# Clarifying the relations between intellectual humility and pseudoscience beliefs, conspiratorial ideation, and susceptibility to fake news[☆]

Shauna M. Bowes [*], Arber Tasimi

*Emory University, United States*

## ABSTRACT

We addressed key questions regarding the relations between intellectual humility (IH) and endorsing/believing misinformation by (1) understanding what aspects of IH best predict endorsing/believing misinformation, (2) examining whether IH is related to endorsing/believing multiple manifestations of misinformation (pseudoscience, conspiracy theories, fake news), and (3) investigating whether these relations are specific to IH as opposed to relevant covariates. Across three samples, the IH measure assessing intrapersonal, interpersonal, and emotional features tended to be a stronger negative correlate of endorsing/believing misinformation than the IH measure assessing intrapersonal features alone. IH was generally related to less conspiratorial ideation and susceptibility to fake news. Nevertheless, IH tended to not be related to pseudoscience measures. Finally, these relations were generally robust after controlling for covariates.

## 1. Introduction

Misinformation is seemingly everywhere. For example, we have seen the emergence of new and compelling conspiracy theories (e.g., COVID-19 is a Chinese bioweapon; see Borger, 2021). We have witnessed the impact of fake news on political engagement and action (e.g., largescale election fraud drastically altered the results of the 2020 U.S. presidential election; see Suderman & Goodman, 2021). And we have watched as pseudoscientific "facts" were promulgated on social media platforms (e. g., reiki techniques boost your immune system functioning; see Caulfield, 2020). Misinformation can contribute to consequential and even dangerous outcomes, from rejection of science (e.g., Fasce & Picó, 2019) to ideological extremism (e.g., van Prooijen et al., 2015) to biased decision-making (e.g., Brotherton & French, 2014; Bronstein et al., 2019; Lobato et al., 2014). Thus, identifying what makes people less likely to endorse and believe misinformation represents a timely and pragmatically important issue.

In recent years, a burgeoning literature has targeted several interventions that attempt to reduce people's susceptibility to misinformation. For example, simply prompting people to think about accuracy has been shown to reduce people's willingness to share novel fake news headlines (e.g., Pennycook et al., 2020); so too is pausing to consider (or

reflect on) why a news headline may be true or false (e.g., Fazio, 2020). Research has also revealed that providing fact-checks after people process news headlines can be an effective way to correct beliefs about misinformation (e.g., Brashier et al., 2021). While these interventions are effective at helping people identify novel pieces of misinformation as inaccurate, it remains unclear whether they move people away from falsehoods and toward accuracy when they already hold misinformed beliefs.

From our point of view, intellectual humility (IH) captures the essence of the aforementioned interventions (i.e., an orientation toward accuracy) in addition to comprising tendencies to self-reflect, remain open-minded to new information, respect others' views, and seek out disconfirmatory evidence (e.g., Alfano et al., 2018; Krumrei-Mancuso & Rouse, 2016; Porter & Schumann, 2018). As such, IH is promising for not only helping people turn away from new pieces of misinformation (as in the tasks described above), but also for helping people hold on to actual misinformed beliefs less strongly and perhaps even away from them altogether. Building off this possibility, IH is positively associated with cognitive reflection (or analytical thinking; Krumrei-Mancuso et al., 2020) and an orientation toward accuracy (e.g., favoring balanced rather than one-sided arguments; Leary et al., 2017). What is more, IH appears to be related to less extremism (e.g., Bowes et al., 2020a) and

holding more accurate beliefs (e.g., views aligning with scientific consensus; Bowes et al., 2021; Huynh & Senger, 2021; Senger & Huynh, 2020).

To our knowledge, only two studies have examined the relations between IH and susceptibility to and belief in misinformation. In one study, IH was related to an ability to discern between real and fake news headlines across three samples; intellectually humble individuals were more likely to investigate (i.e., spend time fact checking) fake news headlines, but they were not more likely to investigate real news headlines (Koetke et al., 2021). In the second study, total scores on IH self-report measures tended to yield small-to-medium (per Gignac & Szodorai's, 2016, guidelines) negative correlations with conspiratorial ideation across three samples (Bowes et al., 2020b). Overall, this research is starting to build a picture of IH being related to less endorsement of and belief in misinformation.

Nevertheless, several key questions remain outstanding. First, what aspects of IH best predict endorsing/believing misinformation? All scholars agree that IH comprises metacognitive (or *intrapersonal*) characteristics, such as open-mindedness and the propensity to self-reflect (e. g., Leary et al., 2017). Nevertheless, there is disagreement over whether IH also comprises (a) relational (or *interpersonal*) characteristics, such as respect for other's views (e.g., Krumrei-Mancuso & Rouse, 2016; McElroy et al., 2014) and/or (b) *emotional* characteristics, such as an ability to tolerate disconfirmatory information (e.g., Krumrei-Mancuso, & Rouse, 2016). Thus, the relations between IH and endorsing/believing misinformation may vary across different conceptualizations of IH, meaning the relations differ across measures and dimensions of IH. For instance, some measures of IH, such as the *General Intellectual Humility Scale* (GIHS; Leary et al., 2017), are unidimensional and assess solely intrapersonal features whereas other measures, such as the *Comprehensive Intellectual Humility Scale* (CIHS; Krumrei-Mancuso & Rouse, 2016), are multidimensional and assess intrapersonal, interpersonal, and emotional features. Within the context of misinformation, the CIHS appeared to be a stronger negative correlate of conspiratorial ideation than the GIHS; in fact, a recent study indicated that whereas the CIHS was significantly related to conspiratorial ideation, the GIHS was not (Bowes et al., 2020b). Thus, it may be that a combination of intrapersonal, interpersonal, and emotional IH features best predicts endorsing/believing misinformation compared with intrapersonal IH features in isolation.

Another key question is whether IH is related to endorsing/believing multiple forms of misinformation. Misinformation refers to any information that is inaccurate, false, and misleading (e.g., Pennycook & Rand, 2021). In accordance with this definition, most measures of belief in conspiracy theories assess misinformation, as opposed to actual conspiracies (e.g., Watergate). Similarly, most measures of belief in pseudoscience assess misinformation through including claims that are not supported by evidence. Finally, fake news also falls within the category of misinformation since the headlines are by necessity false. These three manifestations of misinformation are linked (e.g., Anthony & Moulding, 2019; Bensley et al., 2020; van der Linden, Panagopoulos, & Roozenbeek, 2021), and, as a result, they share similar psychological signatures, such as close-mindedness and acceptance of unusual or low-quality evidence (Bago et al., 2020; Bronstein et al., 2019; Fasce & Picó, 2019; Lobato et al., 2014; Pennycook & Rand, 2019). That said, these manifestations of misinformation are not isomorphic. As foreshadowed above, perceiving a novel fake news headline as accurate overlaps with, but is separable from, clinging to a conspiratorial worldview in the face of uncertainty; the former represents susceptibility to misinformation whereas the latter represents a crystallized belief system centered on misinformation. Previous work has indicated that IH is related to both susceptibility to new pieces of misinformation as well as actual beliefs centered on misinformation (Bowes et al., 2020b; Koetke et al., 2021); research is needed to replicate and extend these findings.

A final outstanding question is whether and to what extent the relations between IH and endorsing/believing misinformation are specific

to IH as opposed to relevant covariates, including general humility, cognitive ability, cognitive reflection, and political ideology. IH manifests medium-to-large positive associations with general humility (e.g., Alfano et al., 2018), small-to-medium positive relations with cognitive ability and cognitive reflection (e.g., Krumrei-Mancuso et al., 2020; Zmigrod et al., 2019), and medium positive associations with liberal political ideology (e.g., Bowes et al., 2021). In turn, low general humility (e.g., Bowes et al., 2020b), low cognitive reflection (e.g., Fasce & Picó, 2019; Pennycook & Rand, 2019), and conservative ideology (e.g., Pennycook & Rand, 2019; van der Linden et al., 2021) are all positive correlates of endorsing/believing in misinformation. Taking these relations into consideration, IH may be associated with endorsing/believing misinformation vis-à-vis its relations with general humility, cognitive ability, cognitive reflection, and political ideology. Of course, research is needed to address this issue.

### 1.1. Current investigation

In this paper, we sought to (1) understand what aspects of IH best predict endorsing/believing misinformation, (2) examine whether IH is related to endorsing/believing in multiple manifestations of misinformation, and (3) investigate whether these relations are specific to IH as opposed to relevant covariates. We explored these aims in three samples spanning college and online participants. We examined the relations between two measures of IH, the GIHS (which assesses intrapersonal features) and the CIHS (which assesses intrapersonal, interpersonal, and emotional features), and multiple manifestations of misinformation (pseudoscience, conspiracy theories, and fake news). Consistent with existing research (e.g., Koetke et al., 2021), we hypothesized that IH would manifest small-to-moderate negative relations with endorsing/believing misinformation. Given that only one study has examined differences between the CIHS and GIHS in their relations with belief in misinformation (specifically, conspiratorial ideation; Bowes et al., 2020b), our analyses regarding what features of IH best predict endorsing/believing misinformation were exploratory. Finally, we examined whether the relations between IH and endorsing/believing misinformation converged with the relations between covariates (general humility, cognitive ability, cognitive reflection, and political ideology) and endorsing/believing misinformation. We additionally examined whether these relations were robust to controlling for covariates. In line with previous research (e.g., Bowes et al., 2021), we hypothesized that IH would predict significant variance in endorsing/believing misinformation after statistically controlling for covariates.

## 2. Methods

### 2.1. Participants

We recruited participants from three different samples. Sample 1 comprised college participants, Sample 2 comprised participants from Amazon's Mechanical Turk (MTurk), and Sample 3 comprised participants from Prolific. Once screened for quality control issues, data quality from MTurk studies is broadly comparable to those collected from other convenience samples, including Prolific (Peer et al., 2017) and undergraduate samples (Buhrmester, Talaifar, & Gosling, 2018). That said, there are controversies surrounding the quality of MTurk data (see Chmielewski & Kucker, 2020) and data from online crowdsourcing platforms more generally. To address data quality concerns, we used several metrics to screen out inconsistent, overused, or otherwise aberrant responding (e.g., Barends & de Vries, 2019; Chmielewski & Kucker, 2020); for a detailed description of these metrics, see Supplemental Materials 1.

### 2.1.1. Sample 1

Participants were undergraduate students enrolled in an introductory psychology course at a private university in the southeast of the

United States; they were recruited over the course of the Spring 2020 academic semester (January – April 2020). The final sample ($N = 209$; $M_{age} = 18.90$, $SD_{age} = 0.89$) was primarily White (47.8%) and female (63.2%). The remainder of participants identified as African-American (8.6%), Hispanic (10.5%), and Asian (35.9%). Most participants identified as Democratic (51.7%), followed by not identifying with a political party (18.7%) and independent (13.4%); Republicans represented a minority of the sample (9.6%).

### 2.1.2. Sample 2

Participants were recruited from Amazon's Mechanical Turk (MTurk) from October 2019 to December 2019. We recruited>400 participants to have 80% power to detect a medium effect size. The final sample ($N = 477$; $M_{age} = 39.68$, $SD_{age} = 11.54$) was primarily White (74.4%), female (54.5%), and college-educated (36.9%). The remainder of the sample comprised African-American (15.9%), Hispanic (12.4%), and Asian (5.0%) individuals. Most participants identified as Democratic (40.7%), with a minority identifying as Republican (29.8%) and independent (21.2%). All participants were from the United States.

### 2.1.3. Sample 3

Participants were recruited from Prolific; data were collected in two waves ($n = 529$; $n = 509$). Participants who participated in the first wave (data were collected from December 2019 to February 2020) were ineligible to enroll as participants in the second wave (data were collected from July 2020 to August 2020). As such, the two waves were merged. As in Sample 2, we recruited>400 participants in each wave to have 80% power to detect a medium effect size. The final sample after cleaning the data ($N = 958$; $M_{age} = 33.16$, $SD_{age} = 11.03$) was primarily White (72.9%), female (54.1%), and college-educated (41.8%). The remainder of the sample was African-American (9.2%), Hispanic (6.7%), and Asian (11.8%). Most participants identified as Democratic (42.3%), followed by independent (16.9%) and Republican (13.7%). Regarding the nationality of participants, most reported currently residing in the United States (63.4%), followed by Canada (24.8%), Australia (3.3%), and the United Kingdom (2.9%). For a full list of countries, refer to Supplemental Table 1.

### 2.2. Procedure & Materials

Participants completed an online battery of self-report measures[1]. For an overview of the measures included in each sample, refer to Table 1. Intercorrelations amongst measures within each sample are presented in Supplemental Tables 2–9. All measures are available at https://osf.io/49jtw/?view_only=43331a96a86f4871bdc256b8fa4ce765. Descriptive statistics, response scales, and internal consistencies are reported in Table 2.

### 2.2.1. Intellectual humility

We administered two different self-report measures of IH in all three samples: the GIHS (Leary et al., 2017) and CIHS (Krumrei-Mancuso & Rouse, 2016). The GIHS is a 6-item self-report measure of the intrapersonal features of IH that yields a total score. The CIHS is a 22-item self-report measure of the intrapersonal, interpersonal, and emotional features of IH that yields a total score in addition to scores on four dimensions: *Independence of Intellect and Ego* (which reflects a blend of intrapersonal, interpersonal, and emotional features), *Openness to Revising One's Viewpoint* (which reflects intrapersonal features), *Respect for Others' Viewpoints* (which reflects interpersonal features), and *Lack of Intellectual Overconfidence* (which reflects a blend of intrapersonal and

---

[1] Other individual differences measures (e.g., personality disorder traits, affective polarization) were included in these datasets. These measures were not analyzed as a part of this study and are being used in ongoing research. No studies in this manuscript were preregistered.

