

# Insight into the accuracy of COVID-19 beliefs predicts behavior during the pandemic

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## Abstract

Susceptibility to COVID-19 misinformation--believing false statements to be true--negatively relates to compliance with public health measures. Here, we make the prediction that metacognitive insight into the varying accuracy of own beliefs predicts compliance with recommended health behaviors, above and beyond the accuracy of these beliefs. In a national sample of German citizens, we investigate metacognitive sensitivity, the degree to which confidence differentiates correct from incorrect beliefs. Bayesian and frequentist analyses show that citizens with higher metacognitive sensitivity were more likely to adopt recommended public health measures. Importantly, this benefit of metacognitive introspection into own beliefs held controlling for the accuracy of the beliefs. The present research highlights that insight into the varying accuracy of beliefs, rather than only the beliefs themselves, relate to citizens' behavior during the pandemic.

*Keywords:* COVID-19, misinformation, infodemic, metacognition, true and false belief.

The COVID-19 pandemic is accompanied by what has come to be known as the *infodemic*, an unprecedented surge of information that is characterized by both its scale, and its high proportion of misinformation (Kouzy et al., 2020). COVID-19 misinformation entails originally true information that is spun or decontextualized, rendering it misleading, but also fabricated information that is entirely false (Brennen et al., 2020). Recently, evidence has accumulated that susceptibility to COVID misinformation—believing FALSE statements to be TRUE--negatively predicts compliance with public health measures (Allington et al., 2020; Enders et al., 2020; Roozenbeek et al., 2020). Here, we propose, however, that in the noisy information environment of the infodemic where external feedback on the accuracy of own beliefs is unreliable, citizens' *metacognitive insight* into the accuracy of their beliefs is relevant for explaining compliance with public health measures. There is considerable research on how human metacognition, our ability to reflect upon, and evaluate own beliefs, enables us to avoid making decisions based on unreliable evidence in the absence of external feedback (Hainguerlot et al., 2018; Schulz et al., 2020; Yeung & Summerfield, 2012). Metacognitive reflection expresses itself in confidence, an awareness of the validity and fallibility of our beliefs, which can be used as an internal control signal to guide behavior (Balsdon et al., 2020; Desender et al., 2018; Rollwage & Fleming, 2021). Ideally, then, citizens' confidence should have high *sensitivity* in that it distinguishes correct from incorrect beliefs. That is, sensitivity is high for a person who has high confidence in beliefs that are correct, and low confidence in beliefs that are incorrect. This would be the case for a person who has high confidence in the belief that, say, physical distancing prevents infection with the virus, and low confidence in the belief that 5G masts foster infection. The present study explores the behavior-guiding function of individual metacognition in an area with real-world, collective implications, the adoption of public health measures to contain the spread of the coronavirus. Here, we make the prediction that metacognitive insight into the accuracy of COVID-beliefs explains citizens' adoption of recommended public health measures. Importantly, to the extent that citizens use the confidence they have in their beliefs to guide their behavior, the relationship between metacognitive sensitivity and behavior should hold above and beyond (controlling for) the accuracy or inaccuracy of the beliefs themselves.

Prior research has shown that confidence helps us control our behavior, such as during self-regulated learning (Bjork et al., 2013), evidence accumulation (Balsdon et al., 2020), learning from mistakes (Sinclair et al., 2019), or information search and processing (Desender et al., 2018; Schulz et al., 2020). Furthermore, cognitive and neuroscientific research has shown that individuals vary in their ability to correctly map confidence to the accuracy of their object-level beliefs (De Martino et al., 2013; Pallier et al., 2002). This metacognitive ability, measured in the laboratory, may transfer to real-world behavior. For example, participants with higher metacognitive sensitivity in distinguishing legitimate and phishing emails as determined in a lab task were less likely to have

