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Acceptance and Adoption of Protective Measures During the COVID-19 Pandemic: The Role of Trust in Politics and Trust in Science

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Abstract

The United Nations have described the outbreak of the coronavirus disease 2019 (COVID-19) as the worst global crisis since the second world war. Behavioral protective measures, such as good hand hygiene and social distancing, may strongly affect infection and fatality rates worldwide. In two studies (total N = 962), we aimed to identify central predictors of acceptance and adoption of protective measures, including sociodemographic variables, risk perception, and trust. We found that men and younger participants show lower acceptance and adoption of protective measures, suggesting that it is crucial to develop targeted health messages for these groups. Moreover, trust in politics and trust in science emerged as important predictors for the acceptance and adoption of protective measures. These results show that maintaining and ideally strengthening trust in politics and trust in science might be central for overcoming the COVID-19 pandemic.

Keywords

COVID-19, trust, protective measures, health communication

Highlights

- The COVID-19 pandemic has led to unprecedented personal, social, and economic costs worldwide.
- A better understanding of the acceptance and adoption of protective measures is crucial.
- Trust in politics and trust in science emerged as important predictors of protective measures.
- Implications for effective health and science communication are derived.

The United Nations have described the outbreak of the coronavirus disease 2019 (COVID-19) as the worst global crisis since the second world war (United Nations, 2020). Behavioural protective measures, such as good hand hygiene and social distancing, may strongly affect infection and death rates worldwide. However, the adoption of protective measures is a social dilemma, as such measures are only effective if many individuals adopt these measures, even though some individuals may only have a low risk of infection or mortality. It is, therefore, of prime importance to understand predictors of acceptance and adoption of protective measures, as this knowledge may guide effective health communication.

Social determinants, such as socioeconomic status, gender, or age, have been recognized as crucial factors for predicting protective health behaviour (Bish & Michie, 2010). Besides these stable, unmodifiable social determinants of health behaviours, many social cognitive models propose that people's risk perception strongly influences protective behaviour (Conner & Norman, 2015). Risk perception is typically based upon a consideration of the perceived likelihood, severity, and susceptibility to a health threat (Brewer et al., 2007; Conner & Norman, 2015), and greater levels of perceived likelihood and perceived severity of the diseases are important predictors of protective behaviour during a pandemic (Bish & Michie, 2010). A largely overlooked factor in many social cognitive models, however, is trust (Bish & Michie, 2010).

The Role of Trust During Pandemics

The situation during a pandemic is highly complex, as information about the severity of a new disease is constantly changing or not available. Trust can be seen as a mechanism to reduce this complexity (Bish & Michie, 2010; Luhmann, 1989; Siegrist & Zingg, 2014). For example, trust is highly important in situations in which individuals lack knowledge to make decisions (Siegrist & Cvetkovich, 2000), and trust reduces psychological reactance against public policies (Song et al., 2018).

Trust plays a crucial role for the adoption of protective measures and the adherence to governmental restrictions during pandemics (Siegrist & Zingg, 2014). During the SARS outbreak in Hong Kong, confidence in the government predicted health behaviours such as maintaining good hygiene and wearing face masks (Tang & Wong, 2003). Moreover, trust in government was associated with an intention to adopt protective measures at the beginning of the H1N1 influenza pandemic in the Netherlands and positively related to vaccination intention (van der Weerd et al., 2011). A study conducted in the UK also showed that individuals with higher trust in the responsible authorities were more likely to follow their recommended behaviours (Rubin et al., 2009). Moreover, Italians who adopted recommended behaviours—such as good hand hygiene—during the H1N1 pandemic had higher trust in media and the Italian ministry of health (Prati et al., 2011). Finally, in the COVID-19 pandemic, countries with higher institutionalized trust report lower fatalities (Oksanen et al., 2020).

Trust in governmental agencies and politicians, however, might only be one aspect of trust that may shape people's acceptance and adoption of preventive measures against novel infectious diseases. In a highly complex situation, such as a pandemic, people also need to rely on relevant scientific experts (Hendriks et al., 2016). Thus, trust in science might also play a crucial role during a pandemic. During the first wave of the COVID-19 pandemic in Germany, for example, the public debate was largely shaped by virologists and epidemiologists, who undertook large efforts to inform the public about COVID-19, such as broadcasting a popular podcast (e.g., Kupferschmidt, 2020). A representative survey conducted during the outbreak of COVID-19 in Germany confirmed that most people were more likely to trust scientists than politicians, and more than 80% agreed that political decisions concerning COVID-19 should be evidence-based (Wissenschaft im Dialog, 2020). The relevance of trust in science has been shown for some protective behaviours such as vaccine uptake (e.g., Hamilton et al., 2015), but for many other health threats, evidence remains scarce.

The Present Research

The present research investigated three types of important predictors of the acceptance and adoption of protective measures during the COVID-19 pandemic. First, social determinants may play a crucial role in explaining protective behaviours (Bish & Michie, 2010). Identifying groups that are less likely to follow recommended behaviours allows public health authorities to design targeted messages to reach precisely the groups where interventions matter most. Second, building on the literature on health-related social-cognitive models (Conner & Norman, 2015), risk perception could explain why some individuals, but not others, accept and adhere to recommended protective measures. Finally, we examined whether trust contributes to explaining individuals' likelihood of accepting and adopting protective measures. In contrast to previous research, however, we not only focused on trust in politics, but also on trust in science. It should be noted that some theoretical models in the literature assume interrelationships between risk perception and trust and conceptualize these relationships in different ways (Mayer et al., 1995; Siegrist, 2019; Slovic, 1999). In line with Bish and Michie (2010), however, we consider both risk perception and trust as independent predictors of protective behaviours in the present research.

