

Acquiring knowledge: Epistemic trust in the age of fake news

“knowledge is not a thing we have, but a link between ourselves and what we know”.

(Parsons M., 2000 on Bion W.R.)

Ever since the acquisition of language, humans have faced the quandary of whether to believe what they are told. The explosion of digital communication and the emergence of “fake news” have generated urgent concern about a breakdown of trust in legitimate sources of information that is corrosive of political and social discourse (Tandoc, Jenkins, & Craft, 2019). The COVID-19 crisis has further heightened awareness of the spread of misinformation and how conspiracy theories can affect behaviour such as adherence to public health guidance and vaccine uptake (Pummerer et al., 2020); for example, approximately 10% of a UK representative sample showed very high levels of conspiracy thinking about COVID-19, and 50% endorsed conspiracy thinking to some degree (Freeman et al., 2020). Similarly a US-based study found that one third of their adult sample believed one or more conspiracies about COVID-19 (Earnshaw et al., 2020).

We are not all equally vulnerable to evaluating information incorrectly and failing to recognise fake news. Demographic variables, including political affiliation, educational achievement, age, gender, ethnicity, religiosity, income, and marital status, together explain only about one third of the variance in susceptibility to COVID-19 myths (Meyer, Alfano, & De Bruin, 2021). Recent attempts to identify what makes people more prone to believe or share fake news have shown that those with stronger analytical thinking (as measured by the Cognitive Reflection Test (CRT)) (Frederick, 2005) are less susceptible to fake news, and better able to discriminate between real and fabricated news (Pennycook & Rand, 2019; Pennycook & Rand, 2020, 2021; Tandoc, 2019). The relationship between CRT and fake news susceptibility has been attributed to ‘lazy’ thinking as opposed to a tendency to consider

information more reflectively and override intuitive responses (Pennycook & Rand, 2019), and may indicate impulsivity in judging information (Baron, Scott, Fincher, & Metz, 2015). Further, cognitive factors such as confirmation bias (Lazer et al., 2018), the effect of repetition (Pennycook, Cannon, & Rand, 2018) and selective exposure have been found to elevate vulnerability to fake news, especially when received via social media (Tandoc, 2019).

While these findings are valuable in terms of identifying the social cognitive processes involved in parsing fake news, a wider developmental and socio-evolutionary understanding of the transmission of knowledge is lacking: the concept of epistemic trust (ET) could provide the basis for such an integrated understanding. ET is defined as trust in communication or communicated knowledge (Fonagy, Luyten, & Allison, 2015); ET involves a complex process which depends on the ability to take into account the reliability, relevance and quality of information and its source (Faulkner, 2011; McLeod, 2002; Sperber & Wilson, 1995; Zagzebski, 2012). Eaves and Shafto have proposed a computational model describing ET as inferences about informants' knowledgeability and helpfulness (versus deception) (Eaves & Shafto, 2017; Shafto, Eaves, Navarro, & Perfors, 2012). Shafto and colleagues have shown that the assessment of intent – i.e., the perception of helpfulness – has been underappreciated in the extant developmental literature (Shafto et al., 2012). In particular, they argue that reasoning about knowledgeability remains relatively constant across the lifespan, but significant developmental changes in reasoning about informants' intent occur across childhood. Namely, younger children tend to be more likely to represent informants as helpful and thus trustworthy; as children are exposed to a broader repertoire of social experiences and their mentalizing capacities develop, they tend to become more sophisticated in their reasoning about informants' helpfulness. The computational model suggests that reasoning about helpfulness is more useful in judging the accuracy of information than reasoning about the informant's knowledgeability: "Given two informants

with unknown knowledgeability, an known unhelpful informant will produce correct labels less often than a known helpful informant” (Eaves & Shafto, 2017, pp.298-299). Further, the model suggests that the nature of an individual’s exposure to helpful behaviour across development may play a role in shaping their epistemic trust. However, existing literature – to our knowledge – is limited in relation to individual differences in social experiences and how they might determine perceptions of informant helpfulness, tending instead to emphasise the different cues provided by the informant. Intriguing initial findings in this domain have suggested that ET is shaped by a child’s attachment status (Corriveau et al., 2009; Venta, 2020), yet, the role of developmental experiences in explaining differences in ET and the implications of these different trajectories for social functioning remain open questions.

Given the lack of empirical evidence and a tendency of the existing models to regard the recipient state as undifferentiated, we have recently developed a framework for understanding the development of different epistemic stances (e.g., Trust, Mistrust and Credulity see below) based on individuals’ social experiences. We have suggested that individuals whose interpersonal environment has left them feeling understood are more likely to be open to social communication and present high levels of epistemic Trust (Campbell et al., 2021; Fonagy, Luyten, Allison, & Campbell, 2017a, 2017b). Individuals with a history of childhood adversity may be more likely to show reluctance towards receiving new information, which can impair learning from new experiences (Fonagy et al., 2015). In terms of Shafto and colleagues’ model, early adversity may affect the saliency of reasoning about unhelpfulness of intent; this may, in certain circumstances, be adaptive as it allows for more precocious reasoning of intent. But when excessively generalized, it may cause epistemic disruption (ED), which can manifest as reluctance towards receiving new information; this may impede learning from social experience (Fonagy et al., 2015). Such disruption can be characterised by high levels of epistemic Mistrust, involving a tendency to reject or avoid any

communication. ED may also comprise excessive epistemic Credulity, where information is received with insufficient discrimination, leaving the recipient vulnerable to misinformation and/or exploitation (Campbell et al., 2021). These three hypothesised epistemic stances – Trust, Mistrust and Credulity were confirmed by recent exploratory and confirmatory factor analyses of a new measure of epistemic stance (the Epistemic Trust, Mistrust and Credulity Questionnaire; ETMCQ (Campbell et al., 2021)). These three correlated yet distinct factors were shown to be associated with reported childhood experiences of adversity and mental health symptoms in adults. In particular, Mistrust and Credulity were associated with insecure attachment styles and childhood adversity, and both factors partially mediated the link between adversity and mental health symptoms (Campbell et al., 2021).

An adaptive epistemic stance – in which vigilance and trust can be appropriately mobilised in response to judgements about the quality of information or the reliability of the informant – may underpin healthy functioning which requires rapid, efficient checking and updating of social knowledge (Pennycook & Rand, 2021; Sperber et al., 2010). The problem of fake news and conspiracy thinking might be closely connected to a dysfunction of the psychological process undergirding epistemic vigilance (Imhoff, Lamberty, & Klein, 2018; Sperber et al., 2010). It has been found, for example, that people with a conspiratorial mindset were generally less inclined to regard epistemically authoritative sources as credible, and more inclined to regard non-expert sources as credible (Imhoff et al., 2018). Building on this literature, we seek to develop a richer and novel understanding of the development and implications of conspiracy thinking by exploring the associations between an individual's epistemic stance (i.e., their disposition to show Trust, Mistrust or Credulity), exposure to childhood adversity and wider social-political phenomena, responses to fake news and conspiracy beliefs. To explore these relationships, we undertook two separate studies on epistemic stance, accuracy in detecting fake news, conspiracy thinking and vaccine hesitancy.

