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Vulnerability to Online Political Misinformation: The Role of Non-clinical Schizotypal Traits

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<https://doi.org/10.34737/wyy68>

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Vulnerability to Online Political Misinformation:
The Role of Non-clinical Schizotypal Traits

JAMES KEMPLEY

A thesis submitted in partial fulfilment of the requirements of the University of
Westminster for the degree of Doctor of Philosophy

July 2024

Abstract

While rumours, lies, and propaganda are nothing new, the rise of online misinformation brings with it new challenges and concerns. Online misinformation has become particularly problematic due to its global reach and the incredible speed at which it can spread. Furthermore, it has been suggested that the propagation of online misinformation often results from the actions of regular social media users who encounter such content organically and choose to engage with it (i.e., interact via online behaviours such as commenting, “liking”, and sharing). As with any viral content hosted on social media platforms, misinformation that attracts sufficient user engagement is algorithmically promoted to others, further increasing its spread and exposing more individuals to false information. Therefore, the most concerning online misinformation is characterised not only by an ability to deceive its audience, but also an ability to entice engagement behaviour from social media users.

This doctoral project aimed to explore individual differences as predictors of vulnerability to online misinformation. Drawing upon cognitive theories of misinformation vulnerability and established research into individual differences associated with receptivity to socio-political conspiracy theories, the current project sought to explore schizotypal personality traits as potential predictors of belief and engagement toward online political misinformation. The project also sought to investigate the potential significance of specific cognitive biases associated with schizotypal cognition that might serve to facilitate this hypothesised relationship, as well as other dispositional traits related to schizotypy (e.g., nonclinical autism-like traits, the need for cognitive closure, and the expression of a conspiratorial worldview). Furthermore, the project also sought to address the potential moderating effects of schizotypal traits on established intervention techniques designed to reduce individual receptivity to online misinformation (i.e., do schizotypal traits influence intervention efficacy?).

Across four individual studies (total n = 1161), politically partisan participants from the US were recruited and exposed to political news content previously published on social media platforms (some being factually accurate, others being examples of political misinformation). Participants were asked to: 1) report their desire to engage with the online content (i.e., “like”, comment, share, or react using an emoji), and 2) rate the factual accuracy of the presented information (i.e., the extent to which they believed the presented claims to be accurate). These ratings were then used as indicators of misinformation vulnerability in subsequent analyses and explored alongside a range of other measures collected across the four studies.

Study 1 involved the recruitment of right-wing participants who completed a brief measure of schizotypal personality traits (the Schizotypal personality questionnaire – Brief Revised Updated), nonclinical autism-like traits (the Autistic Spectrum Quotient – 9), and two performance-based measures of cognitive reflection (the Cognitive Reflection Test and the Cognitive Reflection Test 2). These measures were then explored as predictors of misinformation vulnerability in a series of regression models.

In Study 2 both left and right-wing participants were recruited and asked to complete the same measures used previously in Study 1, as well as an additional performance-based measure designed to assess the presence of a “jumping to conclusions” reasoning bias (a computerised adaptation of The Beads Task). Once again, these variables were explored as predictors of misinformation vulnerability.

Study 3 focused only on right-wing participants and used a different measure of schizotypal personality traits (the Multidimensional Schizotypy Scale – Brief), alongside a brief measure of individual need for cognitive closure (Brief Need for Closure Scale) and endorsement of a generalised conspiratorial worldview (Generic Conspiracy Beliefs Scale). The relationship between these measures and misinformation vulnerability was explored using regression and mediation analyses.

Study 4 retained a focus on right-wing participants and once again included the Multidimensional Schizotypy Scale – Brief and Generic Conspiracy Beliefs Scale as variables of interest. This study’s primary goal was to explore the potential moderating influence of positive schizotypy traits on a content-flagging intervention previously demonstrated to reduce vulnerability to online misinformation. The efficacy of the intervention was first established using ANCOVA while controlling for positive schizotypy, followed by moderation analyses to assess the impact of positive schizotypy on intervention effectiveness.

The findings of the regression analyses indicated that positive schizotypal traits were a robust predictor of misinformation engagement, with greater engagement associated with elevated levels of positive schizotypy. It was also demonstrated that positive schizotypy often acted as a significant predictor of misinformation belief, however this relationship was comparatively weaker and appears to have been partially mediated by the expression of a conspiratorial worldview. Furthermore, the experimental findings of Study 4 indicated that anti-misinformation intervention techniques based on content-flagging remained effective at reducing belief and engagement towards political misinformation, regardless of an individual’s expression of positive schizotypal traits.

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Acknowledgements

I would like to express my sincere gratitude to my supervisory team for all their support throughout this project. Your guidance and advice were instrumental in making the experience of doctoral research as rewarding and enriching as it has been. I would particularly like to thank my director of studies Professor Tom Buchanan for all the help and support he has extended to me since the very beginning of this process. I feel privileged to have had such a kind and knowledgeable mentor guide me through the sometimes-bewildering world of academia. Thank you, Tom. I really don't think I could have done this without you.

I would also like to extend my appreciation to both the University of Westminster and the Quintin Hogg Trust for providing me the opportunity and financial support to pursue my doctorate. The experience has been truly life changing and I will be forever grateful.