**Table 1**
Overview of measures used in each sample.

| | Sample 1 | Sample 2 | Sample 3 |
|---|---|---|---|
| **Intellectual Humility** | | | |
| Comprehensive Intellectual Humility Scale (CIHS) | ✓ | ✓ | ✓ |
| General Intellectual Humility Scale (GIHS) | ✓ | ✓ | ✓ |
| **Pseudoscience** | | | |
| CAM Health Belief Questionnaire (CHBQ) | ✓ | | ✓ |
| Pseudoscientific Belief Scale (PSEUDO) | | | ✓ |
| Revised Paranormal Belief Scale (RPBS) | ✓ | | ✓ |
| Superstitious beliefs | | | ✓ |
| **Conspiratorial Ideation** | | | |
| Belief in Conspiracy Theories Inventory (BCTI) | ✓ | | ✓ |
| Generic Conspiracist Belief Scale (GCBS) | | ✓ | ✓ |
| Ideological conspiracy theories | | ✓ | |
| Contradictory conspiracy theories | | | ✓ |
| Vaccine Conspiracy Theories Scale (VCBS) | | | ✓ |
| **Fake News and Real News Headlines** | | | |
| Perceived Accuracy – Republican | | ✓ | ✓ |
| Perceived Accuracy – Democratic | | ✓ | ✓ |
| Perceived Accuracy – Neutral | | ✓ | ✓ |
| **Covariates** | | | |
| Intelligence | ✓ | ✓ | ✓ |
| Cognitive reflection | ✓ | ✓ | ✓ |
| Honesty-Humility | ✓ | ✓ | ✓ |
| Political ideology | ✓ | ✓ | ✓ |

interpersonal features) [2]. We included two measures of IH to clarify potential differences across conceptualizations of IH. Moreover, by including the CIHS, we were able to examine the relations between subdimensions of IH and endorsing/believing misinformation.

### 2.2.2. Misinformation

Across samples, we used an array of misinformation inventories (described below) to replicate and extend existing research. Herein, we provide brief descriptions of the misinformation scales. Table 1 provides an overview of which scales were administered in each sample, and Table 2 provides an overview of the response scales for each measure. For a detailed account of the measures and their scoring details, refer to Supplemental Materials 3.

*2.2.2.1. Pseudoscience.* We administered four different self-report measures of pseudoscience beliefs in varying combinations across our samples: (1) the *CAM Health Belief Questionnaire* (CHBQ; Lie & Boker, 2004), a 10-item measure of belief in complementary and alternative medicine; (2) the *Pseudoscientific Belief Scale* (PSEUDO; Fasce & Picó, 2019), a 30-item measure of belief in pseudoscientific claims; (3) *The Revised Paranormal Belief Scale* (RPBS; Tobacyk, 2004), a 26-item measure of belief in the paranormal; and (4) Wiseman and Watt's (2004) 6-item measure of superstitious beliefs.

*2.2.2.2. Conspiratorial ideation.* We administered five different self-report conspiratorial ideation measures in varying combinations across our samples: (1) the *Belief in Conspiracy Theories Inventory* (BCTI; Swami et al., 2011), a 15-item inventory of belief in specific conspiracies (i.e., concrete, event-based conspiracy theories); (2) the *Generic Conspiracist Belief Scale* (GCBS; Brotherton et al., 2013), a 15-item measure

---

[2] Participants in Sample 1 and Sample 2 completed additional self-report measures of IH. A description of these measures is provided in Supplemental Materials 2 and their correlations with indices of misinformation are presented in Supplemental Tables 19–20. Given that each measure was used in only one sample (i.e., Sample 1 measures were only used in Sample 1, and the Sample 2 measure was only used in Sample 2), we do not focus on them in the main analyses.

**Table 2**
Descriptive statistics and internal consistencies.

| | Response Scale | Sample 1 | | Sample 2 | | Sample 3 | |
|---|---|---|---|---|---|---|---|
| | | M (SD) | α | M (SD) | α | M (SD) | α |
| **Intellectual Humility** | | | | | | | |
| CIHS | 1 (*strongly disagree*) to 5 (*strongly agree*) | 82.63 (10.11) | 0.87 | 80.75 (12.71) | 0.90 | 83.56 (10.91) | 0.89 |
| Independence of Intellect & Ego | | 17.18 (4.51) | 0.87 | 18.51 (4.91) | 0.90 | 18.05 (4.75) | 0.90 |
| Openness to Revising One's Views | | 19.81 (3.10) | 0.88 | 19.55 (3.83) | 0.88 | 20.67 (2.97) | 0.84 |
| Respect for Other's Views | | 21.65 (3.49) | 0.86 | 23.99 (4.01) | 0.84 | 25.08 (3.37) | 0.85 |
| Lack of Intellectual Overconfidence | | 20.97 (3.51) | 0.70 | 18.44 (4.96) | 0.83 | 19.76 (4.13) | 0.77 |
| GIHS | 1 (*strongly disagree*) to 5 (*strongly agree*) | 23.68 (3.72) | 0.89 | 23.06 (4.15) | 0.85 | 24.61 (3.40) | 0.82 |
| **Pseudoscience** | | | | | | | |
| Belief in comp. and alt. med. | 1 (*absolutely disagree*) to 7 (*absolutely agree*) | 41.12 (8.21) | 0.75 | – | – | 40.75 (10.85) | 0.84 |
| Belief in pseudoscience | 0 (*strongly disagree*) to 4 (*strongly agree*) | – | – | – | – | 78.51 (23.72) | 0.87 |
| Paranormal beliefs | 1 (*strongly disagree*) to 7 (*strongly agree*) | 74.33 (30.53) | 0.93 | – | – | 83.94 (37.92) | 0.93 |
| Superstitious beliefs | 0 (*definitely no*) to 4 (*definitely yes*) | – | – | – | – | 12.95 (5.86) | 0.81 |
| **Conspiratorial Ideation** | | | | | | | |
| Specific conspiracy theories | 1 (*completely false*) to 6 (*completely true*) | 34.27 (13.83) | 0.92 | – | – | 49.73 (27.86) | 0.95 |
| General conspiracy theories | 1 (*definitely not true*) to 5 (*definitely true*) | – | – | 39.49 (15.51) | 0.95 | 39.35 (13.61) | 0.93 |
| Ideological conspiracy theories | 1 (*definitely not true*) to 5 (*definitely true*) | – | – | 15.81 (5.65) | 0.71 | – | – |
| Contradictory conspiracy theories | 1 (*not at all true*) to 10 (*definitely true*) | – | – | – | – | 41.88 (21.75) | 0.91 |
| Vaccine Conspiracy Theories Scale | 1 (*strongly disagree*) to 7 (*strongly agree*) | – | – | – | – | 15.54 (10.41) | 0.97 |
| **Fake News Headlines**[2] | | | | | | | |
| Perceived Accuracy – Republican | 1 (*not at all accurate*) to 5 (*very accurate*) | – | – | 10.85 (3.36) | 0.74 | 10.08 (2.88) | 0.70 |
| Perceived Accuracy – Democratic | 1 (*not at all accurate*) to 5 (*very accurate*) | – | – | 10.65 (2.99) | 0.69 | 10.69 (2.68) | 0.63 |
| Perceived Accuracy – Neutral | 1 (*not at all accurate*) to 5 (*very accurate*) | – | – | 10.37 (2.79) | 0.62 | 10.22 (2.75) | 0.60 |
| **Real News Headlines**[2] | | | | | | | |
| Perceived Accuracy – Republican | 1 (*not at all accurate*) to 5 (*very accurate*) | – | – | 12.84 (2.86) | 0.64 | 12.07 (2.75) | 0.65 |
| Perceived Accuracy – Democratic | 1 (*not at all accurate*) to 5 (*very accurate*) | – | – | 13.09 (2.92) | 0.61 | 13.05 (3.09) | 0.66 |
| Perceived Accuracy – Neutral | 1 (*not at all accurate*) to 5 (*very accurate*) | – | – | 11.70 (2.81) | 0.66 | 11.57 (3.05) | 0.76 |
| **Covariates** | | | | | | | |
| Intelligence[1] | – | 8.49 (2.77) | – | 6.83 (3.49) | – | 7.51 (3.38) | – |
| Cognitive reflection[1] | – | 1.07 (1.06) | – | 2.36 (1.25) | – | 0.00 (3.94)[3] | – |
| Honesty-Humility | 1 (*strongly disagree*) to 5 (*strongly agree*) | 52.15 (9.47) | 0.80 | 3.51 (0.77) | 0.78 | 3.46 (0.62) | 0.66 |
| Political ideology | 1 (*extremely liberal*) to 7 (*extremely conservative*) | 3.20 (1.17) | – | 3.76 (1.88) | – | 3.22 (1.57) | – |

CIHS = Comprehensive Intellectual Humility Scale; GIHS = General Intellectual Humility; Belief in comp. and alt. med. = Belief in complementary and alternative medicine. M = mean, SD = standard deviation.

[1] The Cronbach's alpha coefficient for the intelligence measure was not calculated, as it is not an appropriate metric for reliability with timed administrations (Cronbach & Shavelson, 2004). Similarly, based on recommendations in the literature, we did not calculate Cronbach's alpha coefficients for any performance-based measures, including the cognitive reflection measure (see Taber, 2018).

[2] The means and standard deviations for the news headlines are from the unstandardized composites, given that the means of the standardized composites are necessarily zero.

[3] Items from the three-item and four-item versions of the cognitive reflection measure were standardized and combined.

of belief in general conspiracy theories (i.e., decontextualized, abstract conspiracy theories); (3) Federico and colleagues' (2018) 7-item measure of political conspiracy theories; (4) Wood and colleagues' (2012) measure of belief in mutually incompatible conspiracy theories; and (5) the *Vaccine Conspiracy Theories Scale* (VCBS; Shapiro et al., 2016), a 7-item measure of belief in vaccine-related conspiracy theories.

Regarding the measure of political conspiracy theories (Federico et al., 2018), four of the assessed conspiracy theories were conservative-consistent (e.g., "global warming is a hoax") and three were liberal-consistent (e.g., "Senior federal government officials knew about the September 11th attacks before they happened"). In line with previous research (Federico et al., 2018), conservative-consistent and liberal-consistent conspiracy theories were significantly positively correlated ($r = 0.39$). Hence, we collapsed across conspiracy theories to yield a total score. Regarding the measure of belief in mutually incompatible conspiracy theories, participants were asked a series of questions surrounding Princess Diana's death (5 questions), Osama Bin Laden's death (5 questions), and Jefferey Epstein's death (5 questions). Items were mutually incompatible as some were conspiracy theories maintaining that the individual was secretly alive whereas others were conspiracy theories maintaining that the individual was dead due to nefarious, hidden causes. Consistent with previous research (Wood et al., 2012), mutually incompatible conspiracy beliefs were positively related across assessed individuals (average inter-item $r = 0.42$). Hence, we collapsed across conspiracy theories to yield a total score.

*2.2.2.3. Fake news.* We adapted Pennycook and Rand's (2019) stimuli for the purposes of this study, and we updated headlines to be relevant to current events at the time of data collection (e.g., headlines that were pertinent to the 2020 American presidential election). Participants were presented with 15 real news headlines and 15 fake news headlines. All headlines, whether fake or real, were presented in the format of a Facebook post thumbnail. Participants were presented with 10 Democratic-consistent, 10 Republican-consistent, and 10 politically neutral headlines. The ordering of headlines was randomized across participants.

Participants answered three questions for each headline. All three questions were presented in the same order for each headline: (1) "Have you seen or heard about this story before?"; (2) "To the best of your knowledge, how accurate is the claim in the above headline?"; and (3) "Would you consider sharing this story online (for example, through Facebook or Twitter)?".

Intercorrelations among the items within (a) condition (real vs. fake news headlines) and (b) topic (e.g., Democratic, Republican, or neutral) were positive (Sample 2 *rs* ranged from 0.04 to 0.80; Sample 3 *rs* ranged from 0.10 to 0.69). Hence, items within condition and topic were standardized and subsequently summed to yield total scores (e.g., Fake News – Republican-consistent – Perceived Accuracy). Moreover, consistent with Pennycook and Rand (2019), truth discernment scores were computed, such that accuracy ratings for the fake news headlines were subtracted from the accuracy ratings of real news headlines within topic. We focus our presentation of the results on the relations between

IH and (a) accuracy ratings for real and fake news headlines and (b) truth discernment scores.

The results for the heard and share ratings are reported in the supplemental materials (Supplemental Tables 10 and 11). In secondary analyses, we computed a variable for the "heard" ratings wherein unsure = 1 and other responses = 0. We also computed the following for the "share" ratings: (a) maybe = 1 and other responses = 0 and (b) never = 1 and other responses = 0. For results using these variables, refer to Supplemental Table 18.

*2.2.2.4. Covariates.* We also assessed four relevant covariates to clarify whether and to what extent our results were specific to IH: (1) the Honesty-Humility dimension (i.e., sincerity, modesty, greed avoidance, and fairness) from the *HEXACO Personality Inventory-Revised* (HEXACO PI-R; Ashton & Lee, 2009; Lee & Ashton, 2018), a self-report measure of general personality; (2) the *Cognitive Reflection Test* (CRT; Frederick, 2005; Patel, Baker, & Scherer, 2019; Thomson & Oppenheimer, 2016), a measure of analytical thinking; (3) the 16-item version of *The International Cognitive Ability Resource* (ICAR; Condon & Revelle, 2014), a public-domain measure of intelligence that was validated in approximately 200 countries; and (4) political ideology (i.e., the extent to which one identifies as conservative vs. liberal). Participants in Sample 1 completed the 100-item version of HEXACO PI-R (Lee & Ashton, 2018), and participants in Samples 2 and 3 completed the 60-item version of the HEXACO PI-R (Ashton & Lee, 2009).