In study 1, we tested the hypothesis that an individual's epistemic stance is associated with the capacity to discriminate between real and fake news and the propensity towards conspiracy thinking, in general and in relation to COVID-19. Study 2 aimed to replicate and extend findings by using the same fake news task and adding a more direct measure of impulsivity, a delay-discounting questionnaire which assesses the degree to which individuals can delay their loss or gratification; this measure has been associated with the CRT (Bialek & Sawicki, 2018), used in Study 1. We also examined conspiracy mentality thinking in general and in relation to COVID-19 by using the vaccine attitudes scale (VAX) (Martin & Petrie, 2017) and two specific questions regarding willingness to have the COVID-19 vaccine and confidence in the safety of the COVID-19 programme. Both studies' hypotheses and design were preregistered (<https://osf.io/ef695>; <https://osf.io/s72m3>).

Study 1

Based on the emphasis in Shafto's computational model on the role of reasoning about helpfulness of informants and the hypothesised impact of the recipient's developmental experiences in shaping this reasoning (Eaves & Shafto, 2017), the hypotheses developed for this paper are predicated on the idea that exposure to unhelpful informants (via childhood adversity) will affect the development of an individual's epistemic stance, affecting later functioning when it comes to reasoning about the reliability of information.

To develop our framework on the role of epistemic stance in social functioning, we needed to find evidence to support the links between these putative factors and processes. Following Imhoff and colleagues' work on the relationship between conspiracy mindset and judgements about epistemic credibility, we hypothesized in the first instance that Mistrust would be positively associated with higher conspiracy mentality. Second, given previous findings on the relationship between reduced analytical thinking (measured by the CRT) and

the failure to detect fake news, we hypothesised that ED (i.e., low Trust or high Credulity/Mistrust) would be associated with reduced analytical thinking. Third, we hypothesised that individuals with high ED would be more likely to struggle to distinguish real from fake news after controlling for their analytical thinking. Fourth, based on the proposed role of exposure to unhelpful informants, we expected that individuals who inaccurately identify real or fake news will report higher levels of childhood adversity. Fifth and drawing together the implications of the previous hypotheses, we expected Trust, Mistrust and Credulity to mediate the relationship between childhood adversity and scores on the fake news task. Finally, we anticipated that people with ED would score higher on COVID-19 related conspiracy beliefs.

Participants and procedures

A total of 705 participants took part, using the on-line survey platform Prolific (<https://www.prolific.co>), which allowed us to recruit a representative sample that approximately matches the United Kingdom population distribution in terms of age, sex and ethnicity. Participants were aged 18 years or older, currently living in the UK, and proficient in written and spoken English (Table 1S for demographic characteristics). Participants received financial compensation (at a rate of £7.50/hour). The study was approved by the University College London Research Ethics Committee (14285/002). Questionnaires were designed in Qualtrics (Qualtrics, Provo, UT). Participants were first asked to complete the demographic questions, followed by a battery of questionnaires presented in a randomized order.

Instruments

Epistemic stance. To evaluate participants' openness to the communication of knowledge we

used the ETMCQ; (Campbell et al., 2021)). The ETMCQ is a 15-item questionnaire and responses are rated across a 7-point Likert scale ranging from “strongly disagree” (= 1) to “strongly agree” (= 7) and neither agree nor disagree in the centre (=4). A Trust item is “I find information easier to trust and absorb when it comes from someone who knows me well”. An example of a Mistrust item is “If you put too much faith in what people tell you, you are likely to get hurt”. A Credulity item is “When I speak to different people, I find myself easily persuaded even if it is not what I believed before”. Cronbach’s α were .70, .65 and .81, respectively.

Conspiracy beliefs. To evaluate participants’ beliefs in general conspiracy theories we used the Conspiracy Mentality Questionnaire (CMQ; Imhoff & Bruder, 2014)). The CMQ is A 12-item self-report scale using a 7-point Likert scale to assesses non-content specific tendency towards conspiratorial thinking (e.g., “There are secret organizations that have a great influence on political decisions”). In the present study, Cronbach’s α was .83.

Cognitive reflection. To assess cognitive reflection we used a 7-item questionnaire that measures reflective reasoning and differences in intuitive-analytic cognitive styles (CRT; (Frederick, 2005; Thomson & Oppenheimer, 2016)). Correct responses reflect more analytical-reflective thinking while incorrect intuitive response can indicate an overall failure to engage in reflective reasoning processes (Pennycook & Rand, 2019). Due to a technical error we had to omit one question and CRT scores were calculated based on six items.

Fake/real news task. Participants were presented with 20 politically neutral news headlines. Each headline was presented as a picture accompanied by short text and a reference to a source in a social media format. Participants were instructed to rate to what extent they think these headlines are accurate and whether they would be willing to share this news item on social media. This task was adapted from Pennycook and Rand (2019). All headlines were checked and taken from snopes.com or FullFact.org. Real news headlines were also fact-

checked. We calculated the score of “Truth-discrimination” by subtracting the standardized score for fake news (false alarms) from the standardized score for real news (hits) (Pennycook & Rand, 2019). A positive score on this measure indicates a capacity to distinguish real from fake news (see supplementary for the stimuli that were used).

Childhood trauma. The experience of trauma in childhood was measured using the Childhood Trauma Questionnaire, a 28-item self-report questionnaire validated for clinical and non-clinical populations (Bernstein, Fink, Handelsman, & Foote, 1994). Individuals are asked to indicate on a 5-point Likert scale whether and how often they experienced emotional, physical or sexual abuse and emotional or physical neglect in their childhood. Cronbach’s α were .90, .71, .84, .89 and .95, respectively. Twenty-two participants (2%) had one missing item which was replaced by the subscale mean response items. Four (0.1%) participants had two missing items which were replaced by the subscale mean response items. One participant skipped more than four items and as such was excluded from analysis of this measure (see supplementary for percentage of participants reporting on childhood adversity within our sample).

Coronavirus conspiracy explanations. Participants’ conspiracy beliefs in relation to the COVID-19 crisis were measured using a newly developed scale (Freeman et al., 2020) in which participants are asked to rate the extent to which they agree with 48 COVID-19 conspiracy statements (e.g. “I’m skeptical about the official explanation about the cause of the virus”). The questionnaire authors group the items into six subscales: skepticism about the government’s response, general conspiracy views on the cause of the virus, general conspiracy views about the spread of the virus, general conspiracy views about the reasons for lockdown, specific conspiracy beliefs, and level of agreement with official explanations.

Data analysis

We first ran descriptive statistics and as the ETMCQ scores violated assumptions of

normality, we used nonparametric statistical tests. Spearman's rho correlation analyses were performed to assess the associations between the ETMCQ subscales, CMQ, demographic information (i.e., age, level of education and annual income) and CRT. In addition, we examined the relationships between demographic factors and scores on the fake news task.

To test our hypothesis on the association between the ETMCQ subscales, Truth-discrimination and perception of fake/real news headlines, we conducted three regression models with ETMCQ and conspiracy beliefs as independent variables and sex, age, education, income and CRT as covariates. Distribution residuals were checked following model construction to check for violation of normality residuals and multicollinearity was tested. Results were corrected for multiple comparisons (Benjamini & Hochberg, 1995).