Thanks to all my family and friends for your unwavering patience, support, and encouragement that has been offered to me throughout my PhD. Your faith in me has been a great source of comfort, especially when I found myself struggling.

My biggest thanks go to my partner Ellie. Words cannot do justice to the level of support and love you have shown me throughout this process. I would be lost without you.

Finally, I would like to dedicate this thesis to the memory of Bella, who passed away in November 2022. I miss you.

Authors Declaration

I declare that all the material contained in this thesis is my own work.

Definitions

AD ASD: ASD-like traits “Attention to Detail”

ASD: Autism Spectrum Disorder

BADE: Bias Against Disconfirmatory Evidence

BAP: Broad Autism Phenotype

CP schizotypy: Cognitive-perceptual schizotypy traits

CRT: Cognitive Reflection Test

D Schizotypy: Disorganised schizotypy traits

DT: Dark Triad

FFM: Five Factor Model

IP Schizotypy: Interpersonal schizotypy traits

JTC: Jumping to Conclusion

LW: Left-Wing

MS2R: Motivated System 2 Reasoning

RW: Right-Wing

SA schizotypy: Social anxiety schizotypy traits

SC ASD: ASD-like traits “Social Communication”

Chapter 1: Introduction

The proliferation of incorrect, inaccurate, and misleading information on the internet (i.e., online misinformation) presents a growing concern worldwide. Online misinformation has contributed to the spread of inaccurate beliefs regarding critical social, scientific, and public health issues, while also promoting problematic behaviour in the “offline” world (Muhammed & Mathew, 2022; Treen et al., 2020; Van Der Linden, 2023). Online misinformation also poses a significant challenge to the future of democratic institutions, as political discourse and voter behaviour become increasingly influenced by falsehoods spread online (Bennett & Livingston, 2018; Howard, 2020; Woolley & Howard, 2019).

Therefore, it is crucial that we gain a better understanding of how online misinformation spreads, the factors that allow misinformation to deceive effectively, and why some individuals seem more vulnerable to its influence than others. Once researchers understand how online misinformation functions and identify the risk factors associated with individual vulnerability, it may be possible to implement countermeasures and intervention strategies that reduce the efficacy of online misinformation content and mitigate its broader impact on society. The current project will seek to contribute to this endeavour by exploring individual differences in cognition and temperament as potential predictors of misinformation vulnerability.

1.1 Summary of project goals

This doctoral research project aims to further our understanding of how individual differences in temperament and cognition might influence vulnerability to online misinformation. It is hoped that the findings of the project will contribute towards answering the following questions:

- 1) Why do some individuals believe online misinformation when others do not?
- 2) What motivates individuals to contribute to the spread of online misinformation?

The project will attempt to address these questions by exploring the potential role of individual differences previously associated with conspiratorial cognition (e.g., schizotypal personality traits) and other factors thought to influence reasoning processes.

This introductory chapter will establish the background, rationale, and key concepts that underlie the project's goals and methodology. First, the terminology surrounding false and misleading

online content will be clarified, followed by a summary of how the threat of online misinformation has evolved over time. Next, an overview of the risks and problematic outcomes associated with the contemporary online misinformation crisis will be discussed, followed by an introduction to the potential role of cognitive bias, personality, and political partisanship in promoting misinformation vulnerability. Finally, the rationale for exploring individual differences drawn from existing research into conspiracy theories and reasoning biases will be outlined, followed by the formalisation of the project's research questions and a summary of the thesis structure.

1.2 Clarification of terminology

When discussing false and misleading information disseminated online, terms such as "fake news", misinformation, and disinformation are often used interchangeably. While these terms describe similar concepts, it is worth taking a moment to define their meaning for the purpose of clarity.

First, it is worth noting that not all misleading information is false. Sometimes accurate information can also be used to purposely mislead, deceive, or inflict harm on others. This deceptive use of accurate information is known as *malinformation* (Grimes & Gorski, 2022; Wardle & Derakhshan, 2017). Examples of malinformation include the use of statistics and other metrics presented in a misleading context, cherry-picking facts to establish a false narrative, and the misrepresentation of video/images (e.g., in the aftermath of the 2017 London Bridge terror attack, an image was circulated on social media without relevant context which resulted in the Islamophobic harassment of one of the bystanders; Evon & Mikkelsen, 2017).

Fake news has been defined as "news content published on the internet that aesthetically resembles actual legitimate mainstream news content, but that is fabricated or extremely inaccurate" (Pennycook & Rand, 2021, p.389). Concern over fake news began to reach mainstream awareness in 2016 due to suggestions that such content may have influenced the outcomes of the UK Brexit Referendum and the 2016 US Presidential Election (Allcott & Gentzkow, 2017; Lazer et al., 2018). However, the term itself has become highly politicised and has been used to disparage legitimate news coverage that does not complement one's political agenda (Brummette et al., 2018; Rojas, 2021). Although the term is politically loaded, it does remain useful when specifically describing

falsified information that is designed to emulate the appearance of legitimate news articles. However, it is generally best to avoid politically loaded terms if viable alternatives are available.