malicious files on their home computers (Canfield et al., 2019), students with higher metacognitive accuracy tend to achieve higher academic success (Ward & Butler, 2019), and metacognitive insight translates cognitive and functional skills into real-world contexts in patients with schizophrenia (Davies et al., 2017). Neurocognitive studies in particular found that lacking sensitivity of metacognitive confidence, in contrast, may drive negative behavioral outcomes. These studies showed that following high-confidence decisions, subsequent neural information processing is biased such that it reduces the integration of disconfirmatory evidence, which is problematic when confidence is not aligned with the accuracy of the decision (Rollwage et al., 2020). In sum, existing evidence suggests that people use fluctuations in confidence to guide future behavior, and that variation in the introspective ability to correctly map confidence to object-level accuracy (i.e., metacognitive sensitivity) may be mirrored in variation in real-world behavior. We therefore expect that metacognitive sensitivity of the confidence citizens have in their COVID-beliefs predicts adoption of recommended public health measures.

Since the onset of the pandemic, researchers have collected considerable evidence about the factors that explain adoption of recommended public health measures. In particular, it is now known that higher compliance is explained by how people perceive the pandemic, particularly the extent to which the pandemic is perceived as risky compared to “overblown” (Anguseid, 2020; Jørgensen et al., 2020), but also the extent to which the pandemic is perceived as characterized by civic duty (Barrios et al., 2021; Zajenkowski et al., 2020). Political attitude is a consistent predictor of compliance in the US, UK, and Canada, and New Zealand, but this ideological gap appears to be less pronounced in Europe (Becher et al., 2020; NW et al., 2020; Painter & Qiu, 2020). Apart from these “hot” predictors, also “cold” cognitive variables have been shown to predict compliance. In particular, health literacy and accurate object-level knowledge about COVID appear to be important positive predictors of health behavior across countries (Choma et al., 2021; Gautam et al., 2021; Riiser et al., 2020). Conversely, belief in COVID-19 misinformation and conspiracy theories negatively predict adoption of health-protective behaviors (Allington et al., 2020; Enders et al., 2020). Hence, while present research has uncovered that own perceptions of, and beliefs about the pandemic shape compliance with public health guidance measures, the extent to which these relationships are modulated by the metacognitive ability to realize which beliefs are correct and which ones incorrect, remains unknown.

Here, we investigate whether metacognitive sensitivity, an insight into the validity and fallibility of own beliefs, can explain behavior during the pandemic, above and beyond the accuracy of the beliefs themselves. That is, we investigate whether higher metacognitive sensitivity predicts higher compliance at one particular level of accuracy of COVID-beliefs. The present study harnessed methods from Signal Detection Theory (SDT) on both the object-level, and the

metacognitive level (Fleming, 2017; Maniscalco & Lau, 2012). This provides us with the unique benefit to assess metacognitive ability objectively, rather than relying on self-reports. Furthermore, SDT allows us to assess how well an individual's metacognitive confidence distinguishes between correct and incorrect beliefs (metacognitive sensitivity), independently of how well their beliefs distinguish between correct information and misinformation (object-level sensitivity). The present research, therefore, explores the question: Are citizens with higher insight into the validity of their beliefs about COVID-19 more likely to comply with recommended public health measures compared to citizens with poorer self-assessment? And, importantly: Does that hold irrespective of the differences in the accuracy of their beliefs?

## Method

Our main hypothesis (that metacognitive accuracy predicts compliance, above and beyond susceptibility to COVID-19 misinformation) was pre-registered under [https://aspredicted.org/see\\_one.php](https://aspredicted.org/see_one.php). Additional analyses are indicated as exploratory. All data, materials, and analysis code (in R) are publicly available under <https://osf.io/axj83/>. Participants provided informed consent. Methods were accepted by the ethical review board of University of Tübingen, Germany. Data were collected in December 2020, during the second wave of the pandemic in Germany.

**Participants.** N = 590 participants took part in the study. The sample constituted a nationally balanced quota sample of German citizens, balanced for gender (female: n=304, 51%), age, and geographical distribution, and was sampled by the polling company YouGov.

**Procedure.** The survey was conducted in the following order: Political attitude; trust in media and media consumption (results not reported here); belief in misinformation and factual information together with respective confidence items; compliance with public health guidance measures; debriefing; demographics.