The role of the three ETMCQ subscales as mediators between childhood adversity (measured by the CTQ total score) and fake/real discrimination was explored using mediation analysis with the indirect effect of adversity through each of the factors estimated separately. Age, sex, income, CRT and level of education were included as covariates. Bias-corrected bootstrapped confidence intervals (BC-95% CIs) for the indirect effects were estimated (5000 bootstrap replications).

To explore the hypotheses relating to the COVID-19 scale, correlational analyses of ETMCQ with general and COVID-19 specific conspiracies beliefs, whilst controlling for age, sex, annual income, CRT and level of education, were conducted and corrected for multiple comparisons (Benjamini & Hochberg, 1995).

Results

Our first hypothesis regarding the association between ED and conspiracy mentality was confirmed: Mistrust and Credulity were positively correlated with conspiracy beliefs ($r_{(705)}=.30$, $p<.001$; $r_{(705)}=.23$, $p<.001$) (Table 2S and 3S for summary of Spearman intercorrelations). The second hypothesis regarding the association between the Epistemic

Trust, Mistrust and Credulity Questionnaire (ETMCQ) subscales and analytical thinking was partly confirmed, with individuals scoring high on Credulity showing less cognitive reflection ($r_{(705)} = -.12, p=.001$), although this correlation was small. Moreover, there were no significant correlations between Trust and Mistrust and CRT score.

As predicted, when Truth-discrimination served as the dependent variable, a main effect of analytical thinking emerged supporting the third hypothesis (Table 1). Again consistent with expectations, Credulity was associated with lower Truth-discrimination. To further investigate these effects, regression analysis was performed with perception of fake news as accurate as the dependent variable (e.g., False alarms). Credulity again emerged as a significant main effect, indicating that Credulity was associated with perceiving fake news as real. Both conspiracy mentality thinking and CRT emerged as significant main effects. Finally, when the hit rate of recognising real news as accurate was the dependent measure, the Trust subscale emerged as a positive main effect ($b=.09, SE=.05, t= 2.04, p=.04, 95\%CI[.00;.04]$), but this did not survive FDR corrections. Against expectations, we did not find any significant effect for Mistrust.

The fourth hypothesis regarding the mediating role of epistemic stance on the relationship between adversity and Truth-discrimination was partly confirmed. Credulity was found to mediate the relationship between the total score on the childhood trauma questionnaire (CTQ) and Truth-discrimination ($b=-0.003, SE=0.001, 95\%[-0.004; -0.001]$ see Figure 1A). Specifically, CTQ was a significant predictor of Credulity (path a in Figure 1A; $b=.01, SE=.003, p<.001, 95\%CI[0.01;0.02]$), and Credulity was a significant predictor of Truth-discrimination (path b in Figure 1A; $b=-0.16, SE=.04, p<.001, 95\%CI[-.25;-.07]$). The direct effect between adversity and Truth-discrimination was not significant (path c in Figure 1A; $b=0.002, SE=.003, p=0.46, 95\%[-0.004;0.01]$), which indicates an indirect only mediation (Zhao, Lynch, & Chen, 2010). We did not find any mediation effect with Trust or Mistrust. In

addition, exploratory post-hoc moderation analysis revealed that both Credulity and Mistrust moderate the relationship between CTQ and Truth-discrimination (see supplementary information).

Finally, both Mistrust and Credulity were positively associated with conspiracy beliefs regarding COVID-19 (Table 2). Trust was positively associated with agreement with official explanations about the virus ($r_{(664)}=.09$, $p=.01$) and negatively with lockdown conspiracies ($r_{(664)}=-.08$, $p=.02$), but these effects did not survive FDR corrections. Scores on the Conspiracy Mentality Questionnaire (CMQ) were positively associated with COVID-19 conspiracy beliefs and negatively with agreement with the official explanations (percentages are reported in the supplementary information).

In sum, of our five hypotheses, four were confirmed. Mistrust was correlated with belief in conspiracy theories. Individuals with high Credulity were poorer at discriminating between fake and real news and more likely to perceive fake news as real and affirm false news in relation to COVID-19. Credulity mediated the effect of childhood adversity. Higher Trust was associated with correctly identifying real news headlines, however these effects did not survive statistical corrections.

Study 2

Study 2 sought to replicate the findings of Study 1. To further explore the cognitive elements at work in epistemic stance and reasoning about the reliability of information, we used a direct measure of impulsivity, delay-discounting, as it has been associated with the CRT (Bialek & Sawicki, 2018). Delay discounting has also been suggested as a transdiagnostic process in the context of psychiatric disorders (Amlung et al., 2019). We hypothesised that individuals with ED would tend to prefer immediate reward and would be weaker at distinguishing between real and fake news. Secondly, to explore the mediating and

moderating role of ED on fake news discrimination in individuals who have experienced trauma, we used a different scale to measure exposure to adversity in childhood, the Maltreatment Abuse and Exposure Scale (MAES), on the grounds that it captures severity as well as exposure, and shows greater correlation with psychopathology symptoms than the CTQ (Teicher & Parigger, 2015). We hypothesised that we would replicate our previous findings on adversity. The ongoing COVID-19 situation and the introduction of a vaccine programme for the COVID-19 prompted investigation of epistemic stance in relation to these issues. We hypothesised that ED would be associated with vaccine hesitancy, both generally and in relation to COVID-19, and that Trust would not be associated with vaccine hesitancy.

Participants and procedures

A total of 502 participants from a representative UK sample took part, using the procedure described in Study 1 (Table 1S for demographic characteristics).

Instruments

Epistemic stance. We used the ETMCQ, as described in Study 1. Cronbach's α for Trust, Mistrust and Credulity were .73, .69 and .70, respectively.

Vaccination Attitude Examination. Participants' attitudes towards vaccination were evaluated using the Vaccination Attitude Examination (VAX; (Martin & Petrie, 2017)). The VAX is A 12-item self-report scale using a 6-point Likert scale to assesses general beliefs towards vaccinations and has been shown to be associated with vaccination behaviours and intentions (Martin & Petrie, 2017). In the present study, Cronbach's α was .71.

COVID-19 Vaccination. Willingness to vaccinate against COVID-19 was measured using one item ("If a COVID-19 vaccine were made available to me, I would definitely get it?"). If participants had already received the vaccination, they were requested to report how they felt before they were offered it. Response option was ranged on a 6-point Likert scale. Confidence in the safety and efficacy of the COVID-19 programme was based on one item

("I have confidence in the safety and efficacy of the COVID-19 vaccination programme"), using the same scale.

Delay-discounting. Participants' tendency to prefer towards smaller immediate rewards over delayed larger rewards was measured using the Monetary Choice Questionnaire (MCQ; (Kirby, Petry, & Bickel, 1999)) The MCQ is a 27-item questionnaire in which for each item the participant chooses between immediate monetary reward or a larger delayed reward. Using (<https://kuscholarworks.ku.edu/handle/1808/15424>) protocol we calculated for each participant a K-level, higher levels of which indicate higher levels of impulsivity (for the purpose of this analysis, we used the log transformation K-level (K-log)). Seventeen participants were excluded from this analysis due to missing items, and one participant was excluded due to low consistency (<.70%). Participants' overall consistency was high (97.54%).