The more general term *misinformation* describes any information that is "false, inaccurate, or misleading" (Pennycook & Rand, 2021, p.389). Misinformation can stem from many sources, including logical errors, rumours, misconceptions and "honest mistakes". In contrast, the term *disinformation* is used to describe a subset of misinformation that is purposely spread with the intention to deceive others and achieve a specific (often malicious) outcome (Fallis, 2015). Common examples of disinformation include political propaganda, hoaxes/scams, and hyper-partisan news coverage.

However, conclusively discerning disinformation from misinformation can be a difficult task. To definitively classify misleading, false, or inaccurate information as disinformation, we must be aware of the intention of the communicator (i.e., to intentionally deceive). Outside of cases where known disinformation agents have been identified as the original producers and propagators, it is very difficult to distinguish whether someone is spreading inaccurate information knowingly. Even in the case of highly misleading hyper-partisan news coverage, it is hard to conclusively prove that the "spinning" of a news event to suit a political agenda is a result of a deliberate attempt to mislead, as opposed to other explanatory factors such as unconscious bias, poor critical thinking abilities, or journalistic incompetence. Additionally, the distinction between disinformation and other types of misinformation becomes blurred when considering that successful disinformation campaigns will likely result in a subsequent fallout of misinformation, whereby individuals who were exposed to the initial disinformation message go on to spread the information themselves after coming to believe it to be true.

Therefore, in the pursuit of clarity, the term misinformation will generally be used in the current project when referring to any type of misleading, false, or inaccurate information.

1.3 How has the threat of online misinformation developed over time?

Concerns over the internet becoming a conduit of misinformation stem back to the early days of mass adoption. These early anxieties over online misinformation tended to focus on the potential for "hackers" to cause disruption and economic damage by spreading false or manipulated information via email and websites (Basso, 1997; Fitzgerald, 1997; Mintz, 2002). For example, in 1999 a group of individuals created a counterfeit version of Bloomberg.com that was successfully used to spread false financial information among traders and manipulate stock prices (McKenzie, 1999). Early internet researchers also made prophetic warnings of the pending arrival of "electronic bandits" who would seize upon new opportunities to engage in fraud and deception using the rapid advancements that were occurring in communication and media technology (Heron, 1995).

In an early report on the subject, Piper (2001) outlined four primary sources of online misinformation, implicating 1) commercial websites using misinformation in their marketing strategies, 2) parody websites, 3) hacked websites, and 4) malicious counterfeit websites (e.g., the website martinlutherking.org was once secretly operated by the white nationalist organisation StormFront and used to spread white supremacist propaganda). Medical professionals also started becoming concerned over the potential harm of online health misinformation, as it was thought to play a role in promoting inaccurate and dangerous guidance to the public on the management of cancer and other serious illnesses (Crocco et al., 2002a; 2002b), illicit drug use (Brush et al., 2004; Boyer et al., 2001), and vaccine safety (Anderson & Wexler, 2005; Kata, 2010).

Jumping forward to the present day, we can see that the threat of online misinformation has changed dramatically. While exposure to online misinformation in the early days of the internet would require visiting a misleading website or being receptive to the content of unsolicited emails, now misinformation is automatically presented alongside factual information on social media platforms (Muhammed & Mathew, 2022; Tandoc et al., 2018). There is also emerging evidence to suggest that the "social" components of social media (i.e., the inclusion of options to publicly engage with content) might negatively influence truth discernment, leading to individuals becoming more susceptible to false information than they otherwise would outside of a social media setting (Epstein et al., 2023). Furthermore, while social media has come to rival the dominance of traditional media outlets (Auxier & Anderson, 2021), these platforms have failed to implement equivalent regulatory policies aimed at reducing harmful practices such as exploitative child advertising, political propaganda, hate speech,

and the dissemination of misinformation (Kelly et al., 2015; Napoli, 2019; Persily & Tucker, 2020; Radesky et al., 2020; Sacks & Looi, 2020).

The influence of algorithmically selected content informed by psychological and behavioural profiling (i.e., targeted content) has further contributed to the online misinformation problem (Fernandez & Bellogin, 2020; Shin & Valente, 2020). For example, targeted social media content appears to contribute to an "echo chamber" effect whereby individuals are disproportionately exposed to news and opinions that align with their existing beliefs, while dissenting opinions are suppressed (Pariser, 2011; Srba et al., 2023). These echo chambers subsequently create an artificial sense of social consensus within digital communities that can result in the promotion of unchecked misinformation (Valenzuela et al., 2019). Additionally, those who are profiled as being receptive to misinformation content tend to be exposed to even more misinformation via suggested content, putting an already vulnerable group at increased risk of deception, manipulation, and exploitation (Acerbi, 2019; Giansiracusa, 2021; Kozyreva et al., 2020).

In summary, due to the increased dominance of social media, a relative lack of regulation, and the influence of platform infrastructure, online misinformation appears to be becoming an increasingly concerning social problem.

The following section will give a brief overview of the types of modern misinformation that are commonly encountered online, along with some of the major concerns associated with the unfolding misinformation crisis.