To reach our aims, we conducted two studies. Study 1 used an exploratory approach; Study 2 was preregistered (see study details). Materials, data, and code for both studies are available through the Open Science Framework (OSF; see Supplementary Materials).

Study 1

Method

Design and Participants

We conducted a cross-sectional study during the early phase of the COVID-19 pandemic in Germany. Data were collected between March 24, 2020, and March 31, 2020. The study started two days after the German government imposed heavy restrictions to stem the spread of COVID-19, including banning gatherings of more than two people. On the day the study started, 27,436 cases and 114 deaths due to COVID-19 had been reported in Germany (Robert Koch Institute, 2020).

Inclusion criteria for the study were (a) a minimum age of 18, and (b) permanent residency in Germany. The survey was advertised via the institute's participant pool and via social media postings on Facebook and Twitter, where it was also promoted via the university's press office. Further, participants shared the study within their personal networks (snowball-sampling-method).

Our initial sample consisted of 737 individuals. Of these, 61 individuals (8.3%) dropped out right away after providing their consent, nine individuals (1.2%) indicated that we should not use their data for analyses, and ten individuals (1.4%) resided outside of Germany. All these individuals were excluded from data analyses, leaving a final sample of 661 individuals (M_{age} = 35.22, SD_{age} = 12.56, 77.2% female; see also sample characteristics in Table S1 in the Supplementary Materials). Of these, 554 (83.8%) responded to the final question of the questionnaire, indicating a dropout of 16.2% throughout the survey.

A sensitivity analysis showed that the final sample had a very high chance ($\beta = .95$, $\alpha = .05$, $N = 554$) to detect correlations of $r = .15$. All statistical tests were two-sided, with $p < .05$ considered statistically significant. Given the exploratory nature of Study 1, however, p-values should be interpreted with caution.

Procedure

Participants were invited online to take part in a brief psychological survey on COVID-19. They were informed that they would not receive any compensation, received a digital flyer with general information, and a link to the survey hosted on Qualtrics. After participants consented, Qualtrics automatically guided them through the study and provided them with all measures. At the end of the survey, participants were provided with an open-entry textbox, where they could leave general comments for the research team.

Measures

A translated version of the measures can be found on the OSF (see Supplementary Materials). We first presented participants with eleven behaviour-based protective measures (e.g., "Stay home as much as possible.", α = .89, 1 = *not reasonable*, 7 = *very reasonable*). We only included measures that were promoted by the German federal government agency for disease control (Robert-Koch-Institute) and the Federal Centre for Health Education at the time when the survey was conducted. We moreover assessed acceptance of two items related to hoarding, which we do not discuss further (but see Supplementary Materials). We then presented participants again with the same eleven behaviour-based protective measures and asked them how often they engage in this behaviour to assess adoption of protective measures (α = .71, 1 = *never,* 5 = *always*). These two variables—acceptance and adoption of behavioural protective measures—served as the main outcome variables in our analyses, as they seem central to tackling the spread of COVID-19. Participants also answered twelve items measuring acceptance of the shutdown and of governmental restrictions (e.g., "Closing schools and daycare.", α = .91, 1 = *not reasonable*, 7 = *very reasonable*). Because Germany has a federal structure, restrictions varied at the time of the study, but all mentioned restrictions were effective at least in one state at the time of the study.

Participants then completed nine items to measure their trust in politics during the pandemic (e.g., "Information released by German politicians concerning the coronavirus can be trusted.", α = .94, 1 = *disagree strongly*, 7 = *agree strongly*). We adapted the same nine items to measure trust in science (α = .94). We also included one additional item "Politicians rely on the recommendations of scientists in order to overcome the corona crisis", which we do not discuss further (but see Supplementary Materials). Exploratory factor analyses (with promax rotation) on the items that measured trust in politics and, separately, on the items that measured trust in science indicated a one-factor solution for both trust in politics and trust in science (as demonstrated by the eigenvalue ≥ 1 criterion and the scree plot). Factor loadings are presented in Table S2 in the Supplementary Materials.

Risk perception was assessed as part of a larger project that investigated probability estimates and biases in risk perception; these results are reported elsewhere (Glöckner, Dorrough, Wingen, et al., 2020). Participants indicated their estimated probability that they will become infected with the coronavirus by the end of the year (from 0 to 100%) and how severe the consequences of such an infection would be (1 = *no negative consequences,* 10 = *extreme negative consequences*). We multiplied these two values to obtain an overall index of the perceived risk of infection (see also Glöckner, Dorrough, Wingen, et al., 2020). Participants moreover indicated their estimated probability that they will become infected with the coronavirus requiring hospitalization (0 to 100%) and how severe the consequences of such an infection would be (1 = *no negative consequences*, 10 = *extreme negative consequences*). We multiplied these two measures to obtain an overall index of the perceived risk of infection requiring hospitalization. The overall index of the perceived risk of infection and the overall index of the perceived risk of infection requiring hospitalization were highly correlated, $r(562) = .76$, $p < .001$, 95% CI [.72, .79] (see also Table S3 in the Supplementary Materials).

