear to be more positive than reported in France in late March,[4] which might in part reflect greater confidence in the government. However, our data show efforts are needed to target vaccine education to those with lower education and health literacy.[5] It remains to be seen whether Australia's high intentions towards vaccine uptake will remain when restrictions are relaxed and the immediate perceived threat diminishes.

We declare no competing interests.

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On the first female WHO regional director

Tony Kirby[1] renders a sensitive and important Profile of Matshidiso Moeti, current WHO regional director for Africa. Despite representing 70% of the global health and social workforce,[2] women—and hence, their diverse views, realities, and experiences—continue to be grossly underrepresented in leadership positions across many fields, including global health.[3] Therefore, it is a welcome event when major global multinational organisations, such as WHO, appoint female leaders to their highest echelons. History suggests that the presence of women in leadership positions is not always the incentive for transformative change towards gender equality. Nevertheless, we contend that these are important steps, insofar as they have the potential to drive the promotion of an institutional culture of gender parity, on which relies the meaningful inclusion of women in global health decision making.

See Online for appendix

Commendable as the Profile is, however, its title is inaccurate and misleading: the first female WHO regional director was Mirta Roses-Periago, who took office as the WHO regional director for the Americas in February, 2003,[4] while Gro Harlem Brundtland was finalising her term as the first female director-general of WHO. As shown in the appendix, there were three other female WHO regional directors after Mirta Roses-Periago and before Matshidiso Moeti: Zsuzsanna Jakab, who took office as WHO regional director for Europe in February, 2010;[5] Carissa F Etienne, current regional director for the Americas and the Pan American Health Organization (PAHO), who took office in February, 2013;[6] and Poonam Khetrapal Singh, current WHO regional director for South-East Asia, who took office in February, 2014.[1] The appendix also shows the two remaining WHO Regional Offices

See Online for appendix