1.4 The contemporary misinformation crisis

Contemporary online misinformation comes in a variety of modalities, ranging from captioned images (i.e., "memes") to text, audio, and video (Abdali, 2022; Smith, 2019; Sundar et al., 2021). Modern online misinformation also touches upon a wide range of subjects (for a recent systematic review see Pérez Escolar et al., 2023). For example, health misinformation remains prominent (Krishna & Thompson, 2021; Swire-Thompson & Lazer, 2020; Suarez-Lledo & Alvarez-Galvez, 2021) and commonly touches on topics such as exercise and diet (Dedrick et al., 2020; Lofft, 2020; Marocolo et al., 2021), vaccine safety (Garett & Young, 2021), and the efficacy of alternative medicine for serious illness (Chou et al., 2018; Peterson et al., 2020). Science misinformation is also commonly found online (Scheufele & Krause, 2019), including inaccurate claims about climate change (Allgaier, 2019; Treen et al., 2020) and the promotion of pseudoscientific theories (e.g., flat earth theory; Mohammed, 2019).

Perhaps the most disruptive and socially problematic manifestation of online misinformation is political misinformation, as it has been suggested to be significantly contributing to social division, hyper-partisanship, and fears over the distortion of the democratic process (Bennett & Livingston, 2018; Tucker et al., 2018). The rise of online political misinformation has also been tied to the increasing popularity of political extremism, including the emergence of the "alt-right", a political movement that shares a disconcerting similarity to fascism due to its embracement of white nationalism, pseudoscience, misogyny, anti-LGBT beliefs, and conspiracy theories (Dafaure, 2020; Hermansson et al., 2020; Marwick & Lewis, 2017). Furthermore, social media platforms have been accused of creating an alt-right radicalisation pipeline, whereby content algorithms drive users from popular entertainment content to increasingly extreme political media (Lewis, 2018; Munn, 2019, Ribeiro et al, 2020).

Online political misinformation has also been shown to directly lead to negative real-world consequences. For example, on January 6th 2021, inaccurate and politically motivated claims of widespread election fraud (spread primarily online, but also supported by hyper-partisan news outlets) contributed to a seditious riot at the US Capitol, leading to widespread injury and several deaths (Munn, 2021). Furthermore, online political misinformation has been implicated as a major contributing factor toward the growing trend of right-wing terrorism and politically motivated violence (Hutchinson et al., 2023; Liang & Cross, 2020; Piazza, 2022; Wahlström & Törnberg, 2021).

The impact of online misinformation in the political domain has become so problematic that it has been identified as a significant threat to the future of liberal democracy (House of Commons Digital, Media, Culture and Sport Committee, 2019). The influence of online misinformation has significantly contributed to reduced trust in traditional institutions of authority, increased polarisation of social groups, and the emergence of a "post-truth" culture in which objective reality is perceived as a matter of opinion (Gilchrist, 2018). Just as concerning is the ongoing trend of weaponising online misinformation by nation-states and private mercenary groups, with the aim of causing political and civil disruption or manipulating the outcome of democratic processes (Bradshaw et al., 2021). Such conditions are not suitable for a healthy democracy to flourish, as a central guiding principle of democracy is that the voting public should have access to accurate information to guide their choice of political endorsements (Chambers, 2021). Furthermore, anti-democratic ideologies such as fascism rely on the proliferation of lies and misinformation to indoctrinate followers (Finchelstein, 2020), making the "post-truth" online environment and its tolerance for misinformation an effective medium to promote such beliefs. Upon reflection, it is evident that the proliferation of online misinformation poses a significant problem that if left unaddressed threatens to undermine public safety, liberal democracy, and perhaps even the very notion of "truth".

1.5 Online misinformation vulnerability: Belief and Engagement

To combat the wider impact of online misinformation, we must first understand how this type of content can influence an individual's thoughts and behaviour and how these effects might further contribute to the ongoing problem. When considering vulnerability to the negative consequences of exposure to online misinformation, there are at least two important outcomes to consider: 1) *Belief* (i.e., the extent to which individuals believe the erroneous information to be accurate), and 2) *Engagement* (i.e., the extent to which individuals perform online behaviour that contributes toward the spread of the misinformation content to others). Both outcomes contribute to the continuation of the online misinformation problem in different ways and carry with them their own set of negative consequences.

1.5.1 The consequences of belief in misinformation

The dangers of believing in misinformation are relatively simple to understand; individuals who are misinformed will be more likely to make decisions and perform actions based on inaccurate beliefs. Possessing accurate beliefs allows individuals to better adapt to environmental demands and challenges while effectively looking out for their own well-being (Oliver & Wood, 2014). Therefore inaccurate knowledge is detrimental to one's ability to adaptive, thrive, and survive.