Moreover, we assessed susceptibility to coronavirus as a measure of unrealistic optimism (Brewer et al., 2007; Weinstein, 1982); participants were asked about the risk of becoming infected with the coronavirus compared to another person of the same age and gender living in Germany (-3 = *lower risk*, 0 = about the same, +3 = *higher risk).* One additional item measured global perceived risk, but because it was strongly correlated with the estimated probability to become infected, it is not discussed further (but see Supplementary Materials).

Demographics — We collected participants' gender, age, household income, job status, and education. Measures for income, job status, and education were combined to form one index of socioeconomic status, ranging from 3 to 19 (Winkler-Index; Emrich et al., 2018; Winkler & Stolzenberg, 2009). We moreover assessed participants' political orientation (1 = *left*, 10 = *right*), whether they lived in Germany, in which state they lived, and whether they had children. Regarding health, we assessed their subjective health status (1 = *very bad*, 5 = *very good*), whether participants belonged to a vulnerable risk group, whether close relatives belonged to a risk group, whether participants were or had been infected with the coronavirus, and finally whether participants were or had been suspected to be infected. The demographic characteristics of the sample are summarized in Table S1 in the Supplementary Materials.

Careless responses — Participants indicated on three items (taken from Meade & Craig, 2012) how much effort they invested in the study (1 = *almost no*, 5 = *very much*), how much attention they paid to the study (1 = *almost no*, 5 = *my full*), and finally, whether we should include their data in our analyses. Participants were excluded from analyses when they answered “no” to this last question.

Results

Descriptive Results for Acceptance and Adoption of Measures

We observed a remarkable acceptance of behaviour-based protective measures (M = 6.48, SD = 0.72, on a 7-point scale; see Figure S1 in the Supplementary Materials for detailed results per item). Moreover, participants reported that they adopted protective measures often (M = 4.44, SD = 0.41, on a 5-point scale; see Figure S2 in the Supplementary Materials). Shutdown and governmental restrictions were also widely accepted (M = 6.06, SD = 1.00, on a 7-point scale; see Figure S3 in the Supplementary Materials).

Predictors of Acceptance and Adoption of Measures

Correlation analyses revealed several associations between the variables (see Table S3 and Figure S4). For acceptance of protective measures, the highest correlations were found with trust in science, $r(567) = .34$, $p < .001$, 95% CI [.27, .41], and trust in politics, $r(568) = .35$, $p < .001$, 95% CI [.27, .42]. Moreover, age, health status, and perceived risk of a serious infection requiring hospitalization were associated with acceptance, but the observed correlations are conventionally considered to be small (Cohen, 1988). For adoption of protective measures, the highest correlations were found for trust in science, $r(566) = .26$, $p < .001$, 95% CI [.18, .33], and trust in politics, $r(567) = .31$, $p < .001$, 95% CI [.23, .38]. Small to medium correlations were observed between adoption of measures and age, socioeconomic status, political orientation, and perceived risk of a serious infection requiring hospitalization. Finally, the perceived risk of infection showed a very small but significant correlation with adoption of measures.

We moreover investigated group differences regarding acceptance and adoption of measures (see Table S4 in the Supplementary Materials for details). We compared parents with childless participants, female with male participants, and finally, participants belonging to the risk group with low-risk participants. Parents ($p = .016$) and female participants ($p = .019$) showed a significantly higher acceptance of behavioural measures, but the observed differences are conventionally considered to be small (Cohen, 1988). We moreover observed slightly higher levels of adoption of measures for female participants ($p = .037$), parents ($p = .002$), and participants belonging to a risk group ($p = .034$).

Hierarchical Regression Analyses

Hierarchical regression analyses tested which variables were most relevant for predicting acceptance (Table 1) and adoption (Table 2) of protective measures. In the first step, sociodemographic variables (gender, SES, age, parental status, and being part of a risk group) were entered into the models. In the second step, risk susceptibility, perceived risk of infection, and risk of hospitalization were added. Finally, trust in politics and trust in science were added to the models in a third step. Explained variance (R^2) was highest for models including trust measures to predict acceptance (23%) and adoption of measures (21%). Results further indicated that entering trust in politics and trust in science made a significant, unique contribution to the prediction of acceptance and adoption of protective measures (acceptance: $\Delta R^2 = 0.16$, $p < .001$; adoption of measures: $\Delta R^2 = 0.11$, $p < .001$).

Table 1

Hierarchical Regression Analysis to Predict Acceptance of Protective Measures From Sociodemographic Variables, Risk Perception, and Trust in Science and Politics (Study 1)

Step and predictor variable	*B*	*SE B*	β	R^2	ΔR^2
Step 1				**.03****	
Gender (0 = *male*; 1 = *female*)	0.17	0.07	.11*		
Socioeconomic Status	0.00	0.01	.01		
Age	0.00	0.00	.08		
Parental Status (0 = *no children*; 1 = *children*)	0.06	0.07	.05		
Risk Group (0 = *low risk*; 1 = *high risk*)	-0.19	0.07	-.12**		
Step 2				**.06*****	**.03****
Gender (0 = *male*; 1 = *female*)	0.17	0.07	.11*		
Socioeconomic Status	0.00	0.01	.03		
Age	0.00	0.00	.07		
Parental Status (0 = *no children*; 1 = *children*)	0.05	0.07	.04		
Risk Group (0 = *low risk*; 1 = *high risk*)	-0.31	0.08	-.19***		
Risk Susceptibility	-0.04	0.02	-.08		
Risk of Infection	0.00	0.00	.03		
Risk of Hospitalization	0.00	0.00	.17*		
Step 3				**.23*****	**.16*****
Gender (0 = *male*; 1 = *female*)	0.17	0.06	.11**		
Socioeconomic Status	0.00	0.01	.01		
Age	0.00	0.00	.03		
Parental Status (0 = *no children*; 1 = *children*)	0.16	0.07	.12*		
Risk Group (0 = *low risk*; 1 = *high risk*)	-0.23	0.07	-.14**		
Risk Susceptibility	-0.03	0.02	-.08		
Risk of Infection	0.00	0.00	.01		
Risk of Hospitalization	0.00	0.00	.20**		
Trust in Politics	0.08	0.03	.16**		
Trust in Science	0.17	0.03	.28***		

*$p < .05$. **$p < .01$. ***$p < .001$.