## Measures

**Political attitude.** Participants indicated “When talking about politics, one often hears the concepts “left” and “right”. We would like to know from you where you would place yourself” on a 9-point scale (1: left; 9: right).

**COVID-19 beliefs.** Participants verified 10 statements about the virus, six of which were FALSE, and four of which were TRUE. The list of statements comprised the two true and six false statements from previous research (Roozenbeek et al., 2020), as well as two additional true statements. For each statement, participants indicated: “Is this statement correct or incorrect?” (correct/incorrect). The TRUE statements were: The coronavirus was bioengineered in a military

lab in Wuhan; Being able to hold your breath for 10 seconds or more without coughing or discomfort is a good self-check test for whether you have the coronavirus; The coronavirus is part of a global effort to enforce mandatory vaccination; Gargling salt water or lemon juice reduces the risk of infection from the coronavirus; The new 5G network may be making us more susceptible to the virus; Breathing in hot air through your mouth and nose (e.g. from a hair dryer) kills the coronavirus as it can only live in cool places. The FALSE statements were: People with diabetes are at a higher risk of complications from coronavirus infection; Using hand sanitizer with at least 60% alcohol is effective in reducing risk of infection from coronavirus; people may be infectious two days prior to showing symptoms.

**Metacognitive confidence in COVID-19 beliefs.** Participants provided an item-specific confidence judgment by indicating, after each statement: “How certain are you that your assessment is correct?” on a 6-point scale ranging from 50% (“I guessed”) to 100% (“I am certain”).

**Compliance with public health guidance.** For a total of eleven public health guidance measures taken from prior research (Roozenbeek et al., 2020), participants indicated the frequency with which they had adopted the measure in the last month (7-point scale: much rarer, rarer, equally often, more frequently, much more frequently; I did not take this measure). That is, our measure of compliance assessed how much citizens *adapted* their behavior in response to the pandemic, rather than the extent to which the behavior was part of their normal routine irrespective of the pandemic. The health guidance measures were: Handwashing; using hand disinfectant; wearing a face mask; using public transport; eating out; touch own face; go grocery shopping; eat at home; do homeoffice; visit public gatherings (parties, family celebrations); stock additional food.

## Analysis

**Accuracy of COVID beliefs.** To measure the accuracy of COVID-19 beliefs, we determined sensitivity  $d'$  as specified in a Signal Detection Theory (SDT) framework by calculating the difference of the z-standardized False Positive (responding “true” to statements that are false), and the z-standardized True Positive rate (responding “true” to statements that are, in fact, true).

**Metacognitive accuracy.** To measure metacognitive accuracy, the extent to which confidence judgments discriminate between correct and incorrect answers, we determined two different measures, metacognitive sensitivity and metacognitive efficiency. To assess metacognitive sensitivity, we computed *meta-d'* for each participant (Maniscalco & Lau, 2014). *Meta-d'* is a bias-free measurement of sensitivity in that it controls for metacognitive bias, participants' general tendency to report high/low values of confidence. Furthermore, since *meta-d'* and (object-level)  $d'$  are measured on the same signal/noise ratio scale, *meta-d'* provides the unique advantage of being directly comparable to  $d'$ . Therefore, metacognitive efficiency can be computed as  $Mratio = meta-$

$d'/d'$  (Fleming & Lau, 2014). When  $\text{meta-}d' = d'$ , participants are metacognitively ideal, and able to use all the information available for the type-1 task (belief task) when reporting confidence. When  $\text{meta-}d' < d'$ , participants are less able to report confidence judgment than expected based on the type-1 task, that is, confidence judgments are *noisier* than expected based on the accuracy of the beliefs. That is, metacognitive efficiency determines the level of metacognitive sensitivity, controlling for the accuracy of the object-level task (COVID-19 beliefs, in our case). To compute  $\text{meta-}d'$ , we used a hierarchical Bayes procedure (Fleming, 2017), and code provided at <https://github.com/smfleming/HMeta-d>. During the calculation of  $Mratio$ ,  $n=19$  (0.03%) needed to be excluded. This was for two reasons: (i)  $Mratio$  values of infinity due to division by zero ( $n_{\text{excluded}} = 7$ ; 0.01%), (ii)  $Mratio$  values that were calculated based on positive values of  $\text{meta-}d'$  and negative values of  $d'$  as those result in uninterpretable  $Mratio$  values ( $n_{\text{excluded}} = 12$ ; 0.02%).