A poignant example of this principle was observed during the recent coronavirus pandemic, which was subject to a great deal of online misinformation (Ahmed et al., 2020; Ferrara, 2020; Mian & Khan, 2020; Shahsavari et al., 2020). Conspiratorial narratives quickly spread on social media, ranging from claims that the outbreak was an engineered bioweapon to the idea that the COVID-19 vaccines contained mind-control technology facilitated by 5g mobile communications network. These conspiracy theories had tangibly negative effects on both believers and the wider public, motivating individuals to reject scientific and medical guidance on the use of vaccines, face masks, and social distancing (Akther & Nur, 2022; Imhoff & Lamberty, 2020; Swami & Barron, 2020). It has subsequently been shown that the use of face masks, vaccines, and social distancing all significantly contributed to the reduction of COVID-19 mortality (Motallebi et al., 2022; Qian & Jiang, 2022; VoPham et al., 2020; Watson et al., 2022), implying that inaccurate beliefs around COVID-19 likely resulted in people losing their lives.

Beyond influencing actions for self-preservation, beliefs also guide our perception of reality, with the interpretation of experiences and world events generally being shaped by our personal belief system (i.e., worldview; Hayes et al., 2015; Heine et al., 2006; Hornsey, 2021; Kahan, 2015). Therefore,

inaccurate beliefs integrated into one's worldview can result in the generation of additional inaccurate beliefs and misinterpretations of real events, as individuals attempt to fit their experiences into an inaccurate framework of beliefs.

Furthermore, when otherwise reasonable individuals are indoctrinated into believing inaccurate information, they can become motivated to carry out actions that seem strange or extreme to outside observers. For example, in 2016 a 28-year-old man was arrested in Washington DC after driving 350 miles from his home in North Carolina to confront the staff of a pizza restaurant armed with an automatic rifle (Fisher et al., 2016). The man claimed he was there to free children from an occult child sex trafficking ring that was being operated out of the restaurant in collaboration with Hillary Clinton and other politicians. Once apprehended, it was reported that this man was not suffering from any psychotic disorder, nor was he under the influence of any illicit drugs that might explain his bizarre behaviour. Instead, his actions were motivated by a sincere belief in the "pizzagate" online conspiracy theory (see Bleakley, 2023), and his intentions were solely to free captive children from satanic human traffickers. Incidents like this demonstrate how inaccurate beliefs can result in dangerous actions stemming from benevolent intentions and how extreme behaviour might seem reasonable given a sufficiently distorted interpretation of reality.

It should also be noted that not all factually inaccurate beliefs have significant negative consequences. For example, it has been argued that belief in spirituality and religion has benefits to well-being and quality of life (Baker, 2003; Barton & Miller, 2015; Shaw et al., 2005). However, when inaccurate beliefs relating to pressing social, environmental, and existential issues become widespread, the consequences can be dangerous (especially when individuals who possess these beliefs actively hinder attempts to implement meaningful solutions; Ekberg et al., 2022; James, 2019).

Therefore, in order to mitigate these negative consequences, it is important to understand how online misinformation can successfully deceive individuals and, if possible, develop measures to disrupt the underlying mechanisms that facilitate the process.

1.5.2 The consequences of engagement with misinformation

One of the unique problems with online misinformation is the astounding speed at which it can spread across social networks. Like other types of "viral" online information, misinformation that is sufficiently attention-grabbing, topical, or otherwise appealing can spread very quickly across social networks through a combination of virtual word-of-mouth and being "broadcast" by highly influential

individuals (Goel et al., 2016). In fact, it has been suggested that misinformation on social media platforms can often spread further and quicker than accurate information (Vosoughi et al., 2018).

Despite concerns over professional trolls and bots being primarily responsible for sustaining the proliferation of online misinformation on social media platforms, research seems to contradict this theory. While professional trolls, bots, and other disinformation agents have been shown to be particularly active in sowing the seeds of online misinformation content (Hindman & Barash, 2018; Sanovich, 2017; Shao et al., 2018; Wang et al., 2018b), the successful spread of misinformation on social media platforms appears mostly driven by the subsequent actions of regular users who encounter the information and feel compelled to share or otherwise engage with it (in turn algorithmically increasing the content's visibility to others in related social networks; Buchanan & Benson, 2019; Vosoughi et al., 2018). This effect of content amplification driven by user interactions is known as "organic reach" (Facebook, 2019) and outlines the process through which online misinformation can spread among like-minded online communities.

Interrupting organic reach for online misinformation might therefore be a viable strategy to reduce its negative social impact, as reduced reach would result in lower levels of misinformation exposure to others in related social networks. Reducing the amount of misinformation that individuals are exposed to on social media is important for two reasons: 1) doing so reduces the opportunity for vulnerable individuals to become misinformed, and 2) there is evidence to show that repeated exposure to misinformation increases its perceived believability (Gibbons et al., 2005), suggesting that long term exposure might compromise one's ability to accurately discern reliable information.

It is worth noting that most people do not engage with social media content of any kind (Cucu, 2023) and that engagement rates for misinformation tend to be lower than those for accurate content (Pennycook & Rand, 2021). Previous research has indicated that roughly 10%-20% of social media users actively share misinformation (Barthell et al., 2016; Chadwick & Vaccari, 2019; Guess et al., 2019). In contrast, the frequency of those who engage with online misinformation in the broader sense (including sharing and other actions such as commenting, "liking", etc.) has not been well established. However, as evidence suggests that all engagement behaviours are significantly intercorrelated and that sharing may be among the least common among them (see Buchanan, 2021; Buchanan & Benson, 2019; McClain, 2019), it is possible that misinformation engagement occurs at a similar (if not greater) frequency compared to sharing behaviour alone.