As depicted in Table 1, being female, having children, being part of a low-risk group, higher perceived risk of hospitalization, and higher trust in politics and science were related to higher acceptance of measures. For adoption of protective measures (Table 2), being female, having children, lower risk susceptibility, higher perceived risk of hospitalization, and higher trust in politics and science were significant predictors. Perceived risk of hospitalization, trust in politics, and trust in science were the strongest predictors for acceptance and adoption of protective measures.

Table 2

Hierarchical Regression Analysis to Predict Adoption of Protective Measures From Sociodemographic Variables, Risk Perception, and Trust in Science and Politics (Study 1)

Step and predictor variable	*B*	*SE B*	β	R^2	ΔR^2
Step 1				**.05*****	
Gender (0 = *male*; 1 = *female*)	0.09	0.04	.11*		
Socioeconomic Status	0.01	0.00	.07		
Age	0.00	0.00	.10		
Parental Status (0 = *no children*; 1 = *children*)	0.03	0.04	.04		
Risk Group (0 = *low risk*; 1 = *high risk*)	0.05	0.04	.05		
Step 2				**.09*****	**.05*****
Gender (0 = *male*; 1 = *female*)	0.10	0.04	.12**		
Socioeconomic Status	0.01	0.00	.09		
Age	0.00	0.00	.09		
Parental Status (0 = *no children*; 1 = *children*)	0.03	0.04	.04		
Risk Group (0 = *low risk*; 1 = *high risk*)	0.00	0.04	.00		
Risk Susceptibility	-0.04	0.01	-.17***		
Risk of Infection	0.00	0.00	-.01		
Risk of Hospitalization	0.00	0.00	.21**		
Step 3				**.21*****	**.11*****
Gender (0 = *male*; 1 = *female*)	0.10	0.03	.12**		
Socioeconomic Status	0.01	0.00	.07		
Age	0.00	0.00	.05		
Parental Status (0 = *no children*; 1 = *children*)	0.08	0.04	.10*		
Risk Group (0 = *low risk*; 1 = *high risk*)	0.04	0.04	.04		
Risk Susceptibility	-0.04	0.01	-.17***		
Risk of Infection	0.00	0.00	-.03		
Risk of Hospitalization	0.00	0.00	.23***		
Trust in Politics	0.06	0.02	.21***		
Trust in Science	0.06	0.02	.17**		

*$p < .05$. **$p < .01$. ***$p < .001$.

Discussion

Study 1 revealed important predictors of acceptance and adoption of protective measures. Sociodemographic factors (being older, female, and having children), as well as an increased perceived risk of COVID-19 infection requiring hospitalization, were associated with increased acceptance and adoption. Yet, the most important predictors were trust in politics and trust in science, which had a notable effect on acceptance and adoption, going beyond the effects of sociodemographic factors and risk perception.

Given the exploratory nature of Study 1, we aimed to replicate central findings in a preregistered second study, using a sample representative to the German adult population. Moreover, Study 2 was conducted a month later and thus tested whether our findings from Study 1 also generalize to a later stage of the pandemic.

Study 2

Method

Design and Participants

We conducted a cross-sectional study using a sample representative to the German adult population in terms of age and gender ($N = 301$, $M_{age} = 50.06$, $SD_{age} = 16.15$, 52% female, see also sample characteristics in Table S5 in the Supplementary Materials). Data were collected as part of the COVID-19 battery of the Social Cognition Center Cologne[1]. The battery included further projects that studied conspiracy beliefs about COVID-19 (Imhoff & Lamberty, 2020), probability estimates and risk perception (Glöckner, Dorrough, Wingen, et al., 2020), the role of ambivalence (Schneider & Dorrough, 2020) and personality (Glöckner, Dorrough, Michels, et al., 2020) for adherence to measures, and the role of responsibility on prosocial behaviour (Dorrough et al., 2020). The battery of studies took participants 25 min to complete. Hypotheses for the present study were preregistered (see Supplementary Materials), and analyses were conducted in line with the preregistration. For directed hypotheses, we apply one-sided tests and explicitly note these. For all other comparisons, we use two-sided tests (with $p < .05$). No participant was excluded from the data analyses, in line with our preregistration. A sensitivity analysis showed that this final sample had a very high chance ($\beta = .95$, $\alpha = .05$, $N = 301$) to detect correlations of $r = .21$.

Data were collected between April 29, 2020 and May 4, 2020, so roughly one month after Study 1 was completed. In the meantime, Germans had lived under severe government restrictions (e.g., closing of non-essential businesses and institutions, contact restrictions) and the COVID-19 pandemic rose to 163.175 cases and 6.692 deaths (Robert Koch Institute, 2020). This constitutes an increase of 135.739 cases (495%) and 6.578 deaths (5770%) compared to Study 1.