Fake/real news task. See Study 1.

Childhood adversity. To establish individuals' exposure to childhood adversity we used the Maltreatment Abuse and Exposure Scale (MAES (Teicher & Parigger, 2015)), a 52-item questionnaire that assesses the severity of exposure to ten types of maltreatments. Responses scored and validated using the MAES protocol, resulting in the exclusion of 31 participants (6%).

Data analysis

Data analysis was identical to study 1, with the exception of the use of the additional instruments reported above.

Results

Our first hypothesis regarding the association between epistemic stance and Truth-discrimination was confirmed. Replicating Study 1 findings, we found that when Truth-discrimination served as the dependent variable, Credulity emerged as a negative significant

main effect (see Table 3). When perception of fake news as accurate served as the dependent variable, Credulity again emerged as a significant main effect, indicating that those with high Credulity were more prone to perceive fake news as real. Similarly, a positive main effect for Mistrust emerged, indicating that those with high Mistrust were more prone to perceive fake news as real.

Our hypothesis regarding the association between epistemic stance and delay-discounting was confirmed, with Credulity positively correlated with delay-discounting as measured by K-log ($r_{(456)}=.14$, $p=.002$), indicating that individuals who scored higher on the Credulity subscale were more likely to prefer immediate reward over a larger reward received after a time delay. Our hypothesis on the relationship between scores on the fake news task and scores on the delay-discounting questionnaire was confirmed, showing that those who tend to prefer a smaller immediate reward were less able to distinguish between real and fake news ($\beta=-.24$, $t=2.90$, $p=.004$, 95%CI $[-.40,-.07]$) (see supplementary for main analysis controlling for delay-discounting). Given this pattern of results, we performed a post-hoc analysis to explore the mediating role of delay-discounting on the relationship between Credulity and Truth-discrimination. Delay-discounting partly mediated this relationship ($b=-.02$, $SE=.01$, 95%CI $[-.04;-.001]$). Specifically, Credulity was associated with delay-discounting ($b=.07$, $SE=.03$, $p=.03$, 95%CI $[0.01;0.13]$), and delay-discounting was associated with Truth-discrimination ($b=-0.24$, $SE=.08$, $p=.004$, 95%CI $[-.40;-.07]$). The direct effect between Credulity and Truth-discrimination was significant ($b=-.12$, $SE=.05$, $p=0.03$ 95% $[-0.23;-0.01]$), indicating partial mediation. The indirect effect of Credulity between delay-discounting and Truth-discrimination was not significant ($b=-.02$, $SE=.01$, 95%CI $[-.05; .001]$).

In relation to childhood adversity, similarly to Study 1, Credulity mediated the relationship between exposure to childhood adversity and Truth-discrimination ($b=-0.002$,

$SE=0.001$, 95%[-0.005; -0.003] see Figure 1B). As in Study 1, the effect sizes were small. Childhood adversity was a significant predictor of Credulity (path a in Figure 1B; $b=.02$, $SE=.003$, $p<.001$, 95%CI[0.01;0.03]), and Credulity was a significant predictor of Truth-discrimination (path b in Figure 1B; $b=-0.13$, $SE=.05$, $p=.02$, 95%CI[-.23;-.02]). Again, the direct effect between adversity and Truth-discrimination was not significant (path c in Figure 1B $b=-0.004$, $SE=.004$, $p=0.92$ 95%[-0.008;0.01]). We found a similar small indirect mediation effect of Mistrust, that was not found in Study 1 (indirect effect: $b=-.002$, $SE=.00$, 95%CI[-.003; -.0002]). Lastly, we tested the post-hoc moderation effects of Trust and Mistrust on the relationship between childhood adversity and Truth-discrimination that were found in Study 1, however these were not replicated.

Our hypotheses on the effects of epistemic stance on attitudes towards vaccination were confirmed. Both Mistrust and Credulity were positively associated with vaccine hesitancy in general ($r_{(469)}=.21$, $p<.001$; $r_{(469)}=.22$, $p<.001$, respectively (whilst controlling for age, sex, education level and income)). The relationship between adversity and misinformation as measured by vaccine hesitancy was not significant ($r=.05$, $p=.27$), however this relationship was again mediated by an indirect effect of both Credulity ($b=-0.002$, $SE=.00$, $p=.02$, 95%CI[.00;.004]) and Mistrust ($b=-0.002$, $SE=.00$, 95%CI[.00;.003]), with small effect sizes. Credulity and Mistrust were both negatively correlated with willingness to have the vaccine ($r_{(469)}=-.16$, $p=.001$; $r=-.13$, $p=.006$, respectively) but only Credulity negatively associated with confidence in the safety and efficacy of the COVID-19 vaccination programme ($r_{(469)}=.14$, $p=.001$; $r=-0.08$, $p=0.09$, respectively; see supplementary information for overall response distribution). As predicted, Trust was not associated with vaccine hesitancy.

In sum, we replicated our finding in Study 1 that individuals with high Credulity are less able to discriminate between fake and real news and more prone to perceiving fake news

as real. We partially confirmed our hypothesis in relation to ED and delay-discounting: high Credulity was associated with seeking immediate reward, but high Mistrust was not. A post-hoc exploration found that delay-discounting partially mediates the relationship between Credulity and Truth-discrimination. In addition, we again found that while there was no direct association between childhood adversity and Truth-discrimination; it was only via the mediation of Credulity and Mistrust that an effect was found. Our hypothesis that individuals with ED would show greater hesitancy towards vaccination was confirmed. Again, there was no direct association between childhood adversity and vaccine hesitancy but there was an effect via the mediation of Credulity and Mistrust.

General discussion and conclusions

This study investigated the relationship between the capacity to recognise fake news and misinformation, both generally and in relation to COVID-19, and epistemic stance, represented by three factors: Trust, Mistrust and Credulity. Across two studies, using a UK representative sample, we found consistent evidence of the effect of ED in generating vulnerability to accepting misinformation. This was found in five areas: fake news headlines, conspiracy thinking in general, conspiracy thinking about COVID-19, vaccine hesitancy in general, and COVID-19 vaccination hesitancy. We also explored the potential mediating role of the ETMCQ subscales in the relationship between childhood adversity and fake news discrimination, and investigated epistemic stance in relation to cognitive thinking and impulsivity in the context of processing information (CRT and delay discounting).