**Compliance with public health guidance.** To measure participants' compliance with public health guidance, we computed two compliance scores, a frequency-weighted score and a simple score. The *frequency-weighted* compliance score was computed as the weighted mean of all measures adopted, weighted by their frequency. The *simple* compliance score was computed by summing up the number of health preventative behaviors adopted by each participant, irrespective of the frequency with which they were performed (Roozenbeek et al., 2020). Measures were coded such that higher scores represent higher compliance.

## Results

**Accuracy of beliefs and metacognitive accuracy.** Descriptive statistics of the main measures used in this study are given in Table 1. Figure 1 displays the accuracy of COVID-19 beliefs in the German population and suggests that, by and large, German citizens were well-informed about COVID. Specifically, citizens were 2.7-12.5 times more likely to indicate that a false statement is false (rather than true), and 2.8- 22 times more likely to indicate that a true statement is true (rather than false). This was reflected in an average object-level accuracy of  $d' = 2.0$ , which indicates accuracy clearly exceeding the chance level ( $d' = 0$ ).

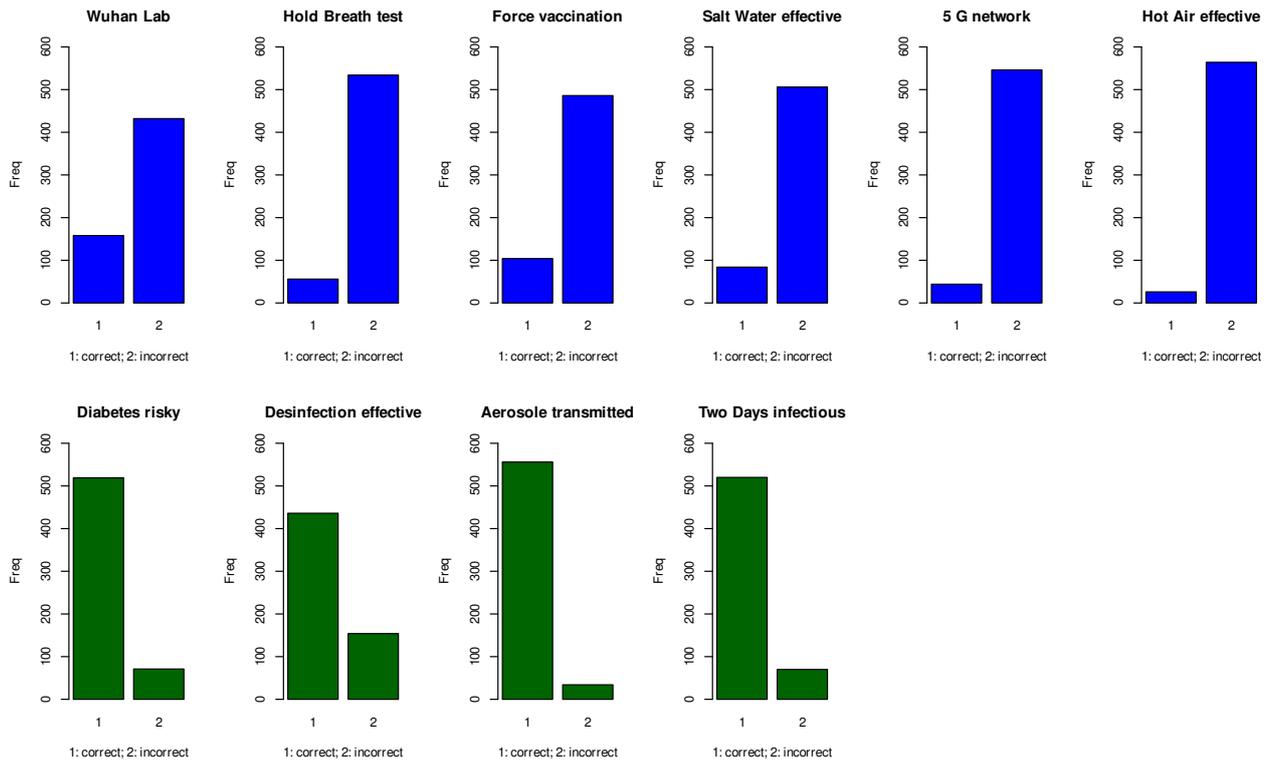
In terms of metacognitive accuracy ( $Mratio$ ), however, results demonstrated a lack of awareness of the accuracy of object-level beliefs, reflected in an average metacognitive efficiency of  $Mratio = 0.86$ . Since metacognitive efficiency controls for object-level accuracy, optimal insight into the varying accuracy of their object-level beliefs would be  $Mratio = 1.0$ . Hence, these results suggest that citizens' insight into the accuracy of their object-level beliefs was 16% lower than it could be based on the accuracy of their beliefs.