Procedure

Participants were invited to a survey by the online panel provider Toluna, a professional recruitment platform that provides access to population-representative samples[2].

1) See https://osf.io/2w58s/?view_only=465aa85be8b54295a8a070b0af4a857e

Participants received a link to the survey, hosted on the online survey system Unipark. After participants consented, the platform automatically guided participants through the study and provided them with all measures. At the end of the survey, participants were provided with contact details for further questions.

Measures

We aimed to include all measures from Study 1. Due to time restrictions, some measures had to be shortened and some secondary measures had to be dropped. In the following, we briefly present all measures that we used in Study 2.

We presented participants the same eleven items from Study 1 to measure acceptance of behaviour-based protective measures, and one additional item asking about the use of face masks (α = .94). Participants then reported their adoption of these measures by indicating how often they engage in each behaviour (α = .88). We also measured participants' acceptance of the shutdown and of governmental restrictions and added one additional item asking about the use of tracking apps, to include a more recently discussed measure (α = .95).

We selected two items to measure participants' trust in politics during the pandemic ("Information released by German politicians concerning the coronavirus can be trusted"; "The skills of important decision makers in politics are sufficient to overcome this crisis") and their respective adapted versions to measure trust in science. Items were selected because they all showed a very high correlation with the overall trust in politics and trust in science scores, respectively (all *r*s > .82).

Participants completed the same items from Study 1 measuring their estimated probability that they will become infected with the coronavirus by the end of the year, the severity of the consequences of such an infection (which we again multiplied with each other to indicate perceived risk of infection), their estimated probability that they will become infected with the coronavirus requiring hospitalization and how severe the consequences of such an infection would be (which we again multiplied with each other to assess risk of hospitalization) and their risk susceptibility. There was one minor deviation compared to Study 1, in that the consequences of infection and hospitalization were each assessed on an 11-point scale (0 = *no negative consequences,* 10 = *extreme negative consequences*). As in Study 1, the index of the perceived risk of infection and the index of the perceived risk of infection requiring hospitalization were highly correlated, $r(298) = .79$, $p < .001$, 95% CI [.74, .83] (see also Table S6 in the Supplementary Materials).

Demographics — We again collected participants' gender, age, household income, job status, and education. We moreover assessed participants' political orientation and whether they had children. Regarding health, we assessed whether participants belonged

2) https://de.toluna.com/#/

to a vulnerable risk group and whether participants were infected with the coronavirus (for a summary, see Table S5 in the Supplementary Materials).

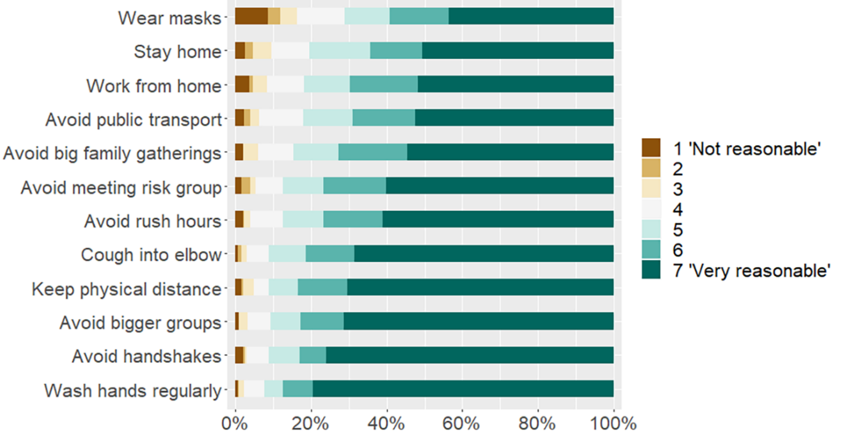
Results

Descriptive Results for Acceptance and Adoption of Measures

We again observed a high acceptance of behaviour-based protective measures (M = 6.11, SD = 1.06, on a 7-point scale), and participants adopted protective measures often (M = 4.34, SD = 0.63, on a 5-point scale). Acceptance of the shutdown and governmental restrictions was also high (M = 5.34, SD = 1.37, on a 7-point scale). Detailed results per item are presented in Figure 1 and Figure 2, and S5 (see Supplementary Materials), respectively.

Figure 1

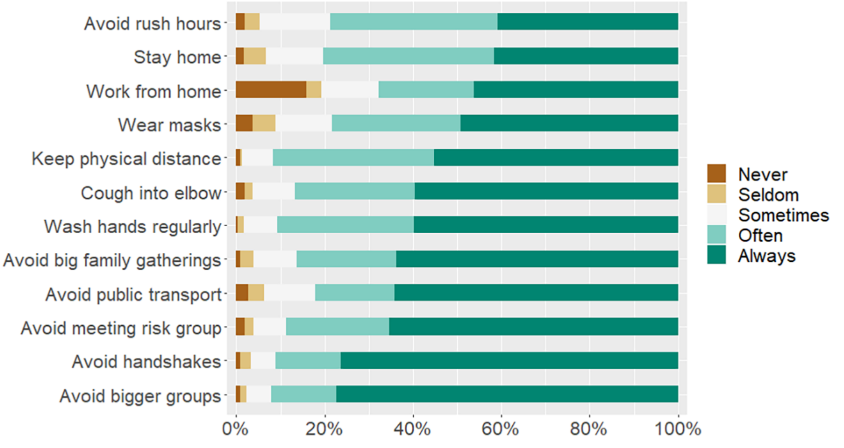
Stacked Bar Chart Presenting Acceptance of Protective Measures (Study 2)



Note. Measures are sorted by the percentage of participants who selected "very reasonable" in ascending order.