## 2.3. Data analytic plan

We examined the correlations between (a) IH total scores and dimensions and (b) indices of endorsing/believing misinformation across three samples (Tables 4–6). The correlations between IH measures and dimensions of misinformation are reported in Supplemental Tables 12–13. For constructs with Cronbach's alpha coefficients that were below recommended cutoffs for adequate reliability (<0.70; see Taber, 2018), we calculated disattenuated correlation coefficients to account for measurement error (see Boone & Staver, 2020).

Because Sample 3 included both American and non-American participants, we examined whether nationality moderated the relations between intellectual humility and indices of endorsing/believing misinformation. We created a variable in which the United States = 1 and all other countries = 2. Moderation analyses were conducted using the PROCESS macro in SPSS (Hayes, 2018). Coefficients were estimated based on bootstrapped confidence intervals and heteroscedasticity-consistent standard errors. Of 22 moderation analyses (all pseudoscience measures, all conspiracy theory measures, and the fake news truth discernment scores), only 1 was statistically significant: the relationship between the CIHS and belief in complementary and alternative medicine was significantly more negative in other countries compared with United States ($b = -0.17$, 95% CI = $-0.31$, $-0.01$, $R^2 = 0.02$). Given that <5% of the results were significant, we collapse across nationalities.

To clarify what aspects of IH best predict less endorsement of and belief in misinformation, we conducted two sets of analyses. First, we statistically compared IH total scores in their relations with endorsing/believing misinformation to clarify whether the relations were stronger when assessing a blend of intrapersonal, interpersonal, and emotional features compared with intrapersonal features in isolation. We conducted these tests of the difference between dependent correlations using Fisher's *r*-to-*z* transformation (Lee & Preacher, 2013).

Second, we examined the correlations between the CIHS dimensions and endorsing/believing misinformation (Tables 4–6). To clarify the proportionate contribution of each CIHS dimension relative to each other in predicting endorsement of/belief in misinformation, we used relative importance analyses (see Supplemental Tables 14–16). These analyses were conducted using RWA-Web (Tonidandel & LeBreton, 2015) based on the raw data for each sample. The raw and rescaled (i.e.,

the percentage of the variance attributable to each CIHS dimension in the model) weights were generated based on 10,000 bootstrapped samples (Supplemental Tables 14–16). For the fake news measures, we restricted the relative weights analyses to the truth discernment scores to limit the number of analyses and hence our Type I error rate. Through using relative importance analyses, it was possible to parse the total variance into the proportionate contribution of each predictor variable (Tonidandel & LeBreton, 2011). These analyses will allow us to clarify whether certain CIHS dimensions, such as Independence of Intellect and Ego (which comprises a blend of intrapersonal, interpersonal, and emotional features) and Lack of Intellectual Overconfidence (which comprises a blend of intrapersonal and interpersonal features), account for more variance in the endorsement of/belief in misinformation than other CIHS dimensions, such as Openness to Revising One's Viewpoint (which comprises intrapersonal features) and Respect for Other's Viewpoints (which comprises interpersonal features).

We also examined the correlations between covariates (i.e., Honesty-Humility, intelligence, cognitive reflection, political ideology) and endorsing/believing misinformation across the three samples (Tables 4–6) to clarify the extent to which IH's relations converge with or diverge from these relations. To examine whether IH was a stronger predictor of less endorsement of/belief in misinformation than covariates, we conducted tests of the difference between dependent correlations using Fisher's *r*-to-*z* transformation (Lee & Preacher, 2013). Significant differences are denoted in Tables 3–5. As with the relative weights analyses, we restricted these tests of the difference between dependent correlations to the truth discernment scores for the fake news measure to limit the number of analyses conducted.

Finally, to investigate whether the relations between IH and endorsing/believing misinformation were unique to IH, we statistically controlled for covariates in separate regression models (Tables 7–9). The covariate was entered into the first step of the regression and the IH measure was entered into the second step of the regression. All variables were mean-centered.

## 3. Results

Raw data files and relevant output files are available at https://osf.io/49jtw/?view_only=43331a96a86f4871bdc256b8fa4ce765. Effect sizes here and throughout the manuscript were interpreted according to Gignac and Szodorai's (2016) guidelines ($r = 0.10$ is small, $r = 0.20$ is medium, $r = 0.30$ is large).

## 3.1. Pseudoscience

Relations between IH and pseudoscience beliefs are reported in Table 3. Both the GIHS and CIHS were consistently negatively and significantly related to paranormal beliefs (with effect sizes ranging from small to large) and superstitious beliefs (with effect sizes being small). Only the CIHS was significantly and negatively related to belief in complementary and alternative medicine (in Sample 1) and belief in pseudoscience. There were no significant differences between the CIHS and GIHS in their relations with any of the measures of pseudoscience beliefs ($Zs < 1.30$, $ps > 0.05$).

Regarding CIHS dimensions, Independence of Intellect and Ego (which reflects a blend of intrapersonal, interpersonal, and emotional features) and Lack of Intellectual Overconfidence (which reflects a blend of intrapersonal and interpersonal features) tended to be small-to-medium negative correlates of paranormal beliefs and belief in pseudoscientific claims. Respect for Other's Viewpoints (which reflects interpersonal features) in Sample 1 and Openness to Revising One's Viewpoint (which reflects intrapersonal features) were only negatively and significantly related to paranormal beliefs. Respect for Others' Viewpoints yielded a small, significant, and positive relationship with belief in complementary and alternative medicine (in Sample 3). Independence of Intellect and Ego and Lack of Intellectual Overconfidence

**Table 3**
Correlations between IH and pseudoscience beliefs.

| | GIHS | | CIHS | | CIHS Ind. of Int. and Ego | | CIHS Open | | CIHS Respect | | CIHS Lack. Int. Overconf. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S1 | S3 | S1 | S3 | S1 | S3 | S1 | S3 | S1 | S3 | S1 | S3 |
| Belief in Comp. and Alt. Medicine | −0.11 | −.00[e] | −0.15*[e] | −.01[e] | −0.13 | −0.01 | −0.13 | −0.01 | −0.11 | 0.14*** | −0.10 | −0.12*** |
| Pseudoscientific Beliefs | – | −.03[e] | – | −0.11**[e] | – | −0.11** | – | −0.01 | – | 0.06 | – | −0.20*** |
| Paranormal Beliefs | −0.23***[d,e] | −0.12***[e] | −0.32***[c,e] | −0.14***[e] | −0.20** | −0.15*** | −0.31*** | −0.12*** | −0.27*** | 0.02 | −0.16* | −0.13*** |
| Superstitious Beliefs | – | −0.07* | – | −0.11** | – | −0.19*** | – | −0.05 | – | −0.01 | – | −0.03 |

| | Intelligence | | Cognitive Reflection | | Honesty-Humility | | Political Ideology | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S1 | S3 | S1 | S3 | S1 | S3 | S1 | S3 | | | | |
| Belief in Comp. and Alt. Medicine | −0.00 | −0.22***[a,b] | −0.28*** | −0.19***[a,b] | −0.09 | −0.02 | 0.05 | 0.18*** | | | | |
| Pseudoscientific Beliefs | – | −0.14***[a] | – | −0.13***[a] | – | −0.11* | – | 0.18*** | | | | |
| Paranormal Beliefs | −0.12 | −0.21***[a] | −0.31*** | −0.21***[a] | −0.05 | −0.12* | 0.02 | 0.21*** | | | | |
| Superstitious Beliefs | – | −0.11** | – | −0.13*** | – | −0.09* | – | 0.02 | | | | |

*Note.* $* = p < .05$, $** = p < .01$, $*** = p < .001$. CIHS = Comprehensive Intellectual Humility Scale, Ind. of Int. and Ego = Independence of Intellect and Ego, Open = Openness to Revising One's Viewpoint, Respect = Respect for Others' Viewpoints, Lack. Int. Overconf. = Lack of Intellectual Overconfidence; GIHS = General Intellectual Humility Scale; Belief in Comp. and Alt. Medicine = Belief in complementary and alternative medicine. S = Sample.
[a] Denotes that the correlation between the covariate and the pseudoscience measure was significantly larger than the GIHS.
[b] Denotes that the correlation between the covariate and the pseudoscience measure was significantly larger than the CIHS.
[c] Denotes that the correlation between the CIHS and paranormal beliefs was significantly larger than both intelligence and honesty-humility.
[d] Denotes that the correlation between the GIHS and paranormal beliefs was significantly larger than honesty-humility.
[e] Denotes that the correlations between IH and pseudoscience measures were significantly different from political ideology.

accounted for over half of the variance in pseudoscience beliefs relative to other CIHS dimensions (rescaled percentages were 23% and 32%, respectively) across samples[3].

Similar to IH total scores, Honesty-Humility tended to be weakly negatively related to measures of pseudoscience beliefs, with relations being significant for pseudoscientific beliefs, paranormal beliefs (in Sample 1), and superstitious beliefs. Broadly, the relations between Honesty-Humility and pseudoscience belief measures were not significantly different from the relations between IH and pseudoscience belief measures. Intelligence was significantly negatively related to all measures of pseudoscience beliefs in Sample 3 (effect sizes were small to moderate), and cognitive reflection was significantly negatively related to all measures of pseudoscience beliefs across samples. The extent to which the relations between (a) intelligence and cognitive reflection and (b) pseudoscience belief measures converged with IH depended on the IH measure. In Sample 3, the relations between both intelligence and cognitive reflection and pseudoscience belief measures tended to be larger than the relations between the GIHS and pseudoscience belief measures ($Zs > 2.10$, $ps < 0.05$). In contrast, the relations between both intelligence and cognitive reflection and pseudoscience belief measures tended to be similar to the relations between the CIHS and pseudoscience belief measures. Turning to conservative political ideology, it was a small positive correlate of pseudoscience belief measures, with relations being significant for belief in complementary and alternative medicine (in Sample 3), pseudoscience beliefs, and paranormal beliefs (in Sample 3). The relations between IH total scores and pseudoscience belief measures tended to significantly differ from the relations between political ideology and pseudoscience belief measures ($Zs > 2.00$, $ps < 0.05$).

### 3.2. Conspiratorial ideation

Relations between IH and conspiratorial ideation are presented in Table 4. The CIHS was consistently significantly related to less conspiratorial ideation across all measures, and these relations were medium-to-large. In contrast, the GIHS was significantly related to less than half of the conspiratorial ideation measures across samples (specific conspiracy theories in Sample 1, ideological conspiracy theories in Sample 2, and contradictory conspiracy theories and vaccine conspiracy theories in Sample 3). The differences across IH measures were significant: the relations between the CIHS and conspiratorial ideation were significantly larger for all conspiratorial ideation measures than the GIHS ($Zs > 1.90$, $ps < 0.05$) excluding belief in specific conspiracy theories in Sample 1.

Independence of Intellect and Ego, Lack of Intellectual Overconfidence, and Openness to Revising One's Viewpoint tended to be significant negative correlates of conspiratorial ideation, with the former two dimensions yielding medium-to-large relations and the latter dimension yielding small relations. Respect for Others' Viewpoints, however, tended to not be significantly related to conspiratorial ideation. As with pseudoscience beliefs, Independence of Intellect and Ego and Lack of Intellectual Overconfidence accounted for over half of the variance in conspiratorial ideation relative to other CIHS dimensions (rescaled percentages were 55% and 22%, respectively) across samples.

Similar to the relations between the CIHS and conspiratorial ideation, Honesty-Humility tended to be significantly negatively correlated with conspiratorial ideation (effect sizes were small to moderate). Intelligence and cognitive reflection also tended be negatively related to conspiratorial ideation, with effect sizes tending to be moderate-to-strong. Overall, Honesty-Humility, intelligence, and cognitive reflection tended to be more strongly related to conspiratorial ideation than the GIHS ($Zs > 2.00$, $ps < 0.05$). In contrast, there was some evidence to suggest that the CIHS was a stronger correlate of conspiratorial ideation than Honesty-Humility and cognitive reflection. Specifically, the CIHS was a stronger correlate of (a) belief in political conspiracy theories than Honesty-Humility in Sample 2 ($Z(475) = 2.21$, $p < .05$), (b) belief in both specific and general conspiracy theories than Honesty-Humility in Sample 3 ($Zs > 2.25$, $p < .05$), and (c) belief in specific conspiracy theories than cognitive reflection in Sample 2 ($Z(475) = 1.98$, $p < .05$).

---

[3] In secondary analyses, responses on the pseudoscientific beliefs measure (PSEUDO) were recoded such that "I don't know" = 1 and all other responses = 0. Items were summed to yield a total ambivalence score. Generally, IH was not related to this total score with two exceptions: CIHS Independence of Intellect and Ego and Lack of Intellectual Overconfidence were weakly positively related to making "I don't know" ratings ($rs$ were both 0.07).