**Table 1.** Means, standard deviations, and correlations with confidence intervals.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
<b>1. Compliance, simple</b>	0.44	0.24						
<b>2. compliance, frequency-weighted</b>	0.50	0.49	.66** [.61, .71]					
<b>3. Political attitude</b>	4.66	1.50	-.04 [-.12, .04]	-.01 [-.09, .08]				
<b>4. Accuracy of beliefs (d')</b>	2.05	0.71	.15** [.07, .23]	.10* [.02, .18]	-.06 [-.15, .02]			
<b>5. confidence</b>	0.86	0.10	.13** [.05, .21]	.10* [.02, .18]	-.04 [-.12, .05]	.34** [.26, .41]		
<b>6. Metacognitive sensitivity (meta-d')</b>	1.73	1.15	.16** [.08, .24]	.12** [.04, .20]	-.04 [-.12, .05]	.52** [.45, .57]	.81** [.78, .84]	
<b>7. Metacognitive efficiency (Mratio)</b>	0.86	0.62	.11** [.03, .19]	.10* [.02, .18]	-.04 [-.13, .04]	-.07 [-.15, .02]	.64** [.59, .69]	.65** [.61, .70]

*Note.* *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. \* indicates  $p < .05$ . \*\* indicates  $p < .01$ .

**Does accuracy of COVID-beliefs relate to compliance with public health measures?** We first investigated the zero-order relationship of whether the accuracy of COVID-beliefs ( $d'$ ) relates to compliance with public health measures in our sample. In line with previous research (Allington et al., 2020; Enders et al., 2020; Roozenbeek et al., 2020), this was indeed the case, for both the simple,  $r(576) = .15$ ,  $p < .001$ , and the frequency-weighted score,  $r(576) = .1$ ,  $p = .02$ . This result suggests that citizens with more accurate beliefs about COVID were more likely to comply with recommended health measures.



**Figure 1.** Answers to the COVID-19 beliefs, separate for false statements (blue, top row) and true statements (green, bottom row). Answers indicate whether participants believed the statement to be correct, or incorrect.

**Metacognition as a predictor of compliance.** We investigated whether metacognitive accuracy can predict compliance, controlling for object-level accuracy of beliefs ( $d'$ ), political attitude, and sociodemographics, using Bayesian and frequentist regressions (Figure 3).