Figure 2

Stacked Bar Chart Presenting Adoption of Protective Measures (Study 2)



Note. Measures are sorted by the percentage of participants who selected "always" in ascending order.

Development Over Time – Combined Analyses

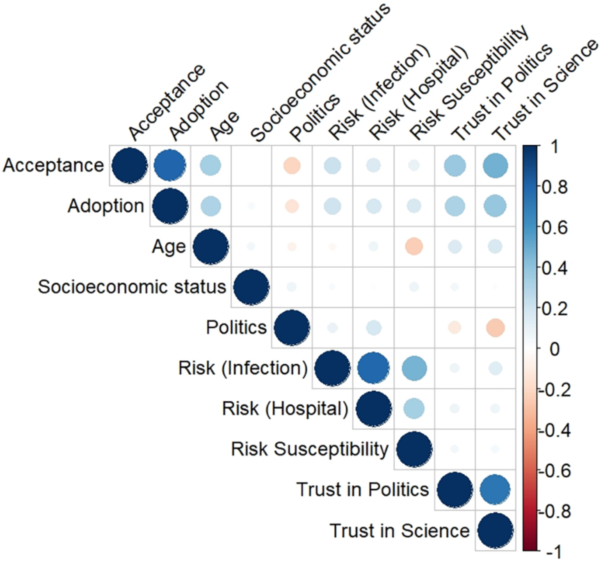
Even though acceptance and adoption were overall still high in our second study, they were reduced compared to the levels observed in our first study. Multiple linear regressions controlling for sample differences (age, gender, risk group status, parental status, and SES) and including only those items that were measured at both time points revealed that these differences were significant for all investigated dimensions: acceptance of protective measures ($p < .001$), adoption of measures ($p < .001$), and finally acceptance of the shutdown and governmental restrictions ($p < .001$). Detailed results for these analyses are presented in Table S7 (in the Supplementary Materials).

Predictors of Acceptance and Adoption of Measures

Correlation analyses revealed several associations between the variables (see Table S6 in the Supplementary Materials and Figure 3). For acceptance, the highest correlation was found for trust in science, $r(299) = .46$, $p < .001$, 95% CI [.36, .54], trust in politics, $r(299) = .35$, $p < .001$, 95% CI [.25, .45], and age, $r(299) = .35$, $p < .001$, 95% CI [.25, .45]. Moreover, perceived risk of an infection, perceived risk of a serious infection requiring hospitalization, and political orientation were also associated with acceptance, but the observed correlations are conventionally considered small to medium (Cohen, 1988). For adoption of protective measures, the highest correlation was found for trust in science, $r(299) = .37$, $p < .001$, 95% CI [.27, .47], trust in politics, $r(299) = .30$, $p < .001$, 95% CI [.20, .40], and age, $r(299) = .31$, $p < .001$, 95% CI [.21, .41]. Small to medium correlations were observed between adoption and perceived risk of an infection, perceived risk of a serious infection requiring hospitalization, risk susceptibility, and political orientation.

Figure 3

Graphical Overview of Zero-Order Pearson Correlations Between Measures (Study 2)



We moreover investigated potential group differences regarding acceptance and adoption of measures (see Table S8 in the Supplementary Materials). As preregistered, we hypothesized that parents (compared to childless participants) and women (compared to men) would show significantly higher acceptance, as in Study 1. In line with our preregistration, we found that women (p = .027, one-sided test for directed hypothesis) had higher acceptance, but parental status had no influence. We also found that participants belonging to the risk group indicated increased acceptance (p < .001) of behavioural measures, compared to low-risk participants. For adoption of measures, we hypothesized that women, parents, and individuals belonging to the risk group would show higher values. The results showed that parents (p = .027, one-sided) and participants belonging to the risk group (p < .001, one-sided) showed higher adoption of protective measures, but the hypothesis was not confirmed for gender.

Hierarchical Regression Analyses

For the hierarchical regression analyses, we hypothesized that all steps (the same as in Study 1) will make a unique contribution to the prediction of acceptance and adoption of protective measures, as indicated by significant changes in R^2. We also hypothesized that the increase in R^2 will be largest when adding trust in politics and trust in science to the model. As predicted, all steps made a unique contribution to the prediction of acceptance and adoption of protective measures and resulted in significant changes in R^2. Entering trust in politics and trust in science lead to a stronger increase in R^2 compared to the inclusion of risk-related measures (acceptance: $\Delta R^2 = 0.14$, $p < .001$; adoption of measures: $\Delta R^2 = 0.09$, $p < .001$). As depicted in Table 3, being female, higher age, and trust in science (but not trust in politics) were related to higher acceptance of measures.