**Table 4**
Correlations between IH and indices of conspiratorial ideation.

| | GIHS | | | CIHS | | | CIHS Ind. of Int. and Ego | | | CIHS Open | | | CIHS Respect | | | CIHS Lack. Int. Overconf. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S1 | S2 | S3 | S1 | S2 | S3 | S1 | S2 | S3 | S1 | S2 | S3 | S1 | S2 | S3 | S1 | S2 | S3 |
| Specific CTs | −0.17* | – | −0.05 | −0.18* | – | −0.25***[a,c,e] | −0.10 | – | −0.18*** | −0.14* | – | −0.11* | −0.12 | – | −0.05 | −0.19** | – | −0.29*** |
| General CTs | – | 0.01 | −0.02 | – | −0.19***[a] | −0.18***[a,c] | – | −0.21*** | −0.15*** | – | −0.07 | −0.04 | – | 0.02 | −0.01 | – | −0.27*** | −0.24*** |
| Political CTs | – | −0.11* | – | – | −0.38***[a,c] | | – | −0.38*** | | – | −0.16*** | | – | −0.14** | | – | −0.40*** | |
| Cont. CTs | – | – | −0.07* | – | – | −0.22***[a] | – | – | −0.14*** | – | – | −0.14*** | – | – | −0.08* | – | – | −0.26*** |
| Vaccine CTs | – | – | −0.16*** | – | – | −0.22***[a] | – | – | −0.09** | – | – | −0.15*** | – | – | −0.05 | – | – | −0.31*** |

| | Intelligence | | | Cognitive Reflection | | | Honesty-Humility | | | Political Ideology | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S1 | S2 | S3 | S1 | S2 | S3 | S1 | S2 | S3 | S1 | S2 | S3 |
| Specific CTs | −0.02 | – | −0.32***[b] | −0.21*** | – | −0.17***[b] | −0.04 | – | −0.17***[b] | −0.03 | – | 0.22***[f] |
| General CTs | – | −0.29***[b] | −0.23***[b] | – | −0.30***[b,d] | −0.16***[b] | – | −0.20***[b] | −0.29***[b] | – | 0.21***[f] | 0.19***[f] |
| Political CTs | – | −0.34***[b] | – | – | −0.39***[b] | – | – | −0.27***[b] | – | – | 0.36***[f] | – |
| Cont. CTs | – | – | −0.27***[b] | – | – | −0.17***[b] | – | – | −0.24***[b] | – | – | 0.25***[f] |
| Vaccine CTs | – | – | −0.25***[b] | – | – | −0.20*** | – | – | −0.16*** | – | – | 0.36***[f] |

*Note.* * = $p < .05$, ** = $p < .01$, *** = $p < .001$. CIHS = Comprehensive Intellectual Humility Scale, Ind. of Int. and Ego = Independence of Intellect and Ego, Open = Openness to Revising One's Viewpoint, Respect = Respect for Others' Viewpoints, Lack. Int. Overconf. = Lack of Intellectual Overconfidence; GIHS = General Intellectual Humility Scale; Specific CTs = Belief in Conspiracy Theories Inventory (BCTI); General CTs = Generic Conspiracist Belief Scale (GCBS); Political CTs = Ideological conspiracy theories; Cont. CTs = Contradictory conspiracy theories; Vaccine CTs = Vaccine Conspiracy Theories Scale (VCBS). S = Sample.

[a] Denotes correlations that were significantly larger for the CIHS than the GIHS.
[b] Denotes correlations that were significantly larger for the covariate than the GIHS.
[c] Denotes correlations that were significantly larger for the CIHS than honesty-humility.
[d] Denotes correlations that were significantly larger for the covariate than the CIHS.
[e] Denotes correlations that were significantly larger for the CIHS than cognitive reflection.
[f] Denotes that the correlations between political ideology and conspiratorial ideation were significantly different from the relations between IH total scores and conspiratorial ideation.

**Table 5**
Correlations between IH and (a) accuracy ratings for news headlines and (b) truth discernment.

| | GIHS | | CIHS | | CIHS Ind. of Int. and Ego | | CIHS Open | | CIHS Respect | | CIHS Lack. Int. Overconf. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S2 | S3 | S2 | S3 | S2 | S3 | S2 | S3 | S2 | S3 | S2 | S3 |
| **Fake News** | | | | | | | | | | | | |
| Republican | −0.07 | −0.10** | −0.23***[b] | −0.13*** | −0.21*** | −0.08* | −0.11* | −0.09** | −0.09 | −0.01 | −0.25*** | −0.17*** |
| Democratic | 0.11**[a] | .02[a] | −0.19***[a,b] | −0.15***[a,b] | −0.34***[a] | −0.16***[a] | 0.10*[a] | −.05[a] | −0.13***[a] | −0.12***[a] | −0.19*[a] | −.06[a] |
| Neutral | .05[a] | −.03[a] | −0.24***[a,b] | −0.16***[a,b] | −0.31***[a] | −0.12***[a] | −.03[a] | −0.09*[a] | −.09[a] | −.06[a] | −0.26***[a] | −0.19***[a] |
| **Real News** | | | | | | | | | | | | |
| Republican | .03[a] | .05[a] | −0.03 | −.02[a] | −0.04 | −.02[a] | .03[a] | .05[a] | .04[a] | 0.09*[a] | −.09[a] | −.01[a] |
| Democratic | 0.32***[a,c] | 0.16***[a,c] | .04[a] | .01[a] | −.07[a] | −0.10**[a] | 0.32***[a] | 0.16***[a] | .03[a] | −.02[a] | −0.10*[a] | 0.10**[a] |
| Neutral | 0.10*[a,c] | .01[c] | −0.08*[a] | −0.10** | −0.17***[a] | −0.06 | 0.10*[a] | 0.01 | −.05[a] | −0.00 | −0.13**[a] | −0.01 |
| **Truth Discernment** | | | | | | | | | | | | |
| Republican | 0.15** | 0.11** | 0.24***[b,f] | 0.13*** | 0.20*** | 0.07* | 0.18*** | 0.14*** | 0.15** | 0.08* | 0.19*** | 0.11** |
| Democratic | 0.13** | 0.09** | 0.18*** | 0.11** | 0.23*** | 0.04 | 0.14** | 0.15*** | 0.12* | 0.07* | 0.09 | 0.11** |
| Neutral | 0.08 | 0.07 | 0.11* | 0.07* | 0.10* | 0.02 | 0.10* | 0.07* | 0.02 | 0.04 | 0.09 | 0.12*** |

| | Intelligence | | Cognitive Reflection | | Honesty-Humility | | Political Ideology | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S2 | S3 | S2 | S3 | S2 | S3 | S2 | S3 | | | | |
| **Fake News** | | | | | | | | | | | | |
| Republican | −0.15** | −0.06 | −0.16*** | −0.02 | −0.13** | −0.21*** | 0.54*** | 0.35*** | | | | |
| Democratic | −0.14** | −0.08* | −0.21*** | −0.08* | −0.33***[a] | −0.15***[a] | −0.08 | −0.11** | | | | |
| Neutral | −0.20*** | −0.13*** | −0.22*** | −0.08* | −0.33***[a] | −0.36***[a] | 0.21*** | 0.18*** | | | | |
| **Real News** | | | | | | | | | | | | |
| Republican | 0.07 | 0.00 | 0.01 | 0.03 | −0.03 | 0.12**[a] | 0.36*** | 0.25*** | | | | |
| Democratic | 0.13** | 0.18*** | 0.03 | 0.15*** | −0.10* | .08[a] | −0.22*** | −0.29*** | | | | |
| Neutral | 0.01 | 0.02 | −0.09 | 0.02 | −0.15** | −0.21***[a] | 0.12* | 0.00 | | | | |
| **Truth Discernment** | | | | | | | | | | | | |
| Republican | 0.26*** | 0.07* | 0.22*** | 0.06 | 0.13** | 0.07 | −0.26***[g] | −0.12***[g] | | | | |
| Democratic | 0.27***[d] | 0.24***[d,e] | 0.23*** | 0.20***[d,e] | 0.16*** | 0.16*** | −0.13***[g] | −0.17***[g] | | | | |
| Neutral | 0.21***[d] | 0.14*** | 0.13** | 0.10* | 0.08 | 0.08 | −0.08[g] | −0.16***[g] | | | | |

*Note.* * = $p < .05$, ** = $p < .01$, *** = $p < .001$. CIHS = Comprehensive Intellectual Humility Scale, Ind. of Int. and Ego = Independence of Intellect and Ego, Open = Openness to Revising One's Viewpoint, Respect = Respect for Others' Viewpoints, Lack. Int. Overconf. = Lack of Intellectual Overconfidence; GIHS = General Intellectual Humility Scale. S= Sample.

[a] Denotes disattenuated correlations. We did not compute disattenuated correlation coefficients for intelligence, cognitive reflection, or political ideology given that internal consistency statistics were not computed for these measures.

[b] Denotes correlations that were significantly larger for the CIHS than the GIHS.

[c] Denotes correlations that were significantly larger for the GIHS than the CIHS.

[d] Denotes correlations that were significantly larger for the covariate than the GIHS.

[e] Denotes correlations that were significantly larger for the covariate than the CIHS.

[f] Denotes correlations that were significantly larger for the CIHS than Honesty-Humility.

[g] Denotes that the correlations between political ideology and truth discernment were significantly different from the relations between IH total scores and truth discernment.

**Table 6**
Correlations between IH and covariates.

| | GIHS | | | CIHS | | |
|---|---|---|---|---|---|---|
| | S1 | S2 | S3 | S1 | S2 | S3 |
| Honesty-Humility | 0.14 | 0.10 | 0.17*** | 0.37*** | 0.37*** | 0.31*** |
| Intelligence | 0.05 | 0.20*** | 0.12** | 0.04 | 0.28*** | 0.12*** |
| Cognitive Reflection | 0.00 | 0.10* | 0.13*** | 0.09 | 0.24*** | 0.17*** |
| Conservative Political Ideology | -0.08 | -0.18*** | -0.18*** | -0.05 | -0.19*** | -0.16*** |

*Note.* * = $p < .05$, ** = $p < .01$, *** = $p < .001$. CIHS = Comprehensive Intellectual Humility Scale; GIHS = General Intellectual Humility Scale. S = Sample.

**Table 7**
Multiple regression analyses for pseudoscience beliefs.

| | Belief in Complementary and Alternative Medicine | | | | | | Paranormal Beliefs | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample 1 | | | Sample 3 | | | Sample 1 | | | Sample 3 | | |
| | Adj R² ΔR² | b (β) | 95% CI | Adj R² ΔR² | b (β) | 95% CI | Adj R² ΔR² | b (β) | 95% CI | Adj R² ΔR² | b (β) | 95% CI |
| **Step 1: Intelligence** | | | | | | | | | | | | |
| Step 2: | 0.00 | – | – | 0.05 | – | – | 0.09 | −0.86 | −1.27, | 0.06 | −0.29 | −0.54, |
| CIHS | 0.01 | | | 0.00 | | | 0.09*** | (−0.30)*** | −0.46 | 0.01* | (−0.08)* | −0.05 |
| Step 2: | 0.01 | – | – | 0.05 | – | – | 0.06** | −1.92 | −3.06, | 0.05 | −0.83 | −1.64, |
| GIHS | 0.01 | | | 0.00 | | | | (−0.24)** | −0.78 | 0.01* | (−0.07)* | −0.02 |
| **Step 1: Cognitive Reflection** | | | | | | | | | | | | |
| Step 2: | 0.07 | – | – | 0.04 | – | – | 0.09*** | −0.89 | −1.26, | 0.06 | −0.36 | −0.58, |
| CIHS | 0.02 | | | 0.00 | | | | (−0.30)*** | −0.51 | 0.01** | (−0.10)** | −0.13 |
| Step 2: | 0.09 | – | – | 0.04 | – | – | 0.16 | −1.86 | −2.92, | 0.06 | −1.09 | −1.79, |
| GIHS | 0.01 | | | 0.00 | | | 0.05*** | (−0.23)*** | −0.80 | 0.01** | (−0.10)** | −0.40 |
| **Step 1: Honesty-Humility** | | | | | | | | | | | | |
| Step 2: | 0.02 | – | – | 0.01 | −0.15 | −0.24, | 0.10 | −1.03 | −1.46, | 0.04 | −0.58 | −0.92, |
| CIHS | 0.01 | | | 0.02** | (−0.14)** | −0.05 | 0.10*** | (−0.34)*** | −0.60 | 0.02*** | (−0.16)*** | −0.24 |
| Step 2: | 0.01 | – | – | 0.00 | – | – | 0.04 | −1.82 | −2.96, | 0.02 | −1.40 | −2.44, |
| GIHS | 0.01 | | | 0.00 | | | 0.05** | (−0.22)** | −0.68 | 0.02** | (−0.12)** | −0.37 |
| **Step 1: Political Ideology** | | | | | | | | | | | | |
| Step 2: | 0.02 | −0.11 | −0.22, | 0.03 | – | – | 0.10 | −0.95 | −1.34, | 0.05 | −0.35 | −0.58, |
| CIHS | 0.02* | (−0.14)* | −0.00 | 0.00 | | | 0.11*** | (−0.32)*** | −0.56 | 0.01* | (−0.10)* | −0.13 |
| Step 2: | 0.00 | – | – | 0.03 | – | – | 0.05 | −1.79 | −2.93, | 0.05 | −0.99 | −1.70, |
| GIHS | 0.01 | | | 0.00 | | | 0.05** | (−0.22)** | −0.65 | 0.01** | (−0.09)** | −0.29 |

| | Pseudoscientific Beliefs | | | Superstitious Beliefs | | |
|---|---|---|---|---|---|---|
| | Sample 3 | | | Sample 3 | | |
| | Adj R² ΔR² | b (β) | 95% CI | Adj R² ΔR² | b (β) | 95% CI |
| **Step 1: Intelligence** | | | | | | |
| Step 2: | 0.02 | – | – | 0.02 | −0.05 | −0.09, |
| CIHS | 0.00 | | | 0.01* | (−0.09)* | −0.01 |
| Step 2: | 0.02 | – | – | 0.01 | – | – |
| GIHS | 0.00 | | | 0.00 | | |
| **Step 1: Cognitive Reflection** | | | | | | |
| Step 2: | 0.02 | −0.19 | −0.33, | 0.03 | −0.05 | −0.09, |
| CIHS | 0.01* | (−0.09)* | −0.05 | 0.01** | (−0.09)** | −0.01 |
| Step 2: | 0.02 | – | – | 0.02 | – | – |
| GIHS | 0.00 | | | 0.00 | | |
| **Step 1: Honesty-Humility** | | | | | | |
| Step 2: | 0.02 | – | – | 0.02 | −0.08 | −0.13, |
| CIHS | 0.01 | | | 0.02** | (−0.14)** | −0.02 |
| Step 2: | 0.01 | – | – | 0.01 | – | – |
| GIHS | 0.00 | | | 0.00 | | |
| **Step 1: Political Ideology** | | | | | | |
| Step 2: | 0.04 | −0.17 | −0.31, | 0.01 | −0.06 | −0.09, |
| CIHS | 0.01* | (−0.08)* | −0.03 | 0.01** | (−0.11)** | −0.02 |
| Step 2: | 0.03 | – | – | 0.00 | – | – |
| GIHS | 0.00 | | | 0.00 | | |

*Note.* * = $p < .05$, ** = $p < .01$, *** = $p < .001$. CIHS = Comprehensive Intellectual Humility Scale; GIHS = General Intellectual Humility Scale.
Regression coefficients are provided for models with a significant ΔR². The covariate was entered into the first step of the multiple regression and the intellectual humility total score was entered into the second step of the regression. The pseudoscience belief measures were the outcome variable in the multiple regression.