A consistent pattern of results supports the idea that the Credulity subscale does capture a lack of capacity to judge accurately the quality and reliability of social communication and renders the individual more at risk of being misled or manipulated (Campbell et al., 2021). Although previous findings indicate an association between trauma and heightened Mistrust and Credulity (Campbell et al., 2021) and the current finding that

Credulity is associated with reduced ability to discern fake information, we did not find a significant direct effect between childhood adversity and Truth-discrimination or vaccine hesitancy. However, there was a significant indirect effect via both Credulity and Mistrust. These findings may indicate that a disruption in the capacity to trust in the communication of information is one of the mechanisms by which childhood experiences may affect later social cognitive processes involved in the assessment of the reliability of information. This also is consistent with Shafra and colleagues' emphasis on reasoning about informants' intent as a precursor of epistemic trust (Eaves & Shafra, 2017; Shafra et al., 2012). We suggest that our findings might suggest that one of the sequelae of childhood trauma comes arises from learning that a caregiver or a significant other cannot be helpful, a state that is necessary for creating the interpersonal understanding on which the emergence of trust depend. It should be noted that the scales we used focus on past experiences of adversity in childhood. It is possible that current experiences of adversity may generate a more direct link to misinformation, which may be an interesting avenue for future research.

Trust was not associated with better recognition of fake news. This finding suggests that what would normally be an adaptive epistemic stance is not helpful in discerning fake information or reducing the likelihood of affirming conspiracy theories in relation to Covid-19. This may be understood in terms of an evolutionary mismatch: our social cognitive capacities were adapted to small social groups where communication took place face to face with known others. We are not necessarily well-equipped to recognise when, in the context of modern media stimuli, it is advisable to close the channel of ET. Individuals with healthy levels of Trust may therefore not be protected from misinformation if it is presented as viable cultural knowledge.

The current pandemic allowed us to measure the effect of epistemic stance in relation to public health messages and vaccine hesitancy. Individuals with higher Credulity and

Mistrust were more likely to believe COVID-19 conspiracy theories, showed greater skepticism toward official accounts and were less willing to receive the COVID-19 vaccine or to believe in the safety of the vaccination programme. Again, individuals with high Trust were not immune to conspiracy beliefs but we report a trend showing more alignment with official explanations of the origins and modes of transmission of COVID-19. This point is consistent with previous findings (Campbell et al., 2021) that Trust does not act as a resilience factor for psychopathology, but rather Mistrust and Credulity constitute vulnerability factors. This finding indicates how we might approach the problem of behaviour change in relation to the pandemic: Trust may increase the likelihood of accepting an ‘official version’ but does not protect us from being influenced by fake news or conspiracy theories. Thus effective interventions in public health need to directly tackle and attempt to reverse Mistrust and Credulity. The role of Credulity indicates the readiness of a significant proportion of individuals to believe narratives without requiring evidence: it is unlikely that presenting contrary evidence alone is likely to reverse beliefs.

Our hypothesis regarding the association between epistemic stance and delay-discounting was confirmed, with individuals who scored higher on the Credulity subscale more likely to prefer immediate reward, and those who preferred immediate reward were more likely to be weaker at Truth-discrimination. Delay-discounting draws on similar cognitive processes as epistemic stance in relation to shared knowledge and receiving social information, with both ED and immediacy of reward being associated with uncertainty about the value of cooperation and reliability of the social world to deliver what it proposes. Delay-discounting mediated the relationship between Credulity and Truth-discrimination but Credulity did not mediate the relationship between delay-discounting and Truth-discrimination. These findings are intriguing although preliminary, possibly suggesting that at least to some extent Credulity may be the initiator of the vulnerability cascade.

This study has some limitations. Firstly, both studies are cross-sectional and so we cannot infer causality or the involvement of a common cause in a third variable; further longitudinal research is required. We cannot rule out other factors that might affect the capacity to recognise fake news – for example, we did not assess general interpersonal trust (Rotter, 1967), which would generate discriminant validity of the ETMCQ factors. Secondly, a possible limitation arises from the modest correlations we found between COVID-19 conspiracy beliefs and ETMCQ, suggesting that other factors may be at play. Thirdly, the scale that we used to assess COVID-19 conspiracy beliefs (Freeman et al., 2020) has been subject to criticism on the grounds of an imbalance of response options leading to inflated levels of agreement (Sutton & Douglas, 2020). It should also be noted that Freeman et al.’s study was conducted in early May 2020, whereas both Sutton and Douglas’s and our study were performed in June 2020, and as such it may be difficult to draw direct comparisons of the findings. Finally, this study was only UK-based; future studies should explore these questions internationally. However, this is the first study that investigates the alarming phenomenon of fake news in the context of wider psychological and socio-evolutionary understanding of the transmission of knowledge. In the current climate of concern about the loss of public trust in official discourse, especially in relation to COVID-19, the findings of this study could inform policy-makers’ perspective on the role of trust in the communication of information and its significance in governing the relationship between individuals and institutions and perceptions of the legitimacy of the state.

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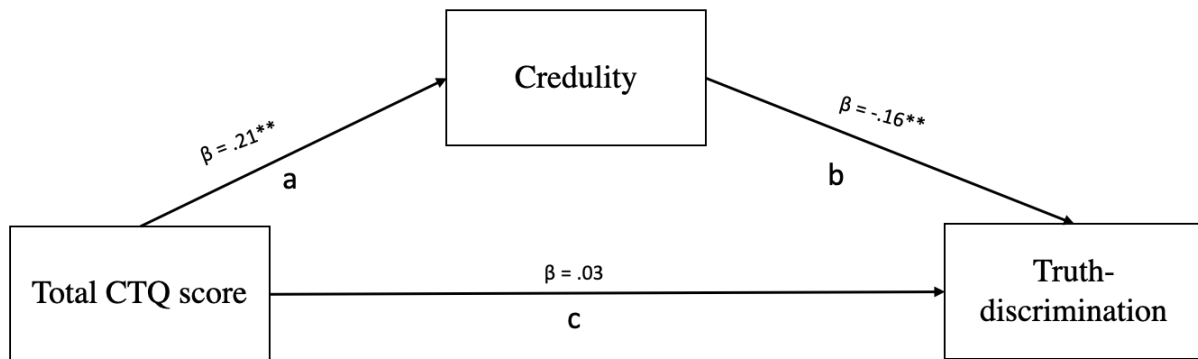
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Figure 1. Schematic model of the mediating role of Credulity on the relationship between childhood adversity (A. in Study 1 as measured by the CTQ, B. in Study 2 as measured by the MAES) and Truth-discrimination. Controlling for age, gender, education and income
** $p < .001$.

A



B

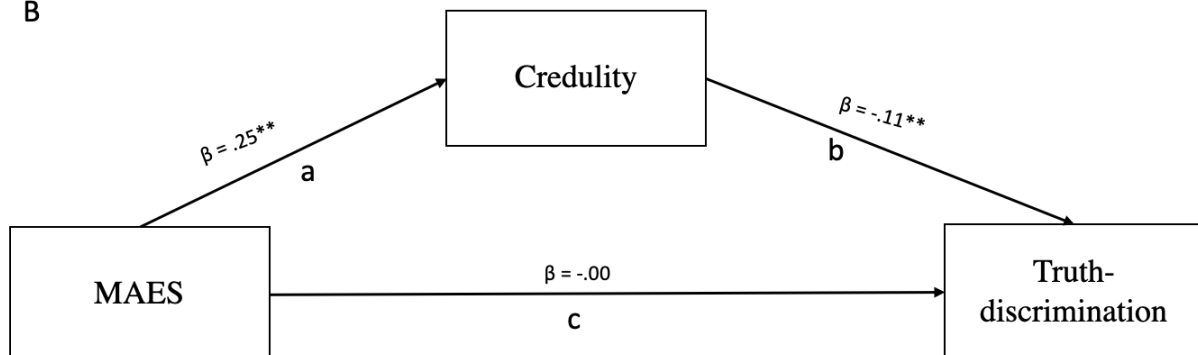


Table 1. A. Correlations between ETMCQ subscales, conspiracy beliefs, score on the CRT and dependent variables [Truth-discrimination, Fake accuracy (False alarm) and Real news accuracy (Hit)] B. Linear multiple regression of ETMCQ subscales on the fake/real measures (n=475), controlling for sex, education, income, CRT and age, FDR corrected.

