**Infographic on SARS-CoV-2 Airborne Transmission Improves Opponents' View of the Benefits of
Masks: Evidence from Serial Cross-Sectional and Experimental Data**

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Introduction

Universal masking in hospitals has been associated with a significantly lower rate of SARS-CoV-2 positivity among health care workers¹. The World Health Organization recently recognized transmission via aerosols as a possible way of getting infected with SARS-CoV-2 and has recommended wearing non-medical masks, e.g., in settings where physical distancing cannot be achieved.² Nevertheless, a considerable part of the population generally opposes measures taken to curb the transmission of SARS-CoV-2, which also leads to less frequent mask wearing - despite mandatory policies, as recently found in Germany.³ Prather and colleagues published a seminal infographic showing that “Infectious aerosol particles can be released during breathing and speaking by asymptomatic infected individuals. No masking maximizes exposure, whereas universal masking results in the least exposure.”⁴ The goal of this contribution was to assess whether explaining how masks are effective can change the relevant correlates of mask-wearing behavior even in those opposing the measures.

Methods

The IRB of the University of Erfurt approved the COVID-19 Snapshot Monitoring (COSMO)⁵, which assesses roughly $n = 1,000$ participants in weekly/fortnightly online serial cross-sectional data collection via the online panel www.Respondi.com. The samples are quota-representative for age (18 to 74 years old) $\times$ gender and federal state in Germany. The data support the German government’s policy making and crisis communication.⁵ Starting in mid-April, the participants were repeatedly asked whether they believed wearing a mask was effective in reducing transmission of COVID-19, how frequently they wore a mask, and how much they generally opposed the measures taken to curb transmission. On 07/07/20 the survey also included a one-factorial experiment in which $n = 1,010$ participants randomly viewed vs. did not view a German translation of the infographic (Fig. 1C⁴). Subsequently, they indicated whether they found wearing a mask convenient and pleasant, effective and reasonable, and whether they thought it protected themselves and others.

Results

Since mid-April, generally opposing the measures has been negatively related to frequent mask wearing while knowing about masks' effectiveness has been positively related to mask wearing (Pearson correlations in Fig. 1A). Thus, despite a mandatory mask policy, a considerable proportion of the population needs to be made aware of the benefits of mask wearing. Both perceived effectiveness ($r = .50$, $p > 0.01$) and knowing that masks protect others ($r = .42$, $p > 0.01$) were more strongly related to the frequency of mask wearing than how convenient mask wearing was considered ($r = .19$, $p > 0.01$) and whether people assumed that masks protect themselves ($r = .29$, $p > 0.01$) (Fig. 1B, $n = 500$).

The results of ordinary least squares (OLS) regressions analyzing the infographic's effect on those who oppose vs. do not oppose the measures are displayed in Table 1. The analyses show that viewing vs. not viewing Prather's infographic⁴ increased the relevant knowledge about effectiveness and protection of others as well as protection of oneself. This was especially so for those opposing the measures (Fig. 1D). The infographic did not affect participants' judgments of how convenient wearing a mask was. The analyses' results are robust when controlled for sociodemographic data (age, gender, education, chronic illness).

Discussion

While mandates may elicit feelings of anger and opposition in some people, explaining why masks are a useful tool to stop the spread of COVID-19 can increase relevant correlates of compliance—despite an existing mandate, and despite general opposition to measures. Displaying such infographics where physical distancing cannot be achieved and where masks are required (in hospitals, shops, public transport, and other settings) can thus increase compliance. Experimental survey data are only a proxy for real-life behavior and limit the results' external validity. Intervention studies should test the infographic's effect on actual behavior. This study adds to the growing body of evidence emphasizing that social processes considerably influence preventive behaviors.⁶ Thus, explaining not only how to wear masks but also why, can ultimately reduce the airborne transmission of COVID-19.

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Table 1. Linear regressions predicting self and other protection as well as effectiveness and convenience of mask wearing by those opposing the measures and having seen vs. not seen the infographic.

	Protecting oneself			Protecting others			Effectiveness of masks			Convenience of masks		
Predictors	<i>std. Beta</i>	<i>std. CI</i>	<i>p</i>	<i>std. Beta</i>	<i>std. CI</i>	<i>p</i>	<i>std. Beta</i>	<i>std. CI</i>	<i>p</i>	<i>std. Beta</i>	<i>std. CI</i>	<i>p</i>
Opposing the measures	-0.16	-0.22 – -0.09	<0.001	-0.46	-0.52 – -0.41	<0.001	-0.59	-0.64 – -0.54	<0.001	-0.26	-0.32 – -0.20	<0.001
Infographic present (vs. absent)	0.17	0.04 – 0.29	0.007	0.14	0.03 – 0.25	0.012	0.21	0.11 – 0.31	<0.001	0.08	-0.04 – 0.20	0.202
Opposing the measures * Infographic present (vs. absent)	0.12	0.00 – 0.24	0.048	0.14	0.03 – 0.25	0.012	0.11	0.01 – 0.21	0.026	-0.06	-0.18 – 0.06	0.309
Observations	1,010			1,010			1,010			1,010		
R ² / R ² adjusted	0.035 / 0.032			0.223 / 0.220			0.365 / 0.363			0.072 / 0.069		

Note: Opposing the measures (range: 1–7) was mean centered; the factor infographic was effect coded (absent = -0.5, present = +0.5). Fig. 1D displays the interaction effects of the two most relevant regressions (highest R², dependent variables most strongly related to mask-wearing frequency) that indicate that the infographic was especially effective among those opposing the measures. Standardized regression coefficients Beta; 95% confidence intervals (CI); statistical significance assumed at $p < 0.05$.

Figure 1. Viewing an infographic increased the perception that masks are effective and protect others, beliefs that have been relevant correlates of frequent mask wearing throughout the pandemic. *Note:* Since mid-April 2020, considering masks as more effective has been related to more frequent mask wearing; generally opposing the measures has been related to less frequent mask wearing despite a mandatory mask policy that came into effect in Germany in late April (A, B) (N = 9,942). Having viewed vs. not viewed the infographic (C) increased the perceived effectiveness of masks and knowledge about protecting others,

especially among those generally opposing the measures (interaction effects: D; also see Table 1). Infographic (C) from Prather KA, Wang CC, Schooley RT. Reducing transmission of SARS-CoV-2. *Science*. Published online May 27, 2020:eabc6197. doi:10.1126/science.abc6197. Reprinted with permission from AAAS.