Whereas Honesty-Humility, intelligence, and cognitive reflection were negative correlates of conspiratorial ideation, conservative political ideology was moderately-to-strongly positively related to conspiratorial ideation. For both the GIHS and the CIHS, the relations between IH and conspiratorial ideation were significantly different from the relations between conservative political ideology and conspiratorial ideation (*Zs*

**Table 8**
Multiple regression analyses for conspiratorial ideation.

| | Specific Conspiracy Theories | | | | | | General Conspiracy Theories | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Sample 1 | | | Sample 3 | | | Sample 2 | | | Sample 3 | | |
| | Adj R² ΔR² | b (β) | 95% CI | Adj R² ΔR² | b (β) | 95% CI | Adj R² ΔR² | b (β) | 95% CI | Adj R² ΔR² | b (β) | 95% CI |
| **Step 1: Intelligence** | | | | | | | | | | | | |
| Step 2: | 0.01 | −0.22 | −0.42, | 0.13 | −0.53 | −0.79, | 0.09 | −0.15 | −0.27, | 0.07 | −0.18 | −0.27, |
| CIHS | 0.03* | (−0.16)* | −0.02 | 0.04*** | (−0.19)*** | −0.27 | 0.01* | (−0.12)* | −0.03 | 0.02*** | (−0.15)*** | −0.10 |
| Step 2: | 0.04 | −0.78 | −1.32, | 0.10 | − | − | 0.08 | − | − | 0.05 | − | − |
| GIHS | 0.04** | (−0.21)** | −0.24 | 0.00 | | | 0.01 | | | 0.00 | | |
| **Step 1: Cognitive Reflection** | | | | | | | | | | | | |
| Step 2: | 0.07 | −0.21 | −0.40, | 0.08 | −0.64 | −0.89, | 0.09 | −0.15 | −0.26, | 0.06 | −0.19 | −0.27, |
| CIHS | 0.02* | (−0.16)* | −0.03 | 0.05*** | (−0.23)*** | −0.39 | 0.02** | (−0.13)** | −0.04 | 0.02*** | (−0.15)*** | −0.11 |
| Step 2: | 0.07 | −0.63 | −1.13, | 0.03 | − | − | 0.09 | − | − | 0.03 | − | − |
| GIHS | 0.03* | (−0.17)* | −0.13 | 0.00 | | | 0.00 | | | 0.00 | | |
| **Step 1: Honesty-Humility** | | | | | | | | | | | | |
| Step 2: | 0.02 | −0.25 | −0.46, | 0.07 | −0.58 | −0.84, | 0.05 | −0.16 | −0.28, | 0.11 | −0.25 | −0.38, |
| CIHS | 0.03* | (−0.19)* | −0.05 | 0.04*** | (−0.21)*** | −0.32 | 0.02** | (−0.13)** | −0.04 | 0.03*** | (−0.18)*** | −0.13 |
| Step 2: | 0.02 | −0.62 | −1.14, | 0.03 | − | − | 0.04 | − | − | 0.08 | − | − |
| GIHS | 0.03* | (−0.17)* | −0.10 | 0.00 | | | 0.00 | | | 0.00 | | |
| **Step 1: Political Ideology** | | | | | | | | | | | | |
| Step 2: | 0.02 | −0.23 | −0.42, | 0.10 | −0.60 | −0.85, | 0.06 | −0.18 | −0.29, | 0.05 | −0.18 | −0.27, |
| CIHS | 0.03* | (−0.18)* | −0.05 | 0.04*** | (−0.21)*** | −0.35 | 0.02** | (−0.15)** | −0.07 | 0.02*** | (−4.49)*** | −0.10 |
| Step 2: | 0.02 | −0.60 | −1.12, | 0.05 | − | − | 0.04 | − | − | 0.03 | − | − |
| GIHS | 0.03* | (−0.16)* | −0.08 | 0.00 | | | 0.00 | | | 0.00 | | |

| | Political Conspiracy Theories | | | Contradictory Conspiracy Theories | | | Vaccine Conspiracy Theories | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Sample 2 | | | Sample 3 | | | Sample 3 | | |
| | Adj R² ΔR² | b (β) | 95% CI | Adj R² ΔR² | b (β) | 95% CI | Adj R² ΔR² | b (β) | 95% CI |
| **Step 1: Intelligence** | | | | | | | | | |
| Step 2: | 0.21 | −0.13 | −0.17, | 0.11 | −0.36 | −0.49, | 0.11 | −0.36 | −0.49, |
| CIHS | 0.09*** | (−0.31)*** | −0.09 | 0.03*** | (−0.18)*** | −0.22 | 0.03*** | (−0.18)*** | −0.22 |
| Step 2: | 0.11 | − | − | 0.07 | − | − | 0.07 | − | − |
| GIHS | 0.00 | | | 0.00 | | | 0.00 | | |
| **Step 1: Cognitive Reflection** | | | | | | | | | |
| Step 2: | 0.24 | −0.14 | −0.17, | 0.07 | −0.39 | −0.52, | 0.07 | −0.39 | −0.52, |
| CIHS | 0.09*** | (−0.31)*** | −0.10 | 0.04*** | (−0.20)*** | −0.26 | 0.04*** | (−0.20)*** | −0.26 |
| Step 2: | 0.15 | − | − | 0.03 | − | − | 0.03 | − | − |
| GIHS | 0.00 | | | 0.00 | | | 0.00 | | |
| **Step 1: Honesty-Humility** | | | | | | | | | |
| Step 2: | 0.16 | −0.15 | −0.19, | 0.12 | −0.59 | −0.79, | 0.12 | −0.59 | −0.79, |
| CIHS | 0.10*** | (−0.34)*** | −0.11 | 0.06*** | (−0.26)*** | −0.38 | 0.06*** | (−0.26)*** | −0.38 |
| Step 2: | 0.07 | − | − | 0.06 | − | − | 0.06 | − | − |
| GIHS | 0.01 | | | 0.00 | | | 0.00 | | |
| **Step 1: Political Ideology** | | | | | | | | | |
| Step 2: | 0.23 | −0.14 | −0.18, | 0.10 | −0.37 | −0.50, | 0.10 | −0.37 | −0.50, |
| CIHS | 0.10*** | (−0.32)*** | −0.11 | 0.03*** | (−0.19)*** | −0.25 | 0.03*** | (−0.19)*** | −0.25 |
| Step 2: | 0.13 | − | − | 0.07 | − | − | 0.07 | − | − |
| GIHS | 0.00 | | | 0.00 | | | 0.00 | | |

*Note.* * = $p < .05$, ** = $p < .01$, *** = $p < .001$. Regression coefficients are provided for models with a significant $\Delta R^2$. CIHS = Comprehensive Intellectual Humility Scale; GIHS = General Intellectual Humility Scale. The covariate was entered into the first step of the multiple regression and the intellectual humility total score was entered into the second step of the regression. The conspiratorial ideation measures were the outcome variable in the multiple regression.

$> 2.80$, $ps < 0.01$).

### 3.3. Fake news

Relations between IH and endorsement of fake news are reported in Table 5. Whereas the relations between the CIHS and endorsement of fake news were consistently negative and significant (with the correlations tending to be medium in Sample 2 and small in Sample 3), the GIHS tended to not be significantly related to endorsement of fake news. There were, however, two exceptions—the correlation between the GIHS and accuracy ratings for Republican fake news headlines in Sample 3 was small and negative whereas the correlation between the GIHS and accuracy ratings for Democratic fake news headlines in Sample 2 was small and positive. The CIHS tended to manifest correlations with endorsement of fake news that were significantly larger than the GIHS ($Zs > 2.90$, $ps < 0.01$).

Turning to the CIHS dimensions, Independence of Intellect and Ego and Lack of Intellectual Overconfidence tended to be moderate-to-large negative correlates of endorsement of fake news. In contrast, Openness to Revising One's Viewpoint and Respect for Others' Viewpoints tended to be weak or not statistically significant correlates of endorsement of fake news. Similar to the GIHS, Openness to Revising One's Viewpoint was significantly and positively related to accuracy ratings for Democratic fake news headlines in Sample 2.

The relations between (a) Honesty-Humility, intelligence, and cognitive reflection and (b) accuracy ratings for fake news headlines tended to be small-to-moderate, significant, and negative. Conservative political ideology was strongly positively related to accuracy ratings for Republican fake news headlines, weakly-to-moderately positively related to accuracy ratings for Neutral fake news headlines, and weakly negatively related to accuracy ratings for Democratic fake news headlines (although the relationship was not significant in Sample 2).

**Table 9**
Multiple regression analyses for truth discernment.

| | Truth Discernment - Republican | | | | | | Truth Discernment – Democratic | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Sample 2 | | | Sample 3 | | | Sample 2 | | | Sample 3 | | |
| | Adj R²ΔR² | b (β) | 95% CI | Adj R²ΔR² | b (β) | 95% CI | Adj R²ΔR² | b (β) | 95% CI | Adj R²ΔR² | b (β) | 95% CI |
| **Step 1: Intelligence** | | | | | | | | | | | | |
| Step 2: | 0.10 | 0.04 (0.19) | 0.02, | 0.01 | 0.03 (0.10) | 0.01, | 0.09 | 0.03 (0.01) | 0.01, | 0.05 | – | – |
| CIHS | 0.03*** | *** | 0.07 | 0.01** | ** | 0.05 | 0.01* | * | 0.06 | 0.00 | | |
| Step 2: | 0.07 | 0.08 (0.11) | 0.01, | 0.01 | 0.09 (0.09) | 0.02, | 0.08 | – | – | 0.06 | – | – |
| GIHS | 0.01* | * | 0.14 | 0.01* | * | 0.16 | 0.01 | | | 0.00 | | |
| **Step 1: Cognitive Reflection** | | | | | | | | | | | | |
| Step 2: | 0.08 | 0.05 (0.20) | 0.03, | 0.02 | 0.03 (0.12) | 0.02, | 0.07 | 0.03 (0.14) | 0.01, | 0.05 | 0.03 | 0.00, |
| CIHS | 0.04*** | *** | 0.07 | 0.01*** | *** | 0.05 | 0.02** | ** | 0.06 | 0.01* | (0.08)** | 0.05 |
| Step 2: | 0.06 | 0.09 (0.13) | 0.03, | 0.01 | 0.09 (0.10) | 0.04, | 0.06 | 0.08 (0.10) | 0.01, | 0.04 | – | – |
| GIHS | 0.02** | ** | 0.15 | 0.01** | ** | 0.15 | 0.01* | * | 0.15 | 0.00 | | |
| **Step 1: Honesty-Humility** | | | | | | | | | | | | |
| Step 2: | 0.06 | 0.05 (0.23) | 0.03, | 0.02 | 0.04 (0.14) | 0.01, | 0.04 | 0.04 (0.14) | 0.01, | 0.03 | – | – |
| CIHS | 0.04*** | *** | 0.08 | 0.02** | ** | 0.07 | 0.02** | ** | 0.06 | 0.00 | | |
| Step 2: | 0.03 | 0.10 (0.14) | 0.03, | 0.00 | – | – | 0.03 | 0.08 (0.11) | 0.01, | 0.02 | – | – |
| GIHS | 0.02** | ** | 0.16 | 0.00 | | | 0.01* | * | 0.15 | 0.00 | | |
| **Step 1: Political Ideology** | | | | | | | | | | | | |
| Step 2: | 0.10 | 0.05 (0.20) | 0.03, | 0.02 | 0.03 (0.10) | 0.01, | 0.04 | 0.04 (0.16) | 0.02, | 0.03 | 0.03 | 0.01, |
| CIHS | 0.04*** | *** | 0.07 | 0.01** | ** | 0.05 | 0.03*** | *** | 0.06 | 0.01* | (0.09)* | 0.05 |
| Step 2: | 0.07 | 0.08 (0.11) | 0.01, | 0.02 | 0.08 (0.09) | 0.02, | 0.02 | 0.08 (0.10) | 0.01, | 0.03 | – | – |
| GIHS | 0.01* | * | 0.14 | 0.01** | ** | 0.14 | 0.01* | * | 0.15 | 0.00 | | |

| | Truth Discernment - Neutral | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | Sample 2 | | | Sample 3 | | |
| | Adj R²ΔR² | b (β) | 95% CI | Adj R²ΔR² | b (β) | 95% CI |
| **Step 1: Intelligence** | | | | | | |
| Step 2: | 0.04 | – | – | 0.02 | – | – |
| CIHS | 0.00 | | | 0.00 | | |
| Step 2: | 0.04 | – | – | 0.02 | – | – |
| GIHS | 0.00 | | | 0.00 | | |
| **Step 1: Cognitive Reflection** | | | | | | |
| Step 2: | 0.02 | – | – | 0.01 | – | – |
| CIHS | 0.01 | | | 0.00 | | |
| Step 2: | 0.02 | – | – | 0.01 | – | – |
| GIHS | 0.00 | | | 0.00 | | |
| **Step 1: Honesty-Humility** | | | | | | |
| Step 2: | 0.01 | – | – | 0.03 | 0.06 (0.18) | 0.03, |
| CIHS | 0.01 | | | 0.03*** | *** | 0.08 |
| Step 2: | 0.01 | – | – | 0.01 | 0.10 (0.11) | 0.01, |
| GIHS | 0.00 | | | 0.01* | * | 0.19 |
| **Step 1: Political Ideology** | | | | | | |
| Step 2: | 0.01 | 0.02 (0.10) | 0.00, | 0.02 | – | – |
| CIHS | 0.01* | * | 0.05 | 0.00 | | |
| Step 2: | 0.01 | – | – | 0.03 | – | – |
| GIHS | 0.00 | | | 0.00 | | |

*Note.* * = p < .05, ** = p < .01, *** = p < .001. CIHS = Comprehensive Intellectual Humility Scale; GIHS = General Intellectual Humility Scale.
The covariate was entered into the first step of the multiple regression and the intellectual humility total score was entered into the second step of the regression. The truth discernment scores were the outcome variable in the multiple regression.