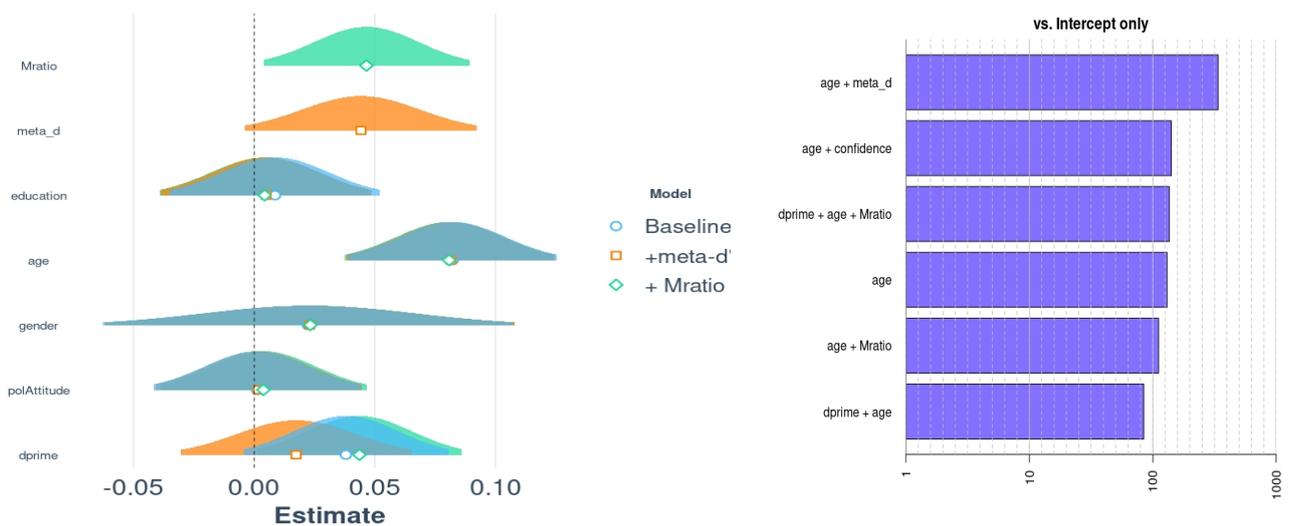
To conduct the *Bayesian* regression, we employed default priors (Wetzels et al., 2011), as computationally realized in the R-package *BayesFactor*. Bayesian regression selects the model that best fits the data from all possible combinations of predictors, while at the same time not incurring in overfitting. That is, Bayesian regression selects the model that optimally balances fit and parsimony. The resulting Bayes Factor quantifies the evidential strength for the model. All Bayes Factors presented here indicate the evidence strength of the model, relative to the intercept-only model (null hypothesis), that is,  $BF_{10}$ . The best model selected entailed age + *meta-d'*, indicating that compliance was best predicted by age and metacognitive sensitivity. This model had a Bayes Factor of  $BF_{10}=338$ , indicating that the data were approx. 338 times more likely under this model compared to under the intercept-only model, amounting to *very strong* (Raftery, 1995), or *decisive* (Jeffreys, 1998) evidence in favor of the model.

For the frequentist regression, we predicted the compliance score from a baseline model (accuracy of beliefs:  $d'$ , political attitude, demographics), and subsequently entering the

metacognitive accuracy variables in two additional models, sensitivity (*meta-d'*), or efficiency (*Mratio*). Both models including metacognitive accuracy predicted compliance better than the baseline model (see Supplementary Material). These results are largely in line with the Bayesian regression, with the only difference that a model consisting of age + *d'* + *Mratio* (rather than age + *meta-d'*) proved to be the slightly better model. Also in line with the Bayesian regression, age proved the best predictor of the list of sociodemographics, and revealed that older citizens were more likely to comply with recommended health behaviors.

To test the robustness of these results, we conducted three additional tests. First, we conducted robust regression using the R package *robustbase* that weights data points based on how deviant they are, thereby delivering results that are highly robust against outliers. Results from the robust regression corroborated results from the ordinary frequentist regression. In particular, estimates for *Mratio* were virtually identical for the ordinary frequentist ( $\beta = .078$ ), and the robust regression ( $\beta = .084$ ). Second, we conducted Bayesian and frequentist regression models using the simple (rather than frequency-weighted) compliance score. Results proved robust to using the simple compliance score. In particular, the best model selected from the Bayesian using the simple compliance score regression entailed *d'* + *Mratio* ( $BF_{10}=10.5$ ), corroborating the importance of both *d'* and *Mratio* for predicting compliance. And third, we conducted an alternative computation of *meta-d'* that does not make use of a hierarchical Bayesian procedure, but fits *meta-d'* using maximum likelihood estimation (Maniscalco & Lau, 2012), using the code provided under <https://www.columbia.edu/~bsm2105/type2sdt/>. Results were robust to this alternative measure of *meta-d'*, and corroborated the importance of metacognition for predicting compliance. In particular, the best model selected in the Bayesian regression entailed *d'* + *Mratio* ( $BF_{10}=10.7$ ) using the simple compliance score, and age + *meta-d'* ( $BF_{10}=2.243$ ) using the frequency-weighted compliance score.