A.	Trust	Mistrust	Credulity	CMQ	CRT		
Truth-discrimination	.05	-.06	-.15**	-.15**	.20**		
Fake accuracy (False alarm)	.02	.06	.13**	.19**	-.21**		
Real news accuracy (Hit)	.08*	-.00	-.05	.01	.04		
B. Dependent variable - Truth-discrimination							
Independent	<i>b</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	Collinearity	VIF
Variables						Tolerance	
Trust	.07	.06	.05	1.26	.25	.86	1.16
Mistrust	-.02	.06	-.02	-.41	.68	.76	1.32
Credulity	-.15	.05	-.14	-3.30	.002	.81	1.23
CMQ	-.09	.05	-.08	-1.96	.09	.85	1.17
CRT	.67	.15	.17	4.36	.0001	.90	1.10
Dependent variable – Fake accuracy (False alarm)							
Trust	0.00	.01	.02	.43	.75	.86	1.15
Mistrust	0.00	.01	.01	.32	.75	.75	1.32
Credulity	0.01	.01	.10	2.33	.03	.81	1.23
CMQ	0.02	.01	.14	3.53	.001	.85	1.18
CRT	-0.09	.02	-.18	-4.70	.0001	.90	1.10
Dependent variable – Real news accuracy (Hit)							
Trust	0.2	.01	.08	2.03	.15	.86	1.15
Mistrust	-0.00	.01	-.01	-0.21	.85	.76	1.32
Credulity	-0.01	.01	-.08	-1.87	.15	.81	1.24
CMQ	0.01	.01	.04	1.03	.46	.85	1.17
CRT	0.02	.02	.04	0.86	.48	.90	1.11

Note: CRT = cognitive reflection test; CMQ = conspiracy mentality questionnaire; ETMCQ = epistemic trust, mistrust and credulity questionnaire; FDR = false discovery rate.

Table 2. Spearman correlations between ETMCQ subscales, conspiracy beliefs, and conspiracy beliefs in relation to COVID-19 controlling for CRT, sex, age, annual income and level of education (FDR corrected).

	Official explanations	Skepticism Authorities	Conspiracies on Cause of the virus	Lock-down	Specific COVID-19	Spread of the virus
1. Trust	.10	-.03	.00	-.09	-.06	-.05
2. Mistrust	-.05	.16***	.09*	.14***	.19***	.16***

3. Credulity	-.04	.15***	.11***	.14***	.17***	.16***
4. CMQ	-.23**	.49***	.42***	.39***	.52***	.51***
5. Truth dis	.16*	-.24***	-.25**	-.18***	-.18***	-.23***

Note: CRT = cognitive reflection test; CMQ = conspiracy mentality questionnaire; ETMCQ = epistemic trust, mistrust and credulity questionnaire; FDR = false discovery rate.

* $p < .05$

** $p < .01$

*** $p < .001$

Table 3. A. Spearman correlations between ETMCQ subscales and dependent variables [Truth-discrimination, Fake accuracy (False alarm) and Real news accuracy (Hit)] B. Linear multiple regression of ETMCQ subscales on the fake/real measures (n=XXX), controlling for sex, education, income and age, FDR corrected.

A.	Trust		Mistrust		Credulity		
Truth-discrimination	.07		-.11*		-.14**		
Fake accuracy (False alarm)	-.02		.14**		.17**		
Real news accuracy (Hit)	.09*		.01		.03		
B. Dependent variable - Truth-discrimination							
Independent	<i>b</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	Collinearity	VIF
Variables						Tolerance	
Trust	.04	.07	.03	0.63	.52	.79	1.27
Mistrust	-.13	.06	-.10	-1.77	.08	.70	1.42
Credulity	-.13	.05	-.12	-2.41	.02	.83	1.20
Dependent variable – Fake accuracy (False alarm)							
Trust	.007	.01	.04	.73	.46	.78	1.27
Mistrust	.02	.01	.12	2.21	.03	.70	1.42
Credulity	0.02	.01	.15	3.13	.002	.83	1.20
Dependent variable – Real news accuracy (Hit)							
Trust	0.17	.01	.08	1.50	.39	.79	1.27
Mistrust	0.00	.01	.00	0.04	.98	.70	1.42
Credulity	0.00	.01	.01	.18	.98	.83	1.20

Note: ETMCQ = epistemic trust, mistrust and credulity questionnaire; FDR = false discovery rate.

Supplementary Information

Demographic data

Table 1S – Sample demographics (Study 1 N=705, Study 2 N = 502).

Gender					
	Female	Male	Non-Binary	Prefer not to say	
Study 1	363 (51%)	342 (49%)	0	0	
Study 2	256 (51%)	244 (49%)	3 (0.00%)		
Age					
	18-29	30-39	40-49	50-59	>60
Study 1	172 (24%)	125 (18%)	93 (13%)	143 (20%)	172 (34%)
Study 2	93	90	93	82	144
Ethnicity					
	White	Asian/Asian British	Black/African/ Caribbean/Black British	Mixed / Multiple ethnic groups	Other/ Prefer not to say
Study 1	584 (83%)	57 (8%)	32 (4.5%)	18(2.5%)	14(2%)
Study 2	409	41	24	15	13
Marital status					
	Single	Relationship/ Married	Civil/ Separated/ Divorced	Widowed	Prefer not to say
Study 1	191 (27%)	463 (66%)	37 (5%)	13 (2%)	1 (0.01%)
Study 2	136	301	38	17	3
Educational level					
	Secondary	University degree	Postgraduate	No formal	Prefer not to say
Study 1	277(39%)	295(42%)	123 (17%)	8 (1.1%)	2 (0.3%)
Study 2	179	205	108	5	5
Income level					
	< £15,000	£15,001 - £19,999	£20,000 - £29,999	- £30,000 - £39,999	- £40,000 - £49,999
Study 1	75	76	131	95	77
Study 2	83	46	87	85	56
	£50,000 - £59,999	£60,000 - £69,999	£70,000 - £99,999	- £100,00 - £149,999	- > £150,000
Study 1	71	47	61	28	4
Study 2	45	20	36	15	3

Percentage of participants reporting on childhood adversity within our sample:

Study 1: Within our sample, 27% of participants in the study reported moderate to severe emotional neglect (score > 15) (Bernstein & Fink, 1998), 12% of the study sample reported moderate to severe physical neglect (score >10), 11% reported moderate to severe physical abuse (score > 10), 12% of participants reported moderate to severe emotional abuse (score >13), and 10% reported moderate to severe sexual abuse (score > 8).