Therefore, to reduce the spread of online misinformation (thereby reducing overall levels of misinformation exposure), it is important to develop a firm understanding of the factors that promote engagement behaviour, including individual differences associated with a tendency to engage with misinformation content.

1.6 Individual differences and misinformation vulnerability

Researchers have an important role to play in mitigating the social impact of online misinformation, both by improving our understanding of the phenomenon and by developing intervention strategies. An important step toward both these goals is identifying individual differences that are associated with heightened vulnerability to online misinformation, both in terms of belief and engagement. Emerging research suggests that online misinformation vulnerability may be associated with individual differences relating to political identity, personality, and cognitive style. These findings will be briefly introduced, followed by a discussion on the potential benefit of drawing from the related field of conspiracy theory research when exploring potentially relevant individual differences (e.g., schizotypy). Afterward, the rationale behind the potential relevance of non-clinical autism-like traits will also be outlined. Finally, the potential moderating influence of schizotypy on existing anti-misinformation interventions will be introduced.

1.6.1 Political identity

Political identity (i.e., partisanship) has been shown to play a significant role in moderating vulnerability to political online misinformation (Pereira et al., 2021; Sanchez & Dunning, 2021a; Van Bavel & Pereira, 2018), with individuals tending to believe and engage with misinformation when it is either congruent with their own political beliefs or derogatory toward the beliefs of their political opponents. Furthermore, those who strongly identify with a partisan identity and harbour feelings of hostility for opposing ideologies have been shown to be particularly vulnerable to online misinformation when the content is unfavourable toward their ideological "enemies" (Lobato et al., 2020; Osmundsen et al., 2021; Pennycook & Rand, 2019a).

1.6.2 Personality

While personality has been defined in a variety of ways, the definition that will be utilised in the current project will be that suggested by Bergner (2020): "An individual's personality is the enduring set of Traits and Styles that he or she exhibits, which characteristics represent (a) dispositions (i.e., natural tendencies or personal inclinations) of this person, and (b) ways in which this person differs from the "standard normal person" in his or her society." (p. 4).

Perhaps the most influential contemporary personality model is the Five-Factor Model (FFM), or "Big Five," which breaks down personality into five core dimensions: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (McCrae & Costa, 2008). Alternative models such as the six factor HEXACO model have also been suggested (Ashton & Lee,

2007), however the FFM has been so extensively researched and validated that it has widely come to be treated as the “gold standard” in personality research (Kabigting, 2021).

Some have voiced concern that the FFM risks oversimplifying the complex nature of human personality, potentially neglecting other significant personality constructs (Block, 2010). Additionally, the model's reliance on lexical approaches, which are grounded in language and self-report questionnaires, may not fully capture the depth and complexity of individual dispositions and characteristic (Cheung et al., 2011). However, despite these concerns and the availability of alternative models, research investigating the relationship between personality and receptivity to online misinformation has almost exclusively utilised the FFM (see Calvillo et al., 2024).

For example, Buchanan and Benson (2019) demonstrated that lower levels of the personality trait agreeableness were associated with increased engagement with misinformation content. Agreeableness is generally associated with prosocial behaviour and a reluctance to cause social conflict (Graziano, 1995) and, therefore, might be particularly relevant to the endorsement of controversial misinformation on social media (i.e., agreeable individuals may be less likely to share or comment on misinformation content that might upset other people). Research has also implicated the cluster of low-agreeableness traits known as the Dark Triad (DT) as correlates of belief in conspiratorial narratives (March & Springer, 2019) and receptivity to misinformation (Buchanan & Kempley, 2021; Enders et al., 2023; Escolà-Gascón, 2020).

These findings imply that individual differences in personality (especially those that reflect aspects of social regulation) may be a viable target for further investigation as potential correlates of misinformation vulnerability. Furthermore, in line with Bergner's definition of personality, researchers should broaden the range of traits and styles considered when exploring individual dispositions and differences among people.

1.6.3 Cognitive style and reasoning biases

One of the more well-established individual differences associated with online misinformation vulnerability relates to cognitive style and the dual-process model of reasoning.

The dual-process model of reasoning suggests that human problem-solving is facilitated by two distinct systems: System 1 and System 2 (Pennycook, 2017). System 1 is thought to facilitate the quick and reflexive decision-making that we rely on to navigate the mundane challenges of daily life. In contrast, System 2 deals with more demanding cognitive tasks, such as those that are novel or require

concentration/analytical scrutiny. System 1 can be thought of as the source of intuitive reasoning, while System 2 can be thought of as the source of rationality and analytical reasoning.

The dual-process model also suggests humans to be "cognitive misers" who expend the minimum amount of cognitive effort possible when solving problems (Fiske & Taylor, 1991; Stanovich, 2018). Therefore, it is suggested that humans tend to rely on less effortful System 1 processing and only engage with their comparatively effortful System 2 faculties when absolutely necessary.