These results provide converging evidence that, controlling for the overall accuracy of citizens' COVID-beliefs, citizens with higher metacognitive insight into which beliefs, exactly, are correct and which ones incorrect, were more likely to comply with recommended health behaviors.



**Figure 3.** Results of multiple regression models predicting the frequency-weighted compliance score. Left: Frequentist regression. Size of the distribution indicates 95% CI. Education and sex (1=male, 2=female) are dummy-coded. Right: Bayesian regression. Bar indicate Bayes Factors for the six best models, compared against the intercept-only (null) model.

**Does metacognition interact with political orientation in shaping compliance?** We explored whether the link between metacognitive accuracy and compliance is modulated by political orientation. This could be the case if citizens across the political spectrum differ in their tendency to rely on metacognitive compared to object-level beliefs for shaping behavior. To do so, we included the interaction Mratio\*political attitude in the list of possible predictors. Bayesian regression revealed that this was not the case: The best model selected (d' + age + Mratio) was unchanged, and did not include the interaction term. Furthermore, with a Bayes Factor of  $BF_{10}=14$ , the best model that did contain an interaction term (d' + age + Mratio + political Attitude + Mratio\*polAttitude) was considerably worse compared to the overall best model. This result suggests that metacognitive efficiency relates to compliance irrespective across the political spectrum.

**What predicts belief in misinformation?** To exploratively assess predictors of belief in misinformation, we computed the accuracy of responses to the FALSE statements only. Bayesian regression revealed that the best model to predict susceptibility to misinformation entailed political attitude, providing very strong evidence ( $BF_{10}=41.6$ ) in favor of this model over the intercept only-model. Specifically, citizens who self-identified as politically right-leaning were more likely to be susceptible to misinformation ( $\beta = .02, p<.001$ ).

## Discussion

The onset of the COVID-19 pandemic has been accompanied by an infodemic, “an overabundance of information—some accurate and some not—that makes it hard for people to find trustworthy information sources and reliable guidance when they need it” (World Health Organization, 2020). The present research was based on the proposition that in this noisy information environment where external guidance for behavior is lacking, metacognition can serve the purpose of internal guidance. By helping citizens decide how much weight (confidence) they should assign to a particular belief, confidence can inform subsequent behavior. Here, we demonstrate that citizens with more accurate metacognition--where confidence matches the accuracy of the underlying belief--were more likely to comply with recommended public health measures. Notably, this benefit of higher introspective ability in the varying accuracy of own beliefs held above and beyond (controlling for) the accuracy of these beliefs. This result provides evidence that citizens with more accurate awareness of which beliefs, exactly, are correct and which ones incorrect were more likely to comply with recommended public health measures.

These results are consistent with behavioral evidence demonstrating that citizens use varying levels of confidence as a signal to guide behavior (Balsdon et al., 2020; Hainguerlot et al., 2018; Schulz et al., 2020; Van den Berg et al., 2016), as well as neurocognitive evidence suggesting that confidence can act as an internal advice-giver when external advice is unavailable (Guggenmos et al., 2016). Notably, given this behavior-guiding function of confidence, the importance of metacognitive accuracy is to be expected with almost analytical necessity: When beliefs are weighted by accurate confidence, low-confidence beliefs that are likely to be inaccurate (such as gargling salt water as a preventive measure) are down-weighted and less likely to inform subsequent behavior. In contrast, high-confidence beliefs that are likely to be accurate (such as using disinfectants) are up-weighted and more likely to inform behavior. Consequently, in the present research, higher metacognitive accuracy was related to behavior that is in line with, rather than contradicts, recommendations based on scientifically accurate knowledge.

