Vaccines are one of the most important achievements of medicine. Starting with Edward Jenner in 1796, more than 50 years before the germ theory of disease was described by Louis Pasteur in 1861, the ability to eradicate diseases from the population has been a public health goal. Since their inception, many vaccines have been created and utilized to avoid morbidity and mortality related to a plethora of diseases. When a disease is rampant, and the individual is impacted either through direct infection themselves, or infection of a close associate, the benefits of vaccination are clear and far outweigh the risks. However, what is left to remind the individual of the past suffering when the disease is controlled, or eradicated? How do future generations reconcile the risk of a faded memory of suffering with the pain of a needle prick? When the disease itself is less common than the adverse drug event, how do you encourage the individual to comply with vaccination for the greater good? Is resurgence of vaccine preventable disease required to motivate a new generation?

Perhaps the emergence of a novel disease will have a similar effect. Severe acute respiratory coronavirus 2 (SARS-CoV-2), which causes the novel betacoronavirus COVID-19, was first reported in Wuhan, China, in December 2019. Disease manifestations varied significantly, ranging from an asymptomatic carrier state to life threatening, and did not always follow predictable patterns (1). As the first global pandemic in over 100 years, COVID-19 has caused major societal upheaval. This is due in part to the lack of effective treatment which required extensive closures and physical/social distancing mandates to control spread and relieve healthcare strain. However, it has been argued that mismanagement by governments is partially to blame, including slow response and inconsistent messages, which have caused reduced confidence and trust in public health initiatives (2).

It is a widely held belief in the psychology literature that negative experiences hold greater value than positive. Furthermore, it has been shown that negative impressions and stereotypes are quicker to form and more resistant to disconfirmation than positive ones (3). Additionally, negative statements are often considered more intelligent than positive, and therefore greater weight is given to critical reviews (3). Indeed, the negativity bias is clearly present in medicine. The most relevant example to the present discussion is that of a gastroenterologist who authored a brief report of a possible association of a polyvalent vaccine with pervasive developmental disorder in 12 pediatric patients. This caught the attention of the media and resulted in 20 years of subsequent vaccine hesitancy that no number of large epidemiologic studies or well-designed analyses appear to be able to completely alleviate. Notably, this was before the sounding board of social media and the algorithms designed to maintain user attention.

Recently it was reported that perhaps only 12 people are responsible for most of the vaccine hoaxes on social media (4). It seems unbelievable that the few could have such an effect over the many; however, research has shown that bias in information diffusion toward like-minded peers and the aggregation of these groups dominates online dynamics. Social media algorithms favor the creation of echo-chambers in which your own predetermined views are repeatedly validated (5). It is the human tendency toward confirmation bias that has made social media platforms as successful as they are. Unfortunately, the free flowing, unfiltered presentation of confirmatory support to our own beliefs has increased polarization and division in society and has the unsettling ability to perpetuate dangerous misinformation. Confirmation bias, negativity bias and an overall shaken trust in public health systems create a climate on social media platforms in which conspiracy theories can gain traction and erode confidence in scientific fact.

It is shocking that the population surveyed by Har- hay et al., which arguably is made up of individuals who are benevolent enough to undergo a surgical procedure for their kidney recipient that will not benefit them, would be so swayed by news obtained from non-medical sources, including social media, that they are 66% less likely to obtain an inoculation than their counterparts. Particularly when considering the COVID-19 vaccine is not just for the common good but will benefit them personally. Indeed, currently available evidence suggests >90% protection against COVID-19 after completion of the mRNA vaccines and >60% with the adenovirus vectored vaccine, with complete protection from severe disease in
immunocompetent persons. Additionally, all available vaccines have low rates of serious adverse events (6,7). While humoral response in the transplant population appears to be less robust, how this impacts vaccine efficacy has not been completely elucidated. A recent statement from the American Society of Transplantation warns against vaccine hesitancy based on this data and urges ongoing vaccination with priority for family members and other support persons (8). In this way, the power of the trusted healthcare provider to positively effect behavior with the use of clear consistent messages about vaccine safety and efficacy, paired with constructive and open dialogue regarding patient concerns, cannot be overstated. Indeed, previous experience with vaccine hesitancy suggests this interaction is crucial for those who are undecided and can negate misinformation gained from alternative sources (9). This will be particularly important if annual vaccination against COVID-19 is necessary.

In summary, Harbay et al. present a novel issue in transplantation and in medicine in general. How can we disseminate accurate public health information when social media and the human psyche are weighted toward mistrust and rejection of these messages? Like the surgeon performing a procedure to relieve a nidus of infection, we must achieve source control over information streams in our public health initiatives. Although censorship of individuals has been suggested, this is not a good solution as it is plagued with alternative sources (9). This will be particularly important if annual vaccination against COVID-19 is necessary.

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Author Contributions
M. Jorgenson conceptualized the study and wrote the original draft, and reviewed and edited the manuscript.

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See related article, “Living Organ Donor Perspectives and Sources of Hesitancy about COVID-19 Vaccines,” on pages 1132–1140.