### 3.4. Real news

Relations between IH and endorsement of real news are reported in Table 5. There was inconsistent evidence that IH total scores were positively related to accuracy ratings for real news headlines. The GIHS tended to be significantly positively related to accuracy ratings for Democratic news headlines, with relations being large in Sample 2 and small in Sample 3. The GIHS was also weakly and significantly positively related to accuracy ratings for Neutral news headlines in Sample 3. In contrast, the CIHS was weakly and significantly negatively related to accuracy ratings for the Neutral news headlines in Samples 2 and 3. The GIHS tended to be more strongly related to endorsement of real news than the CIHS ($Zs > 2.50$, $ps < 0.01$).

The CIHS dimensions of Independence of Intellect and Ego and Lack of Intellectual Overconfidence tended to be weakly negatively related to accuracy ratings for real news headlines, although the correlation between Lack of Intellectual Overconfidence and accuracy ratings for Democratic real news headlines in Sample 3 was significant and positive. Respect for Others' Viewpoints tended to not be significantly related to endorsement of real news headlines, although the correlation was positive and significant for endorsement of Republican real news headlines in Sample 3. Openness to Revising One's Viewpoint was (a)

weakly and significantly positively related to Neutral accuracy ratings in Sample 2 and Democratic accuracy ratings in Sample 3 and (b) strongly positively related to Democratic accuracy ratings in Sample 2.

In contrast, Honesty-Humility tended to be weakly, significantly and negatively related to accuracy ratings for real news headlines. In line with the GIHS, cognitive reflection was weakly and significantly positively related to accuracy ratings for Democratic real news headlines in Sample 3. Intelligence was also weakly and significantly positively related to accuracy ratings for Democratic real news headlines. Conservative political ideology was strongly positively related to accuracy ratings for Republican real news headlines, weakly positively related to accuracy ratings for Neutral headlines (although the relationship was not significant in Sample 3), and moderately negatively related to accuracy ratings for Democratic headlines.

### 3.5. News truth discernment

Relations between IH and truth discernment are reported in Table 5[4]. IH tended to be significantly positively related to truth discernment. The CIHS was only significantly more positively related to truth discernment for the Republican headlines in Sample 2 compared with the GIHS ($Z$ $(475) = 2.28$, $p < .05$). Mirroring relations between IH total scores and truth discernment, all CIHS dimensions tended to yield significant and positive correlations with truth discernment. Openness to Revising One's Viewpoint and Lack of Intellectual Overconfidence accounted for over half of the variance in truth discernment relative to other CIHS dimensions (rescaled percentages were 36% and 32%, respectively) across samples.

Honesty-Humility, intelligence, and cognitive reflection also were positively related to truth discernment, with relations ranging from small to moderate. The relations between Honesty-Humility and truth discernment tended to not significantly differ from the relations between IH and truth discernment. The relations between (a) intelligence and cognitive reflection and (b) truth discernment for the Democratic headlines, however, tended to be larger than the relations between IH and truth discernment ($Zs > 2.15$, $p < .05$). In contrast with Honesty-Humility, intelligence, and cognitive reflection, conservative political ideology, was weakly-to-moderately negatively related to truth discernment. The relations between IH total scores and truth discernment were significantly different from the relations between conservative political ideology and truth discernment across both samples ($Zs > 2.25$, $p < .05$).

### 3.6. Specificity of the results to IH

The correlations between IH total scores and covariates are presented in Table 6 (see also Supplemental Table 17). The GIHS was weakly positively related to Honesty-Humility, with the relations being significant only in Sample 3. In contrast, the CIHS was strongly and significantly positively related to Honesty-Humility in all samples. IH total scores tended to yield small-to-moderate positive relations with intelligence and cognitive reflection, although these relations were not statistically significant in Sample 1. IH total scores were weakly negatively related to conservative political ideology, with relations reaching significance in Sample 2 and Sample 3.

To investigate whether the relations between IH and endorsing/believing misinformation were unique to IH, we statistically controlled

for (a) Honesty-Humility, (b) intelligence, (c) cognitive reflection, and (d) political ideology in separate regression models[5]. Given the number of analyses conducted, we summarize the broad pattern of results herein. The model coefficients (Adjusted $R^2$ and $\Delta R^2$) are in Tables 7–9. For regression models in which IH accounted for significant variance above-and-beyond covariates (i.e., the $\Delta R^2$ was statistically significant), we also provide the regression coefficients and confidence intervals in Tables 7–9. For the full output, https://osf.io/49jtw/?view_only=43331a96a86f4871bdc256b8fa4ce765.

Regarding measures that tapped into participants' pseudoscience beliefs, IH total scores tended to not significantly increment covariates in predicting belief in complementary and alternative medicine and pseudoscientific beliefs. The CIHS significantly incremented covariates and remained a significant predictor of superstitious beliefs; in contrast, the GIHS did not significantly increment covariates in the prediction of superstitious beliefs. Both the CIHS and GIHS significantly incremented covariates in predicting paranormal beliefs. In Sample 1, the CIHS accounted for an average 6% of the variance in pseudoscience belief measures, and, in Sample 3, it accounted for an average 0.9% of the variance in pseudoscience belief measures above-and-beyond covariates. In Sample 1, the GIHS accounted for an average 3% of the variance in pseudoscience belief measures, and, in Sample 3, it accounted for an average 0.3% of the variance in pseudoscience belief measures above-and-beyond covariates.

Turning to measures of conspiratorial ideation, the CIHS consistently incremented all covariates in the prediction of conspiratorial ideation, and it remained a significant predictor of all measures of conspiratorial ideation across samples. In contrast, there was limited evidence that the GIHS incremented covariates in the prediction of conspiratorial ideation. The GIHS only remained a significant predictor of belief in specific conspiracy theories in Sample 1; otherwise, it did not account for significant variance in conspiratorial ideation above-and-beyond covariates. In Sample 1, the CIHS accounted for an average 3% of the variance in conspiratorial ideation; in Sample 2, it accounted for an average 6% of the variance in conspiratorial ideation; and in Sample 3, it accounted for an average 4% of the variance in conspiratorial ideation above-and-beyond covariates. In Sample 1, the GIHS accounted for an average 3% of the variance in conspiratorial ideation; in Sample 2, it accounted for an average 0.3% of the variance in conspiratorial ideation; and in Sample 3, it accounted for an average 0.5% of the variance in conspiratorial ideation above-and-beyond covariates.

Finally, looking at truth discernment, both the CIHS and GIHS tended to significantly increment covariates in predicting truth discernment for Republican headlines across samples. In Sample 2, both the CIHS and GIHS tended to significantly increment covariates in predicting truth discernment for Democratic headlines; nevertheless, in Sample 3, IH total scores tended to not account for significant variance in truth discernment for Democratic headlines above-and-beyond covariates. Dovetailing with these latter results, IH total scores tended to not increment covariates in the prediction of truth discernment for Neutral headlines. In Sample 2, the CIHS accounted for an average 2% of the variance in truth discernment, and, in Sample 3, it accounted for an

---

[4] We examined whether political party (Republican = 1, Democratic = 2) statistically moderated the relations between IH total scores and truth discernment. Of 6 analyses across both samples, just one result was significant (17%). In Sample 2, political party moderated the relationship between the GIHS and truth discernment for Democratic news headlines ($b = 0.46$, 95% CI [0.29, 0.64], $\Delta R^2 = 0.07$) such that the relationship was negative in Republicans ($b = -0.19$) and positive in Democrats ($b = 0.27$).

[5] We also controlled for the following demographic variables (all entered simultaneously into the first step of the regression): race (Non-White and White), Hispanic ethnicity (Non-Hispanic and Hispanic), education, gender (Male and Female), religious belief (Christian and non-Christian), and age. In Sample 1, the CIHS accounted for an average 4% of the variance in endorsing/believing misinformation and the GIHS accounted for an average 2% after controlling for demographic variables. In Sample 2, the CIHS accounted for an average 3% of the variance in endorsing/believing misinformation and the GIHS accounted for an average 1% after controlling for demographic variables. In Sample 3, the CIHS accounted for an average 1% of the variance in endorsing/believing misinformation and the GIHS accounted for an average of <1% after controlling for demographic variables. The full output is available at https://osf.io/49jtw/?view_only=43331a96a86f4871bdc256b8fa4ce765.

average 0.8% of the variance in truth discernment above-and-beyond covariates. In Sample 2, the GIHS accounted for an average 0.8% of the variance in truth discernment, and, in Sample 3, it accounted for an average 0.3% of the variance in truth discernment above-and-beyond covariates.

## 4. Discussion

Across three samples, a blend of intrapersonal, interpersonal, and emotional IH features tended to best predict less conspiratorial ideation and susceptibility to fake news than either intrapersonal or interpersonal IH features in isolation. Although IH was broadly related to less endorsement of/belief in misinformation, we found that IH tended to not be related to pseudoscience beliefs. What is more, IH generally remained a significant predictor of measures that tapped into people's endorsement of and/or beliefs in misinformation after accounting for covariates (Honesty-Humility, intelligence, cognitive reflection, and political ideology), although the percentage of variance accounted for in endorsing/believing misinformation was often small. Overall, our results align with a small yet burgeoning literature indicating that IH is positively related to accuracy and critical-thinking (e.g., Deffler, Leary, & Hoyle, 2016; Zmigrod et al., 2019) and negatively related to decision-making biases (e.g., Bowes et al., 2021). Below, we consider our results in greater detail.

Although there was a general trend for IH total scores to be negatively related to endorsing/believing misinformation, we found evidence that there were important differences across IH measures in the statistical prediction of endorsing/believing misinformation. Whereas the CIHS (i.e., a measure of IH that assesses intrapersonal, interpersonal, and emotional features) tended to manifest medium-to-large negative correlations with all conspiratorial ideation inventories, the GIHS (i.e., a measure of IH that solely assesses intrapersonal features) was weakly negatively related to most, but not all, conspiratorial ideation inventories. Similarly, the CIHS was consistently significantly related to lower accuracy ratings for the fake news headlines whereas the GIHS tended to not be significantly related to these ratings. In statistically comparing the two measures, the CIHS tended to manifest relations with conspiratorial ideation and fake news accuracy ratings that were significantly more negative than the GIHS (conspiratorial ideation: 6 out of 7 pairs of correlations, 86%; fake news: 16 out of 18 pairs of correlations, 89%). In contrast, the GIHS was a larger correlate of accuracy ratings for real news headlines than the CIHS (4 of 6 pairs of correlations, 67%); that said, the GIHS was not a significantly stronger correlate of truth discernment than the CIHS.

A similar picture emerged when examining the relations between CIHS dimensions and endorsing/believing misinformation; dimensions involving intrapersonal and interpersonal features (Lack of Intellectual Overconfidence) and emotional features (Independence of Intellect and Ego) tended to be consistently negatively related to endorsing/believing misinformation. Intrapersonal IH features in isolation (Openness to Revising One's Viewpoint) also tended to be negatively related to endorsing/believing misinformation, although it appeared to be a weaker correlate of endorsing/believing misinformation than both Independence of Intellect and Ego and Lack of Intellectual Overconfidence. In contrast with these three CIHS dimensions, interpersonal IH features in isolation (Respect for Others' Viewpoints) tended to not be significantly related to endorsing/believing misinformation. Consistent with this broad pattern of results, Independence of Intellect and Ego (26%) and Lack of Intellectual Overconfidence (38%) accounted for most of the variance in endorsing/believing misinformation relative to other CIHS dimensions, and they were closely followed by Openness to Revising One's Viewpoint (23%). Respect for Other's Viewpoints, however, accounted for a small proportion of the variance relative to the other CIHS dimensions (12%).