Our beliefs naturally vary in accuracy. In line with prior evidence demonstrating the relationship between the accuracy of object-level beliefs about COVID-19, and behavior during the pandemic (Allington et al., 2020; Enders et al., 2020; Roozenbeek et al., 2020), we also find that citizens with more accurate object-level beliefs were more likely to comply with public health measures. These results are consistent with the notion that misinformed citizens are unlikely to make optimal decisions (Lewandowsky, 2020). A key result from the present study, however, is that realizing which beliefs exactly are right or wrong increases the likelihood of compliance with recommended health measures, above and beyond the benefit of holding more accurate beliefs. This

result highlights the crucial function of metacognitive reflection as allowing us to distance ourselves from our object-level beliefs, and to assign due weight to them.

Given this result demonstrating the role of metacognitive sensitivity, the infodemic is worrisome not only because exposure to misinformation reduces the accuracy of object-level beliefs (Lee et al., 2020). Rather, the infodemic is worrisome because it produces *informational noise* that reduces the reliability of evidence. When citizens form confidence judgments by accumulating low-reliability evidence, this necessarily decreases metacognitive efficiency, that is, the sensitivity with which confidence distinguishes between true and false belief (Rollwage & Fleming, 2021). In line with a mechanism whereby the reliability of evidence determines the accuracy of confidence judgments, it was found that citizens' metacognitive accuracy is lower for the politicized science of climate change, compared to non-politicized science (Fischer et al., 2019). This metacognitive confusion may have detrimental consequences for forming beliefs informed by knowledge (Fischer & Said, 2020). Together, these results suggest that the danger of the infodemic lies in it sowing metacognitive confusion since this may have detrimental effects when confidence is used to inform belief, or behavior.

Here, we found that with an average object-level accuracy of  $d' = 2.0$ , German citizens are, by and large, well-informed about the coronavirus. This result is in line with prior research demonstrating overall high levels of public knowledge about the virus, and the pandemic (Al-Hanawi et al., 2020; Azlan et al., 2020; Gao et al., 2020). Metacognitive accuracy was worse, however. With a metacognitive efficiency (*Mratio*) of 0.86, a total of 16% of citizens' ability to distinguish true from false statements about COVID-19 was effectively lost in their confidence. The present results, therefore, deliver an explanation for the somewhat puzzling observation that we can see considerable variation in the adoption of recommended health measures (Kuiper et al., 2020; Van Rooij et al., 2020), despite high absolute levels of public knowledge about COVID-19: because non-compliance also relates to lacking *metacognitive* accuracy. Hence, these present results suggest that accurate knowledge about COVID-19 may not be sufficient to foster public compliance—citizens also need accurate awareness of their knowledge.

Prior research has shown that a promising pathway to reduce the impact of misinformation may be to help citizens detect misinformation by detecting reasoning errors (Cook et al., 2018), or inaccuracies (Pennycook et al., 2020) in the fallacious claim. The present results highlighting the role of metacognitive insight, however, suggest a novel pathway: Helping citizens detect errors and inaccuracies in their own reasoning and beliefs. To the extent that citizens use variations in confidence to inform their behavior, interventions targeted at increasing critical self-reflection may help fight the impact of misinformation from the angle of metacognitive, rather than object-level, accuracy.

The sharp increase in online misinformation since the onset of the pandemic is considered a threat to public health (Krause et al., 2020). Although adherence to public health measures helps contain the spread of the virus (Cowling & Aiello, 2020), considerable variation exists in individual compliance with these guidelines. The present results demonstrate that citizens with a more accurate awareness of the varying accuracy of their beliefs were more likely to comply with recommended public health measures, above and beyond the accuracy of the beliefs themselves. The present research, therefore, highlights how behavior during the pandemic relates to correctly validating our own beliefs, rather than only external evidence.

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