It has been suggested that System 1 requires fewer cognitive resources compared to System 2 due to its utilisation of "mental shortcuts", otherwise known as heuristics (Kahneman, 2011). Heuristics are rule-based strategies that rely on the substitution of a complicated cognitive task with simpler thought processes. For example, instead of assessing the merits of a complex argument logically, an individual may instead base their reasoning on what emotional response the argument provokes or its congruence with their existing beliefs (Toplak et al., 2011). There are many different types of heuristics that can influence a person's reasoning processes, such as those based on emotions, group identity, familiarity, and intuitive perceptions of probability (Ceschi et al., 2019). Heuristics essentially serve the function of making judgements "easier" in the pursuit of reducing cognitive effort, but at the potential cost of reduce accuracy (West et al., 2008).

The extent to which individuals engage with System 1 relative to System 2 when problem-solving has been shown to differ among individuals, with some being predisposed to rely on heuristic reasoning strategies (System 1) while others display a preference for analytical reasoning (System 2). Furthermore, individuals who exhibit a bias toward heuristic reasoning have consistently been shown to be more vulnerable to online misinformation (Bronstein et al., 2019; Martel et al., 2020; Pennycook & Rand, 2019a; 2019c; Ross et al., 2021), suggesting that online misinformation is more readily believed and engaged with when individuals fail to utilise their analytical faculties. Therefore, we may be able to identify individuals at greater risk from online misinformation based on measures of reasoning bias or by identifying traits known to be associated with a heuristic reasoning bias.

It should be noted that some have suggested the dual process model of reasoning (like many cognitive models) to present an oversimplified view of the complexity of human reasoning (Keren & Schul, 2009; De Neys, 2023). For example, critics have questioned the perceived binary nature of System 1 and System 2, suggesting that our reasoning processes are unlikely to be neatly divided into two distinct systems. It has also been suggested that the mechanisms behind switching from one

system to the other are unclear if the two systems are considered independent (Osman, 2004) and that changes to the model might more accurately reflect the nuances of human reasoning (De Neys & Pennycook, 2019; Evans, 2008; 2019). However, it is also worth noting that there is considerable research that supports the dual process perspective (De Neys, 2021; Evans & Stanovich, 2013; Kahneman, 2011; Pennycook et al., 2017). Cognitive studies have consistently demonstrated patterns that align with the dual system framework (Pennycook et al., 2015; Thompson et al., 2018), and neuroimaging studies have identified distinct neural correlates associated with each system (De Neys & Glumicic, 2008; Goel et al., 2000; Greene et al., 2004; Lieberman, 2007). There is also a substantial amount of misinformation research that has successfully applied the dual process model as an organising framework, demonstrating its practical utility (e.g., Pennycook & Rand, 2019a; Swire-Thompson & Ecker, 2018). Therefore, even if the dual process model is not fully representative of the complex underlying processes that influence reasoning, it remains a useful organizational framework within the field of online misinformation research.

1.6.4 Conspiracy theories and schizotypy

There exists a substantial degree of conceptual overlap between the fields of conspiracy theory research and online misinformation research, as conspiracy theories are themselves a sub-type of misinformation, and conspiracy theorists often utilise online platforms to develop and distribute conspiracy theories (Birchall & Knight, 2022; Douglas et al., 2019). This overlap is further reflected in the similar research findings across the subject areas. For example, receptivity to socio-political conspiracy theories has been previously associated with factors such as political partisanship (Pasek et al., 2015; Smallpage et al., 2017; Uscinski & Enders, 2023), disagreeable personality traits (Uscinski et al., 2022), and heuristic reasoning (Brashier, 2023; Brotherton & French, 2014; Leman & Cinnirella, 2007), all mirroring the findings of online misinformation researchers. Therefore, it may be possible to gain insight into the relatively modern issue of online misinformation vulnerability by drawing from the comparatively older and more established findings of conspiracy theory researchers who have already explored a diverse range of individual differences associated with the tendency to believe conspiracy theories.

Non-clinical schizotypal personality traits might, therefore, be a good candidate for exploration within the field of online misinformation research, as this personality construct has already been associated with receptivity to classic socio-political conspiracy theories (Barron et al., 2014; Ettinger et al., 2017). Schizotypy is also associated with unusual beliefs (e.g., belief in the paranormal) and a

tendency to engage in "magical thinking" (Elek et al., 2021), indicative of a willingness to believe information that lacks apparent rationality or strong empirical support. Schizotypy has also been shown to correlate with lower levels of trait agreeableness (Kwapil et al., 2018b) and an overreliance on heuristic reasoning (Aldebot Sacks et al., 2012; Barron et al., 2018; Broyd et al., 2019, Swami et al., 2014; Tomljenovic et al., 2020).

However, despite an established association with reasoning biases and conspiratorial beliefs, there has been a lack of schizotypy research in the online misinformation literature. Currently, there are only a few published articles that have explicitly discussed schizotypy within the context of online misinformation vulnerability (Anthony & Moulding, 2019; Buchanan & Kempley, 2021), with the results of these initial studies appearing to support the notion of schizotypy as a risk factor. Given the ongoing efforts among researchers to identify individual differences that predict online misinformation vulnerability, non-clinical schizotypal traits appear to be an understudied and potentially significant variable of interest that requires a more comprehensive investigation. Therefore, one of the primary goals of the current project will be to explore the relationship between schizotypal personality traits and misinformation vulnerability.