There were also differences between IH measures in the prediction of endorsement of/belief in misinformation relative to covariates. Of 39

significant tests of dependent correlations comparing IH to covariates, 26 (67%) indicated that intelligence and cognitive reflection were larger correlates of less belief in pseudoscientific claims, less conspiratorial ideation, and larger truth discernment than the GIHS. Just 1 of 39 results (2%) suggested that the GIHS was a stronger correlate of less pseudoscience beliefs than general humility. For the CIHS, however, only 5 of 39 results (13%) indicated that intelligence and cognitive reflection were stronger correlates of less pseudoscience beliefs, less conspiratorial ideation, and larger truth discernment. Moreover, 7 of 39 results (18%) suggested that the CIHS was a stronger correlate of less pseudoscience beliefs, less conspiratorial ideation, and larger truth discernment than general humility, intelligence, and cognitive reflection. This conclusion held when controlling for covariates in the relations between IH and endorsing/believing misinformation. The CIHS was a robust correlate of superstitious beliefs and conspiratorial ideation after controlling for covariates whereas the GIHS tended to not account for significant variance in superstitious beliefs and conspiratorial ideation. Both the GIHS and CIHS were robust correlates of paranormal beliefs and truth discernment for Republican and Democratic headlines after controlling for covariates.

From our perspective, there are two takeaways from these results. First, our findings provisionally indicate that a combination of intrapersonal, interpersonal, and emotional features of IH best predicts endorsement of/belief in misinformation. Second, intrapersonal IH features in isolation appeared to be stronger predictors of endorsement of/belief in misinformation at large than interpersonal features in isolation. It is possible that interpersonal features in isolation do not lessen endorsement of/belief in misinformation; in some cases (e.g., belief in complementary and alternative medicine), they may even heighten endorsement of/belief in misinformation. This conjecture aligns with the notion of Oberg's dictum, which can be colloquially understood as being so open minded that one's brain falls out. Here, instead of being too open minded, perhaps it is possible to be too respectful or too considerate of another's views; research is needed to corroborate this supposition.

Not only did we find differences across IH measures in their relations with endorsing/believing misinformation, but we also found differences across misinformation measures in their relations with IH. While there was a general trend for IH to be negatively related to endorsing/believing misinformation, our results indicated that this trend may not hold, or at least apply equally, to endorsing and/or believing all forms of misinformation. Specifically, both the CIHS and GIHS tended to be weak and inconsistent negative correlates of pseudoscience beliefs, and the two measures did not differ from each other in the statistical prediction of belief in pseudoscience. Dovetailing with these results, IH tended to not account for significant variance in belief in complementary and alternative medicine and pseudoscientific beliefs after accounting for covariates.

As previously noted, conspiratorial ideation, endorsement of fake news, and pseudoscience beliefs are related (e.g., Anthony & Moulding, 2019; Bensley et al., 2020; Fasce & Picó, 2019; Lobato et al., 2014), yet these three manifestations of misinformation are not the same. For instance, measures of pseudoscience beliefs and conspiratorial ideation typically reflect *already formed* belief systems whereas measures of fake news endorsement typically reflect encountering *novel* misinformation. As such, different manifestations of misinformation have separable, albeit still overlapping, psychological signatures. Although our results do not shed light on *why* relations between IH and endorsement of and belief in misinformation vary across different potential manifestations of misinformation, they suggest that IH may not be sufficient in lessening pseudoscience beliefs. Research is needed to illuminate what makes pseudoscience beliefs different from conspiratorial ideation and falling for fake news (and even what makes conspiratorial ideation different from falling for fake news). For example, pseudoscience beliefs may be more strongly linked to lack of knowledge, specifically scientific knowledge, than believing in conspiracy theories and/or endorsing fake

news. Scientific knowledge may thus buffer against pseudoscience beliefs whereas it may not buffer against conspiratorial ideation or fake news endorsement (see Bensley et al., 2020). Our results raise the possibility that it may not always be productive to lump different manifestations of misinformation together, particularly if the goal is to (a) identify risk and resilience correlates of endorsement of/belief in misinformation and (b) test misinformation interventions.

Consistent with the notion that it is not always productive to lump different manifestations of misinformation together, it may also not be productive to lump different manifestations of the same type of misinformation together. In the domain of pseudoscience beliefs, for instance, both the CIHS and GIHS were medium-to-large negative correlates of belief in the paranormal, and they both accounted for significant variance in paranormal beliefs after controlling for covariates. Some scholars (e.g., Fasce & Picó, 2019) view paranormal beliefs as separate from pseudoscience beliefs, given that they do not always pertain directly to scientific knowledge. In addition, factor analyses of misinformation measures indicate that paranormal beliefs load (loadings of 0.30 or higher) onto both a conspiratorial ideation factor and a pseudoscience factor, suggesting that it cuts across the two broad domains (Bensley et al., 2020). Hence, IH may be significantly and moderately related to paranormal beliefs given its considerable overlap with multiple manifestations of misinformation, such as conspiratorial ideation, and its potentially weaker links to scientific knowledge than other forms of pseudoscience.

Not only was IH negatively related to endorsing/believing misinformation, but it was positively related to truth discernment, meaning that intellectually humble individuals were better able to discriminate between real and fake news headlines than less intellectually humble individuals. There were few differences between the CIHS and GIHS in their relations with truth discernment (5 out of 6 correlation pairs were statistically equivalent, 83%). Both the CIHS and GIHS manifested small-to-medium positive correlations with truth discernment. In addition, the CIHS dimension of Openness to Revising One's Viewpoint, which assesses solely intrapersonal features, accounted for most of the variance in truth discernment relative to other CIHS dimensions. Thus, whereas a combination of intrapersonal, interpersonal, and emotional IH features tended to best predict less endorsement of/belief in misinformation, intrapersonal IH features may be sufficient for orienting to accuracy vis-à-vis identifying real news headlines as more accurate than fake news headlines.

### 4.1. Statement on limitations on generality

We suspect that our results would generalize to other online samples across recruitment strategies, but it is unclear whether and how our results would generalize to other college populations, particularly those that are potentially less politically constrained (e.g., more conservatives represented) than the college population assessed here. Moreover, given that most of our participants resided in the United States or Canada (88%), it is unclear whether and to what extent our findings generalize to different cultural contexts. Relatedly, our samples are not representative of the American population (e.g., political party base-rates, race base-rates), so our results may not generalize to nationally representative samples. The sociocultural context of our study should also be taken into consideration, as much of our data were collected prior to the onset of the COVID-19 pandemic and all data were collected prior to the 2021 Capitol riot, both of which gave rise to a mammoth amount of misinformation. Hence, it may be worthwhile to examine whether our results replicate when measuring these manifestations of misinformation. Regarding measurement, we expect our findings to generalize to additional self-report inventories of assessed constructs. Nevertheless, we cannot assume that our results will generalize to informant-reports, experimental designs, or real-world behaviors (e.g., sharing misinformation online).

### 4.2. Limitations and future directions

The present investigation was characterized by several strengths that distinguish it from other investigations in this domain. First, we comprehensively examined the relations between IH and endorsement of and belief in misinformation, as we assessed different conceptualizations of IH and different manifestations of misinformation. In so doing, we elucidated (a) what features of IH best predict endorsing/believing misinformation and (b) whether these relations held across different manifestations of misinformation. In addition, we were able to clarify that these relations were specific to IH by assessing relevant covariates. That said, there are several limitations and unanswered questions that warrant consideration; we consider these limitations and unanswered questions below.

First, a limitation of our study—and arguably most research on people's responses to misinformation—is that we did not sample from populations already enmeshed with misinformation. Thus, it is unclear whether our results generalize to those who act on misinformation the most—for example, those who attend flat earth conferences, protest outside of the Centers for Disease Control and Prevention or spend their days sharing misinformation on social media. Just a small number of dedicated zealots can drastically shape and drive the spread of misinformation in social networks (e.g., Sikder et al., 2020; Stewart et al., 2019), so understanding what might reach these dedicated individuals or makes some individuals less dedicated than others is of the utmost importance. Within these populations, intellectually humble individuals may be more open to disconfirmatory evidence and less biased than those who are less intellectually humble. For instance, IH is related to less political myside bias even for participants who are generally certain of their political views (Bowes et al., 2021).

Our study was also limited in so far as it was cross-sectional and correlational, precluding conclusions about causality. It is evident that IH is related to endorsing/believing misinformation but whether IH *causes* less endorsement of/belief in misinformation remains an open question. To date, there are only two studies that have examined the malleability of IH (Porter & Schumann, 2018; Porter et al., 2020). In one study, priming a growth mindset of intelligence boosted IH scores compared with priming a fixed mindset of intelligence (Porter & Schumann, 2018). In the second study, participants who read about the benefits of IH scored higher on IH than participants who read about the benefits of intellectual certainty (Porter et al., 2020). These two studies raise the possibility that IH can be increased, at least in the short-term. Future research should examine whether experimentally increasing IH contributes to less endorsement of/belief in of misinformation, and how lasting these effects might be.

Although increases in global IH may prove to be effective in lessening endorsement of/belief in misinformation, our results indicate that it may be more fruitful to increase specific features of IH in the service of lessening endorsement of/belief in misinformation. As described earlier, the combination of intrapersonal, interpersonal, and emotional IH features tended to best predict endorsing/believing misinformation compared with either intrapersonal or interpersonal features in isolation. This combination of features is captured in the CIHS dimensions of Independence of Intellect and Ego and Lack of Intellectual Overconfidence. Independence of Intellect and Ego reflects an ability to separate one's sense-of-self from a disagreement and to not view discord as a personal attack or as emotionally threatening. Threat sensitivity, broadly construed, is a strong correlate of endorsing/believing misinformation, as individuals who score high on threat sensitivity cannot or will not tolerate challenges to their worldviews (see Lewandowsky et al., 2012). Turning to Lack of Intellectual Overconfidence, this dimension reflects an ability to recognize that others may know more about a given topic and that one's beliefs are not superior to others' beliefs. Similar to threat sensitivity, belief superiority and dogmatism are also positive predictors of endorsing/believing misinformation (e.g., Bronstein et al., 2019; Hall & Raimi, 2018). Independence of Intellect and Ego may help

individuals to face disconfirmation without feeling emotional threat while Lack of Intellectual Overconfidence may help individuals to hold their beliefs gently rather than stridently. Experimental research is needed to test these possibilities, as no research has examined whether specific IH dimensions are malleable.

Dovetailing with these conjectures, IH interventions may prove to be especially effective for those enmeshed in misinformation. Existing misinformation interventions have largely focused on intrapersonal processes, such as reminding people to attend to accuracy (e.g., Pennycook et al., 2020) and debunking logical inconsistencies in peoples' beliefs (see Lewandowsky et al., 2020). While these interventions, by and large, have proven to be effective and scalable, they will likely be less effective or even ineffective for individuals already committed to misinformation. In other words, most assessed interventions address misinformation susceptibility, meaning they help people turn away from novel misinformation. Those committed to misinformation believe that they are being accurate, so reminders to be accurate, for instance, will not steer people away from their beliefs. To reach those committed to misinformation, it will likely be necessary to first increase a willingness to entertain the possibility that one's views may be incorrect and feel emotionally secure in the face of disconfirmation. These initial intervention steps map on to the CIHS dimensions of Lack of Intellectual Overconfidence and Independence of Intellect and Ego, respectively. Hence, increases in these dimensions of IH may provide people with the social and emotional tools to engage with new information and successful misinformation interventions and perhaps even modify their worldviews.

Still, IH was not an invariably stronger predictor of endorsing/ believing misinformation than its relevant covariates (general humility, intelligence, cognitive reflection, political ideology). There was some evidence that a combination of intrapersonal, interpersonal, and emotional IH features was a stronger correlate of endorsing/believing misinformation than general humility, indicating that IH is not equivalent to humility in the context of misinformation. Moreover, our results demonstrated that IH is separable from political ideology, as the relations between IH and endorsing/believing misinformation significantly differed from the relations between conservative political ideology and endorsing/believing misinformation; conservative political ideology was consistently a strong, positive correlate of endorsing/ believing misinformation whereas IH tended to be a negative correlate of endorsing/believing misinformation. That said, a large minority of the results (34%) indicated that intelligence and cognitive reflection were stronger correlates of endorsing/believing misinformation than IH, particularly the intrapersonal features of IH. These results should be taken into consideration for future applied work, as they may point to important boundaries. Perhaps IH interventions are most important for individuals lacking the ability to evaluate information critically and reflectively whereas they may not change misinformation susceptibility for those who already can and do evaluate information critically and reflectively.

Similarly, it is also worth emphasizing that IH scores in general accounted for a modest percentage of variance in endorsing/believing misinformation after accounting for covariates (typically < 5%). Given that endorsing/believing misinformation is likely best captured by a complex web of psychological constructs spanning attitudinal, dispositional, technological (i.e., social media design), and demographic-related domains (e.g., Lewandowsky, Ecker, & Cook, 2017; Lewandowsky et al., 2012; Pennycook & Rand, 2021; Van Bavel et al., 2020), it is not altogether surprising that IH accounted for only a small piece of the proverbial pie. That is, small effect sizes can still be of substantial practical utility, particularly when considering how the relations between psychological constructs potentially compound over time (Funder & Ozer, 2019); this possibility again highlights the importance of experimental and longitudinal work in this domain.

## 5. Conclusion

Our investigation suggests that a combination of intrapersonal, interpersonal, and emotional IH features tended to best predict less endorsement of and belief in misinformation compared with either intrapersonal or interpersonal features alone. Whereas intrapersonal features did tend to significantly predict endorsing/believing misinformation, interpersonal IH features tended to not predict endorsing/ believing misinformation. Moreover, the relations between IH and endorsing/believing misinformation tended to be unique to IH, although there were important differences across not only IH measures but also misinformation measures. Our results invite intriguing questions for future research that should prove generative in advancing not only scholarship on IH but also scholarship on misinformation. Perhaps chief among these questions is the question of whether increases in IH, particularly increases in specific features of IH, reduce endorsement of/ belief in misinformation. Research should also examine whether our findings generalize to those already committed to misinformation, as such research will arguably shed light on the population of individuals most likely to spread misinformation and champion its cause.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi. org/10.1016/j.jrp.2022.104220.