Table 3

Hierarchical Regression Analysis to Predict Acceptance of Protective Measures From Sociodemographic Variables, Risk Perception, and Trust in Science and Politics (Study 2)

Step and predictor variable	*B*	*SE B*	β	R^2	ΔR^2
Step 1				**.17*****	
Gender (0 = *male*; 1 = *female*)	0.45	0.12	.21***		
Socioeconomic Status	0.02	0.02	.07		
Age	0.02	0.00	.30***		
Parental Status (0 = *no children*; 1 = *children*)	-0.09	0.12	-.04		
Risk Group (0 = *low risk*; 1 = *high risk*)	0.35	0.15	.17*		
Step 2				**.22*****	**.05****
Gender (0 = *male*; 1 = *female*)	0.42	0.12	.20***		
Socioeconomic Status	0.01	0.02	.04		
Age	0.02	0.00	.36***		
Parental Status (0 = *no children*; 1 = *children*)	-0.10	0.12	-.05		
Risk Group (0 = *low risk*; 1 = *high risk*)	0.27	0.15	.13		
Risk Susceptibility	0.06	0.05	.08		
Risk of Infection	0.00	0.00	.26**		
Risk of Hospitalization	0.00	0.00	-.13		
Step 3				**.36*****	**.14*****
Gender (0 = *male*; 1 = *female*)	0.46	0.11	.22***		
Socioeconomic Status	0.01	0.01	.03		
Age	0.02	0.00	.31***		
Parental Status (0 = *no children*; 1 = *children*)	0.00	0.11	.00		
Risk Group (0 = *low risk*; 1 = *high risk*)	0.16	0.14	.08		
Risk Susceptibility	0.05	0.04	.07		
Risk of Infection	0.00	0.00	.16		
Risk of Hospitalization	0.00	0.00	-.06		
Trust in Politics	0.01	0.04	.02		
Trust in Science	0.27	0.05	.38***		

*$p < .05$. **$p < .01$. ***$p < .001$.

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For the adoption of protective measures (Table 4), being female, higher age, higher risk susceptibility, and higher trust in science (but not trust in politics) were significant positive predictors.

Table 4

Hierarchical Regression Analysis to Predict Adoption of Protective Measures From Sociodemographic Variables, Risk Perception, and Trust in Science and Politics (Study 2)

Step and predictor variable	B	$SE\ B$	β	R^2	ΔR^2
Step 1				**.13*****	
Gender (0 = *male*; 1 = *female*)	0.22	0.07	.18**		
Socioeconomic Status	0.01	0.01	.08		
Age	0.01	0.00	.29***		
Parental Status (0 = *no children*; 1 = *children*)	0.01	0.07	.00		
Risk Group (0 = *low risk*; 1 = *high risk*)	0.11	0.09	.09		
Step 2				**.18*****	**.05****
Gender (0 = *male*; 1 = *female*)	0.21	0.07	.17**		
Socioeconomic Status	0.01	0.01	.05		
Age	0.01	0.00	.37***		
Parental Status (0 = *no children*; 1 = *children*)	-0.01	0.07	-.01		
Risk Group (0 = *low risk*; 1 = *high risk*)	0.05	0.09	.04		
Risk Susceptibility	0.07	0.03	.16*		
Risk of Infection	0.00	0.00	.15		
Risk of Hospitalization	0.00	0.00	-.06		
Step 3				**.27*****	**.09****
Gender (0 = *male*; 1 = *female*)	0.23	0.07	.19**		
Socioeconomic Status	0.01	0.01	.04		
Age	0.01	0.00	.33***		
Parental Status (0 = *no children*; 1 = *children*)	0.04	0.07	.03		
Risk Group (0 = *low risk*; 1 = *high risk*)	0.00	0.09	.00		
Risk Susceptibility	0.06	0.03	.15*		
Risk of Infection	0.00	0.00	.08		
Risk of Hospitalization	0.00	0.00	-.01		
Trust in Politics	0.01	0.03	.03		
Trust in Science	0.12	0.03	.30***		

*$p < .05$. **$p < .01$. ***$p < .001$.

Discussion

Acceptance and adoption of protective measures were still high in Study 2 but significantly reduced compared to Study 1, which was conducted one month earlier. Even at this later point in time, however, trust in science strongly affected whether people accepted and adopted protective measures. Moreover, hierarchical regression analyses as well as the combined analyses across studies demonstrated that older and female individuals were more likely to accept and adopt protective measures.

General Discussion

Our research identified important predictors of acceptance and adoption of protective measures during the COVID-19 pandemic. Across studies, women and older participants showed higher acceptance and adoption. Besides these sociodemographic variables, risk perception, but especially trust in politics and trust in science emerged as important predictors of the acceptance and adoption of protective measures.

Higher fatality rates for COVID-19 have been reported for older individuals, but also for men (e.g., Livingston & Bucher, 2020). Nevertheless, men seem to adopt protective measures less frequently than women, in line with previous research showing that men usually show less health-promoting behaviours and more health-risk behaviours (Bish & Michie, 2010; Helgeson, 2017). In many countries, there are also differences in health behaviours and long-term health outcomes between people of different socioeconomic positions (e.g., Petrovic et al., 2018), but we found no indication that socioeconomic status was related to acceptance or adoption of measures. For health communication during the COVID-19 pandemic, these results suggest that it is important to develop target-group specific interventions focusing on men and younger individuals. For men, this could include highlighting their increased individual risks, whereas for younger individuals these messages could focus on the societal consequences of their behaviour.

The three indicators of risk perception (risk of infection, risk of hospitalization, and risk susceptibility) revealed a mixed picture. In Study 1, risk of hospitalization, but not risk of infection was related to higher acceptance and adoption of the measures in the hierarchical regression analysis, but this pattern was not observed in Study 2. Risk susceptibility was even negatively related to adoption of measures in Study 1, indicating that participants who felt less susceptible compared to others of the same age and gender reported more protective behaviours. This pattern was not observed in Study 2; here, participants who felt more susceptible showed more protective behaviours. These differences might be due to unobserved sample characteristics or actual changes over time, but it is also possible that participants in Study 1 considered themselves not to be vulnerable because they already showed protective behaviours.