Study 2: Within our sample, 31% of participants reported on zero exposure to types of maltreatment, 17% of the study sample reported on exposure to one type of maltreatment, , 15% of participants reported on exposure to two types, 10% of participants reported on three types, 7% reported on four types, 6% on five types and 7% of participants reported on exposure to more than 7 types of maltreatment.

Fake/real news task

Study 1. Fake news headlines were perceived as less accurate than the real headlines ($M_{\text{fake}} = 1.75$, $SD = .37$; $M_{\text{real}} = 2.51$, $SD = .37$, $p < .001$, 95% CI [-.78,-.72]). Among individuals who reported that they sometimes share news over social media ($n=535$), willingness to share fake news was lower than real news ($M_{\text{fake}} = 0.21$, $SD = .44$; $M_{\text{real}} = 0.56$, $SD = .47$; $p < .001$, 95% CI [.32,.38]). There were no differences between men and women in scores on the fake/real news task (p values >.75). A small but significant negative correlation was found between age and the ability to discriminate between real and fake news ($r_{(705)} = -.09$, $p = .01$) and between age and accurate recognition of real news ($r_{(705)} = -.15$, $p < .001$).

Study 2. Similar to Study 1, fake news headlines that were selected were perceived as less accurate than the real headlines ($M_{\text{fake}} = 1.79$, $SD = .37$; $M_{\text{real}} = 2.57$, $SD = .37$, $p < .001$, 95% CI [.81-.74]). Among individuals who reported that they sometimes share news over social

media ($n=350$), willingness to share fake news was lower than real news ($M_{\text{fake}} = 2.43$, $SD = .47$; $M_{\text{real}} = 2.80$, $SD = .46$; $p < .001$, 95% CI [.33-.41]).

As in Study 1, there were no differences between men and women in scores on the fake/real news task. Replicating Study 1 findings, negative correlations were found between age and the ability to discriminate between real and fake news ($r_{(502)} = -.14$, $p = .002$) and between age and accurate recognition of real news ($r_{(502)} = -.17$, $p < .001$). Positive correlations between Truth-discrimination and education level ($r_{(502)} = .12$, $p < .009$) and income level ($r_{(502)} = .13$, $p = .006$) were found.

Intercorrelations between demographic measures, ETMCQ

Study 1

Table 2S: Summary of Spearman intercorrelations of ETMCQ subscales, conspiracy beliefs, score on the CRT and demographic measures.

	1	2	3	4	5	6	7	8
1. Trust	---	-.18***	.14***	.01	-.02	-.19***	-.001	.05
2. Mistrust		---	.34***	.30***	.004	-.17***	-.08*	.001
3. Credulity			---	.23***	-.12*	-.20***	-.06	-.07
4. CMQ				---	-.18***	-.13**	-.09*	-.03
5. CRT					---	.01	.13**	.15**
6. Age						---	-.05	.02
7. Annual income							---	.24***
8. Education level								---

Note: CRT = cognitive reflection test; CMQ = conspiracy mentality questionnaire; ETMCQ = epistemic trust, mistrust and credulity questionnaire.

* $p < .05$

** $p < .01$

*** $p < .001$

Study 2:

Table 3S: Summary of Spearman intercorrelations of ETMCQ subscales, conspiracy beliefs, score on the CRT and demographic measures.

	1	2	3	4	5	6	7
1. Trust	---	-.33***	.04	-.03	-.12**	.06	.05
2. Mistrust		---	.33***	.10*	-.16***	-.13**	.01
3. Credulity			---	.15**	-.11*	-.04	-.07
4. DD				---	.03	-.14**	-.08
5. Age					---	-.11*	.08
6. Annual income						---	.22***
7. Education level							---

Note: DD: Delay Discounting; ETMCQ = epistemic trust, mistrust and credulity questionnaire.

* $p < .05$

** $p < .01$

*** $p < .001$

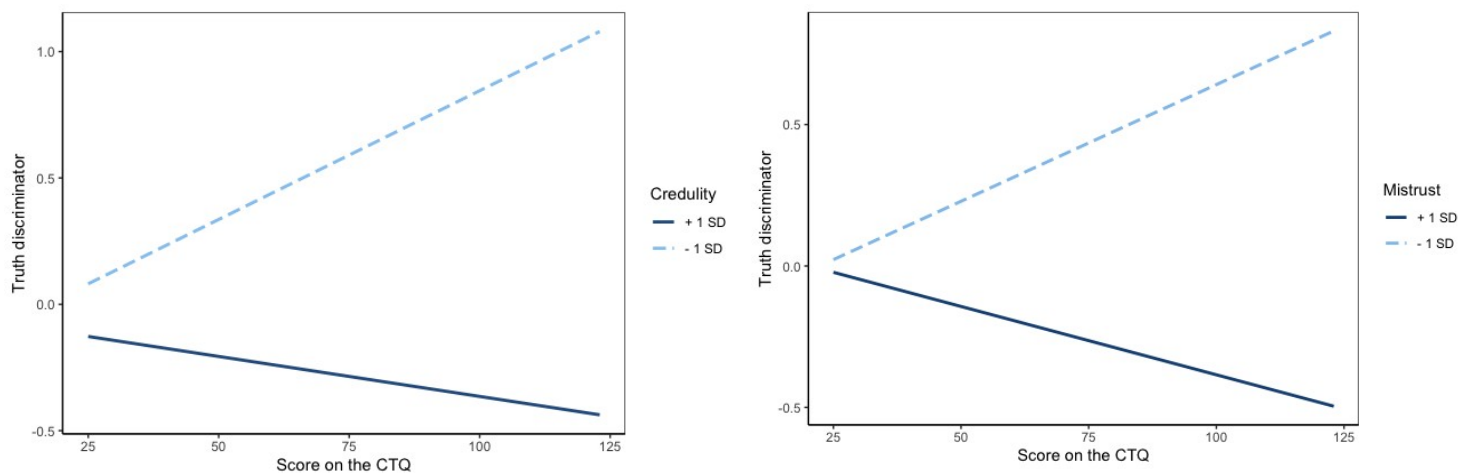
Post hoc moderation analysis: ED, Childhood adversity and Truth discrimination.

Study 1

A post-hoc moderation analysis, controlling for age, sex, level of education, CRT and annual income, revealed a significant interaction between Credulity and number of childhood trauma events ($F(8,654) = 6.92, p < .001, Adjusted R^2 = .08; t = -2.23, b = .01, SE = .003, p = .03$). Closer examination of the simple effects showed that individuals with high Credulity and elevated trauma events (i.e., 1sd above mean) were less able to distinguish real from fake news than those with low Credulity and elevated childhood trauma ($SE = .06, t = -4.56, p < .001$; Figure 1). Importantly, this difference between high and low Credulity was not significant for individuals with low adversity ($SE = .06, t = -1.40, p = .16$; Figure 1). In addition, for individuals with low Credulity (1sd below mean), there was a significant simple effect of adversity suggesting that those with elevated childhood trauma events were better at discriminating real from fake news than with low trauma ($SE = .00, t = 2.09, p = .04$). This effect in relation to low versus high trauma was not found for individuals with high Credulity

($SE = .00$, $t = 1.03$, $p = .31$). A similar pattern of interaction was found with Mistrust and trauma events ($F(8,654) = 5.70$, $p < .001$, $Adjusted R^2 = .06$; $t = -2.45$, $b = -.01$, $SE = .003$, $p = .01$). There was no moderation effect with Trust.