## References

Alfano, M., Iurino, K., Stey, P., Robinson, B., Christen, M., Yu, F., & Lapsley, D. (2017). Development and validation of a multi-dimensional measure of intellectual humility. *PloS One, 12*, 1–28.

Anthony, A., & Moulding, R. (2019). Breaking the news: Belief in fake news and conspiracist beliefs. *Australian Journal of Psychology, 71*, 154–162.

Ashton, M. C., & Lee, K. (2009). The HEXACO–60: A short measure of the major dimensions of personality. *Journal of Personality Assessment, 91*, 340–345.

Bago, B., Rand, D. G., & Pennycook, G. (2020). Fake news, fast and slow: Deliberation reduces belief in false (but not true) news headlines. *Journal of Experimental Psychology: General, 149*, 1608–1613.

Barends, A. J., & de Vries, R. E. (2019). Noncompliant responding: Comparing exclusion criteria in MTurk personality research to improve data quality. *Personality and Individual Differences, 143*, 84–89.

Bensley, D. A., Lilienfeld, S. O., Rowan, K. A., Masciocchi, C. M., & Grain, F. (2020). The generality of belief in unsubstantiated claims. *Applied Cognitive Psychology, 34*, 16–28.

Boone, W. J., & Staver, J. R. (2020). Disattenuated Correlation. In *Advances in Rasch analyses in the human sciences* (pp. 57–63). Springer.

Borger, J. (2021, October 29). *Covid bioweapon claims 'scientifically invalid', US intelligence reports*. The Guardian. https://www.theguardian.com/world/2021/oct/29/us-intelligence-report-covid-origins.

Bowes, S. M., Blanchard, M. C., Costello, T. H., Abramowitz, A. I., & Lilienfeld, S. O. (2020a). Intellectual humility and between-party animus: Implications for affective polarization in two community samples. *Journal of Research in Personality, 88*. Awaiting pagination.

Bowes, S. M., Costello, T. H., Ma, W., & Lilienfeld, S. O. (2020b). Looking under the tinfoil hat: Clarifying the personological and psychopathological correlates of conspiracy beliefs. *Journal of Personality, 89*, 422–436.

Bowes, S. M., Costello, T. H., Lee, C., McElroy-Heltzel, S., Davis, D. E., & Lilienfeld, S. O. (2021). Stepping outside the echo chamber: Is intellectual humility associated with less political myside bias? *Personality and Social Psychology Bulletin*. Advanced online publication.

Brashier, N. M., Pennycook, G., Berinsky, A. J., & Rand, D. G. (2021). Timing matters when correcting fake news. *Proceedings of the National Academy of Sciences, 118*, 1–3.

Brotherton, R., & French, C. C. (2014). Belief in conspiracy theories and susceptibility to the conjunction fallacy. *Applied Cognitive Psychology, 28*, 238–248.

Bronstein, M. V., Pennycook, G., Bear, A., Rand, D. G., & Cannon, T. D. (2019). Belief in fake news is associated with delusionality, dogmatism, religious fundamentalism, and reduced analytic thinking. *Journal of Applied Research in Memory and Cognition, 8*, 108–117.

Brotherton, R., French, C. C., & Pickering, A. D. (2013). Measuring belief in conspiracy theories: The generic conspiracist beliefs scale. *Frontiers in Psychology, 4*, 279.

Buhrmester, M. D., Talaifar, S., & Gosling, S. D. (2018). An evaluation of Amazon's Mechanical Turk, its rapid rise, and its effective use. *Perspectives on Psychological Science, 13*, 149–154.

Caulfield, T. (2020, April 27). *Pseudoscience and COVID-19 – We've had enough already.* Nature: World View. https://www.nature.com/articles/d41586-020-01266-z.

Chmielewski, M., & Kucker, S. C. (2020). An MTurk crisis? Shifts in data quality and the impact on study results. *Social Psychological and Personality Science, 11*, 464–473.

Condon, D. M., & Revelle, W. (2014). The international cognitive ability resource: Development and initial validation of a public-domain measure. *Intelligence, 43*, 52–64.

Cronbach, L. J., & Shavelson, R. J. (2004). My current thoughts on coefficient alpha and successor procedures. *Educational and Psychological Measurement, 64*, 391–418.

Deffler, S. A., Leary, M. R., & Hoyle, R. H. (2016). Knowing what you know: Intellectual humility and judgments of recognition memory. *Personality and Individual Differences, 96*, 255–259.

Fasce, A., & Picó, A. (2019). Conceptual foundations and validation of the Pseudoscientific Belief Scale. *Applied Cognitive Psychology, 33*, 617–628.

Fazio, L. (2020). Pausing to consider why a headline is true or false can help reduce the sharing of false news. *Harvard Kennedy School Misinformation Review, 1*, 1–8.

Federico, C. M., Williams, A. L., & Vitriol, J. A. (2018). The role of system identity threat in conspiracy theory endorsement. *European Journal of Social Psychology, 48*, 927–938.

Frederick, S. (2005). Cognitive reflection and decision making. *Journal of Economic Perspectives, 19*, 25–42.

Funder, D. C., & Ozer, D. J. (2019). Evaluating effect size in psychological research: Sense and nonsense. *Advances in Methods and Practices in Psychological Science, 2*, 156–168.

Gignac, G. E., & Szodorai, E. T. (2016). Effect size guidelines for individual differences researchers. *Personality and Individual Differences, 102*, 74–78.

Hall, M. P., & Raimi, K. T. (2018). Is belief superiority justified by superior knowledge? *Journal of Experimental Social Psychology, 76*, 290–306.

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach third edition.* The Guilford Press.

Huynh, H. P., & Senger, A. R. (2021). A little shot of humility: Intellectual humility predicts vaccination attitudes and intention to vaccinate against COVID-19. *Journal of Applied Social Psychology, 51*, 449–460.

Koetke, J., Schumann, K., & Porter, T. (2021). Intellectual humility predicts scrutiny of COVID-19 misinformation. *Social Psychological and Personality Science*. Advanced online publication.

Krumrei-Mancuso, E. J., Haggard, M. C., LaBouff, J. P., & Rowatt, W. C. (2020). Links between intellectual humility and acquiring knowledge. *The Journal of Positive Psychology, 15*, 155–170.

Krumrei-Mancuso, E. J., & Rouse, S. V. (2016). The development and validation of the comprehensive intellectual humility scale. *Journal of Personality Assessment, 98*, 209–221.

Leary, M. R., Diebels, K. J., Davisson, E. K., Jongman-Sereno, K. P., Isherwood, J. C., Raimi, K. T., … Hoyle, R. H. (2017). Cognitive and interpersonal features of intellectual humility. *Personality and Social Psychology Bulletin, 43*, 793–813.

Lee, I. A., & Preacher, K. J. (2013). Calculation for the test of the difference between two dependent correlations with one variable in common.

Lee, K., & Ashton, M. C. (2018). Psychometric properties of the HEXACO-100. *Assessment, 25*, 543–556.

Lewandowsky, S., Cook, J., Ecker, U. K. H., Albarracín, D., Amazeen, M. A., Kendeou, P., Lombardi, D., Newman, E. J., Pennycook, G., Porter, E. Rand, D. G., Rapp, D. N., Reifler, J., Roozenbeek, J., Schmid, P., Seifert, C. M., Sinatra, G. M., Swire-Thompson, B., van der Linden, S., Vraga, E. K., Wood, T. J., Zaragoza, M. S. (2020). The Debunking Handbook 2020. Available at https://sks.to/db2020.

Lewandowsky, S., Ecker, U. K., & Cook, J. (2017). Beyond misinformation: Understanding and coping with the "post-truth" era. *Journal of Applied Research in Memory and Cognition, 6*, 353–369.

Lewandowsky, S., Ecker, U. K., Seifert, C. M., Schwarz, N., & Cook, J. (2012). Misinformation and its correction: Continued influence and successful debiasing. *Psychological Science in the Public Interest, 13*, 106–131.

Lie, D., & Boker, J. (2004). Development and validation of the CAM Health Belief Questionnaire (CHBQ) and CAM use and attitudes amongst medical students. *BMC Medical Education, 4*, 1–9.

Lobato, E., Mendoza, J., Sims, V., & Chin, M. (2014). Examining the relationship between conspiracy theories, paranormal beliefs, and pseudoscience acceptance among a university population. *Applied Cognitive Psychology, 28*, 617–625.

McElroy, S. E., Rice, K. G., Davis, D. E., Hook, J. N., Hill, P. C., Worthington, E. L., Jr, & Van Tongeren, D. R. (2014). Intellectual humility: Scale development and theoretical elaborations in the context of religious leadership. *Journal of Psychology and Theology, 42*, 19–30.

Patel, N., Baker, S. G., & Scherer, L. D. (2019). Evaluating the cognitive reflection test as a measure of intuition/reflection, numeracy, and insight problem solving, and the implications for understanding real-world judgments and beliefs. *Journal of Experimental Psychology: General, 148*, 2129–2153.

Peer, E., Brandimarte, L., Samat, S., & Acquisti, A. (2017). Beyond the Turk: Alternative platforms for crowdsourcing behavioral research. *Journal of Experimental Social Psychology, 70*, 153–163.

Pennycook, G., McPhetres, J., Zhang, Y., Lu, J. G., & Rand, D. G. (2020). Fighting COVID-19 misinformation on social media: Experimental evidence for a scalable accuracy-nudge intervention. *Psychological Science, 31*, 770–780.

Pennycook, G., & Rand, D. G. (2019). Lazy, not biased: Susceptibility to partisan fake news is better explained by lack of reasoning than by motivated reasoning. *Cognition, 188*, 39–50.

Pennycook, G., & Rand, D. G. (2021). The psychology of fake news. *Trends in Cognitive Sciences, 25*, 388–402.

Porter, T., & Schumann, K. (2018). Intellectual humility and openness to the opposing view. *Self and Identity, 17*, 139–162.

Porter, T., Schumann, K., Selmeczy, D., & Trzesniewski, K. (2020). Intellectual humility predicts mastery behaviors when learning. *Learning and Individual Differences, 80*. Awaiting pagination.

Senger, A. R., & Huynh, H. P. (2020). Intellectual humility's association with vaccine attitudes and intentions. *Psychology, Health & Medicine*, 1–11.

Shapiro, G. K., Holding, A., Perez, S., Amsel, R., & Rosberger, Z. (2016). Validation of the vaccine conspiracy beliefs scale. *Papillomavirus Research, 2*, 167–172.

Sikder, O., Smith, R. E., Vivo, P., & Livan, G. (2020). A minimalistic model of bias, polarization and misinformation in social networks. *Scientific Reports, 10*, 1–11.

Stewart, A. J., Mosleh, M., Diakonova, M., Arechar, A. A., Rand, D. G., & Plotkin, J. B. (2019). Information gerrymandering and undemocratic decisions. *Nature, 573*, 117–121.

Suderman, A., & Goodman, J. (2021, October 22). *Facebook faced its own insurrection amid Capitol riot.* Los Angeles Times. https://www.latimes.com/business/story/2021-10-22/amid-capitol-riot-facebook-faced-its-own-insurrection.

Swami, V., Coles, R., Stieger, S., Pietschnig, J., Furnham, A., Rehim, S., & Voracek, M. (2011). Conspiracist ideation in Britain and Austria: Evidence of a monological belief system and associations between individual psychological differences and real-world and fictitious conspiracy theories. *British Journal of Psychology, 102*, 443–463.

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education, 48*, 1273–1296.

Thomson, K. S., & Oppenheimer, D. M. (2016). Investigating an alternate form of the cognitive reflection test. *Judgment and Decision Making, 11*, 99–113.

Tobacyk, J. J. (2004). A revised paranormal belief scale. *The International Journal of Transpersonal Studies, 23*, 94–98.

Tonidandel, S., & LeBreton, J. M. (2011). Relative importance analysis: A useful supplement to regression analysis. *Journal of Business and Psychology, 26*, 1–9.

Tonidandel, S., & LeBreton, J. M. (2015). RWA web: A free, comprehensive, web-based, and user-friendly tool for relative weight analyses. *Journal of Business and Psychology, 30*, 207–216.

Van Bavel, J. J., Harris, E. A., Pärnamets, P., Rathje, S., Doell, K., & Tucker, J. A. (2020). Political psychology in the digital (mis) information age: A model of news belief and sharing. *PsyArXiv*. https://psyarxiv.com/u5yts.

Van der Linden, S., Panagopoulos, C., Azevedo, F., & Jost, J. T. (2021). The paranoid style in American politics revisited: An ideological asymmetry in conspiratorial thinking. *Political Psychology, 42*, 23–51.

Van Prooijen, J. W., Krouwel, A. P., & Pollet, T. V. (2015). Political extremism predicts belief in conspiracy theories. *Social Psychological and Personality Science, 6*, 570–578.

Wiseman, R., & Watt, C. (2004). Measuring superstitious belief: Why lucky charms matter. *Personality and Individual Differences, 37*, 1533–1541.

Wood, M. J., Douglas, K. M., & Sutton, R. M. (2012). Dead and alive: Beliefs in contradictory conspiracy theories. *Social Psychological and Personality Science, 3*, 767–773.

Zmigrod, L., Zmigrod, S., Rentfrow, P. J., & Robbins, T. W. (2019). The psychological roots of intellectual humility: The role of intelligence and cognitive flexibility. *Personality and Individual Differences, 141*, 200–208.