Both trust in politics and trust in science were important predictors in the earlier study, but only trust in science was a significant predictor in the hierarchical regression in Study 2. The outbreak of COVID-19 may have undermined people's confidence that responsible politicians could control the disease, pointing to the complex interplay of trust and risk management strategies (Siegrist & Zingg, 2014). The predictive power of trust in science was also somewhat stronger in Study 2 compared to Study 1, which could be due to the fact that ceiling effects in the outcome measures were less pronounced in Study 2 (see also limitations below). Comparisons between Study 1 and 2, however, should be carried out cautiously as sample recruitment and composition differed.

Given that our studies point to the important role of trust, the question arises as to how trust can be fostered. Trust is difficult to create (Slovic, 1999), and many strategies to build trust can only be achieved in the long term. For example, education (Bak, 2001; Hayes & Tariq, 2000) and science knowledge (Evans & Durant, 1995) are positively associated with trust in science. Other research has stressed that media use may play an important role: Heavy TV viewing is negatively correlated with trust in science (e.g., Gerbner, 1987), whereas using traditional news and social media is positively correlated to trust in science (Huber et al., 2019). Finally, trust in science also results from replicable research findings (Anvari & Lakens, 2018; Hendriks et al., 2020; Wingen et al., 2020). Despite the need for quick answers, researchers studying the current pandemic should thus be especially careful not to publish potentially unreliable findings. In the short term, trust in science and politics might be best bolstered by effective crisis communication. Focusing on trust and crisis communication during pandemics, Siegrist and Zingg (2014) recommended (i) that uncertainties about what is known and what is unknown about a given disease are transparently addressed, (ii) that role models adopt the recommendations for fighting the pandemic, and (iii) that heterogeneous sets of experts should unanimously communicate about the effectiveness of the recommended behaviours.

Some limitations regarding our research need to be acknowledged. First, adoption of protective measures was self-reported, and actual levels of the behaviour may be lower due to reporting bias and social-desirability bias (Bish & Michie, 2010). Second, acceptance and adoption of protective measures showed ceiling effects in both studies. Due to the restricted variance in these measures, it is likely that we underestimated correlations and regression coefficients. For future research, it is therefore important to develop measures that allow for a greater variability in responses. Third, it is important to note that many researchers consider trust as a multidimensional construct, although views differ on how many dimensions are sufficient to describe the construct (Allum, 2007; Hendriks et al., 2015; Johnson, 1999; Mayer et al., 1995; Siegrist, 2019; Terwel et al., 2009). Seminal work by Mayer and colleagues (1995) has identified expertise, integrity, and benevolence as crucial dimensions of trust, and empirical evidence supports these three dimensions (e.g., Hendriks et al., 2015). Building on this research, future studies should take a more systematic approach to capture trust in a multidimensional way. This would also allow conclusions to be drawn as to which dimensions of trust are most strongly linked to protective behaviours in pandemics. Fourth, although the predictors in the hierarchical models explained considerable variance in the outcome variables, it is likely that additional important predictors exist. However, we aimed to parsimoniously explain acceptance and adoption and adding additional predictors would have compromised this aim. The perhaps most important limitation is that the cross-sectional design of this study does not allow causal relations to be tested. The observed correlational associations should thus be considered as a tentative hint for potential causal relationships. Yet, especially the link between trust and increased engagement in prosocial behaviour is well documented in general (Ferrin et al., 2008) and especially during pandemics (Siegrist & Zingg, 2014), and thus, it seems likely that this reflects a causal relationship. Nevertheless, future research should carry out longitudinal or experimental designs to investigate the causal effects of trust in science and politics and acceptance and adoption of protective measures during a pandemic. Furthermore, it has been demonstrated that trust in science varies in the context of specific topics (Hendriks et al., 2016). It is likely that in the context of COVID-19, where science may help to overcome a crisis, trust in science is much higher compared to a context where potential risks arise from science and technology (e.g., nuclear energy). As a result, the influence of trust in science (and also of trust in politics) on the acceptance of behavioural measures will vary according to the context that is studied.

Conclusion

In sum, our research shows that trust is a key factor for the acceptance and adoption of protective measures during the COVID-19 pandemic. Trust in politics and science increases the probability that people will accept and implement protective measures, which can eventually lead to a reduction in infection and fatality rates. Thus, politicians or scientists have to be careful not to propagate any ineffective or even dangerous measures (e.g., Liu et al., 2020). Because the implementation of protective measures is directly related to infection and fatality rates, strong efforts should be taken to ensure that trust in politics and science is not undermined, and that those who are trusted give valid and sound recommendations on how to protect oneself and others.

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Data Availability: For this article, two datasets are freely available (Dohle, Wingen, & Schreiber, 2020b).

Supplementary Materials

The following Supplementary Materials are available (for access see Index of Supplementary Materials below):

- Via AsPredicted: The preregistration protocols for Study 2

- Via the Open Science Framework (OSF) repository: Materials, data, and code for both studies
- Via the PsychArchives repository: Supplementary Materials. This document includes: Tables S1-S8; Figures S1-S5

Index of Supplementary Materials

Dohle, S., Wingen, T., & Schreiber, M. (2020a). *Supplementary materials to "Acceptance and adoption of protective measures during the COVID-19 pandemic: The role of trust in politics and trust in science"* [Preregistration protocol]. AsPredicted. https://aspredicted.org/z4mc5.pdf

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