Figure 1S. Moderation effects of Credulity (A) and Mistrust (B) on the relationship between childhood trauma events (CTQ) and truth discrimination, controlling for age, sex, level of education, annual income and CRT.



A.

Main analysis Fake news task controlling for delay discounting

Study 2.

Table 4S: Linear multiple regression of ETMCQ subscales on the fake/real measures, controlling for sex, education, income and age.

Dependent variable - Truth discrimination							
Independent	<i>b</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	Collinearity	VIF
Variables						Tolerance	
Trust	.05	.07	.77	1.26	.44	.79	1.26
Mistrust	-.11	.07	-1.53	-.41	.13	.70	1.44
Credulity	-.12	.07	-2.13	-3.30	.03	.82	1.21
DD	-.24	.06	-2.90	-1.96	.004	.95	1.05
Dependent variable – Fake accuracy (False alarm)							
Trust	0.00	.01	.02	.43	.59	.79	1.26
Mistrust	0.02	.01	.11	.32	.04	.70	1.43
Credulity	0.02	.01	.14	2.73	.006	.82	1.21
DD	0.02	.01	.07	1.53	.13	.95	1.05
Dependent variable – Real news accuracy (Hit)							
Trust	0.2	.01	.08	1.48	.14	.79	1.26
Mistrust	0.01	.01	.01	0.11	.91	.70	1.43
Credulity	0.01	.01	.01	-1.87	.91	.82	1.21
DD	-0.03	.01	-.10	-2.02	.04	.95	1.05

Note: DD = Delay discounting; ETMCQ

Percentage of participants reporting on conspiracy beliefs in relation to COVID-19 conspiracy beliefs

Study 1

In total, 19% (n=135) of participants in the current sample highly agreed (agreed a lot or agreed completely) with at least one of the specific COVID-19 conspiracy beliefs and 26% (n=180) highly agreed with at least one general conspiracy belief. 63% (n=480) highly agreed with at least one of the official explanations.

Study 2

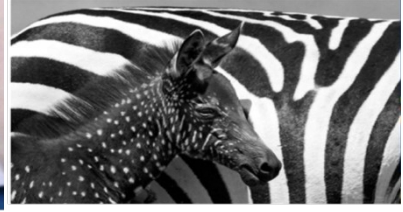
85% (n=426) of participants in the current sample highly agreed to having the COVID-19 vaccine if offered ('6' or '5' on a Likert scale), while 7% (n=35) disagreed to have it ('1' or '2'). In relation to confidence in the safety and efficacy of the COVID-19 vaccination programme, 72% (n=377) of participants in the current sample showed high confidence ('6' or '5') in the programme, while 19% (n=94), showed moderate confidence ('4' or '3') and 7% (n=31) showed low confidence ('2' or '1').

Stimuli used in the fake news task

A turtle was deformed by a plastic ring in the water
The turtle apparently became trapped in the ring when it was younger and grew around it
greeducationfoundation.org



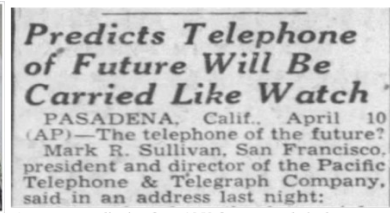
Diamond engagement ring found in vegetable garden 13 years after going missing
A Canadian woman got an extra carrot with her diamond ring when it was found in her vegetable patch 13 years after she lost it
eveningtelegraph.co.uk



Zebra was born with dots instead of stripes
Zebra born at Mara National Reserve in Kenya in 2019
Masaimara.com



Hitler's Austrian birthplace will be home for disability charity BBC News
The house where Adolf Hitler was born will remain standing, Austrian MP's have decided
BBC.com



A newspaper clipping from 1953 features a relatively accurate prediction about future telephones
The rotary telephone was still being used in 1953
Newspapers.com



Yahoo suffers world's biggest hack affecting 1 billion users
Yahoo has discovered a 3-year-old security breach that enabled a hacker to compromise more than 1 billion users accounts.
ABCNEWS.com



It is significantly more expensive to send a child to prison than it is to send them to Eton
The annual price per place for child ranges from £76K-£210K, while the full annual fee for Eton College is just over £40K a year
novamedia.co.uk



Woman who had ovary frozen in childhood gives birth
She is believed to be the first woman in the world to have a baby after having ovarian tissue frozen before the onset of puberty
CBSNEWS.com



More than a third of girls in school uniform sexually harassed in public, survey reveals
Eight per cent of school girls said they had been filmed or photographed by a stranger without their permission
telegraph.co.uk

Fake



Was a Live Morgue Employee Cremated by Mistake?
 "While he was sleeping, another employee mistook him for the corpse of a 52-year old car accident victim and carried him to the crematory."
Worldnewsdailyreport.com



New Jersey Brother and Sister Allowed to Marry After Lengthy Court Battle
 New Jersey brother and sister have won the right to marry after a landmark ruling by the Supreme Court of the United States.
nbcnews.com



China is making corned beef with dead bodies, then selling the products to Africa.
 A source on Facebook exposed the secret of a company that used dead people in production of corned beef
nairaland.com



Because of lack of men, Iceland gives \$5000 per month to immigrants who marry Icelandic woman!
 Iceland team was able to make an unprecedented achievement in the European council
thespiritofwhispers.com



Fake cigarettes are being sold and killing people. Here is how to spot counterfeit packs
 Scammers have recently been targeting those who have the already expensive habit by placing cheap cigarettes in name-brand cartridges, and gas stations are selling them.
THECONTROVERSIALFILES.NET



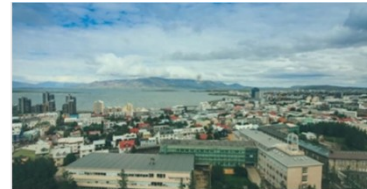
Woman who have had 10 or more sexual partners face DOUBLE the risk of cancer
 Researches found that having 10 or more sexual partners over a lifetime almost doubles the risk of women developing cancer
thetopline.com



Wolf whistling to be made HATE CRIME in Britain
 Wolf whistling is set to be classed as a hate crime
dailystar.co.uk



Several hundred birds found dead
 Attempts to test 5G in the Netherland resulted in the death of 297 birds in a park in The Hague
THEHAGUE.COM



Iceland declares all religions are weapons of Mass Destruction
 Iceland declares all religions dangerous
PATHOES.COM



Santiago Flight 513 Disappear in 1954 Only to Land in 1989
 A missing airliner (Santiago Flight 513) mysteriously landed 35 years later with a cockpit and passenger cabin full of skeletons.
bbs.com