1.6.5 Autism-like traits

A secondary goal of the project will be to investigate the potential significance of non-clinical autism-like traits (ASD traits), a similarly underexplored personality construct within the contemporary misinformation literature. ASD traits refer to a range of behavioural, social, and communication characteristics that share qualitative similarities to the diagnostic features of Autism Spectrum Disorder (ASD), however these traits are commonly expressed at sub-clinical levels and have been suggested to be normally distributed among the general public (Baron-Cohen et al., 2001; De Groot & Van Strien, 2017; Wheelwright et al., 2010).

Schizotypy and ASD traits share a complicated relationship, with some researchers suggesting ASD traits are associated with differences in cognitive style and neurodevelopment that diametrically oppose those associated with schizotypal traits (Crespi & Badcock, 2008; Del Giudice et al., 2010; Dinsdale et al., 2013). The most relevant of these diametric relationships suggests that elevated ASD traits are associated with a reduced reliance on heuristic processing and an increased predisposition toward engaging in analytical reasoning (Lewton et al., 2019; Morsanyi, 2010). Therefore, if schizotypal traits were to promote receptivity to online misinformation vulnerability due to an association with heuristic-driven reasoning, ASD traits might display the opposite relationship due to an association

with rationality and analytical reasoning. For this reason, the current project will also seek to explore the relationship between online misinformation vulnerability and individual expression of ASD traits, with the aim of establishing 1) whether ASD traits are associated with reduced receptivity to misinformation, and 2) whether a diametric relationship between ASD traits and schizotypy is observed in relation to measures of cognitive processing and misinformation vulnerability.

1.6.6 Anti-misinformation interventions and the impact of schizotypy

Researchers have explored a diverse range of intervention strategies to counteract the spread and influence of online misinformation (see Whitehead et al., 2023). These interventions range widely in their approach, including media literacy programs, gamified learning tools, and fact-checking mechanisms. Among the most common approaches are content warning flags and fact-check labels, designed to signal misleading content to online users (Gaozhao, 2021; Ng et al., 2021; Walter & Murphy, 2018).

However, a common theme among online misinformation interventions is the aim of triggering a more critical and analytical response to online content (i.e., utilising System 2 reasoning; Moravec et al., 2020). However, given that individuals with higher levels of schizotypal traits are thought to be less inclined to engage in System 2 reasoning, it may be the case that these interventions are less effective among this demographic. Furthermore, schizotypal traits have been associated with a bias against disconfirmatory evidence (BADE), resulting in individuals being less willing to alter a preexisting belief when presented with information that contradicts it (Buchy et al., 2007; Georgiou et al., 2021b; Kuhn et al., 2021; Orenes, 2012). Given that schizotypal cognition can promote the formation of beliefs based on questionable foundations, the additional presence of a BADE is problematic as it may further reduce the efficacy of fact-checking and other types of intervention efforts designed to reduce belief in misinformation content. It is possible that individuals with elevated levels of schizotypy are both more vulnerable to online misinformation and less susceptible to intervention techniques. Should this pattern of results be demonstrated it would suggest that individuals with elevated schizotypy are distinctly vulnerable to the influence of online misinformation and new intervention techniques may need to be devised to better protect this demographic.

Therefore, once the relationship between schizotypy and misinformation has been established, the current study will also seek to explore the potential moderating effects of schizotypal traits on an existing intervention technique designed to reduce online misinformation vulnerability.

1.7 Summary of research questions and thesis structure

The current research project will draw from multiple areas of existing research (e.g., misinformation vulnerability, psychology of conspiracy theories, personality research, dual processing theory, and reasoning biases) to explore psychological factors that might influence individual vulnerability to online misinformation.

The primary research questions that will be addressed are the following:

- *RQ1 - Can schizotypal personality traits predict misinformation vulnerability?*
- *RQ2 - Can non-clinical ASD traits predict misinformation vulnerability?*
- *RQ3 - Can the relationship between personality traits and misinformation vulnerability be explained by an association with reasoning biases?*
- *RQ4 – How do predictors of misinformation belief differ from predictors of misinformation engagement?*
- *RQ5 – Do schizotypal personality traits moderate the efficacy of existing interventions designed to reduce vulnerability to online misinformation?*

In addition to the primary research questions, exploratory research questions will also be addressed throughout the project in response to any novel findings and theoretical queries that emerge.

In terms of thesis structure, the next chapter will consist of a literature review that provides a comprehensive overview of existing research into individual differences and cognitive mechanisms that promote belief and engagement with online misinformation. The literature review will also expand on research supporting the rationale for exploring the role of non-clinical schizotypy and ASD traits as moderators of online misinformation vulnerability. This chapter will conclude with the establishment of a set of hypotheses based on the findings of existing literature that will guide the design of the first empirical chapter of the project.

Following the literature review chapter, details on the methodological approach that was utilised throughout the project will be outlined.

Next, the results of four empirical studies that comprise the main body of the project are presented in separate chapters.

Finally, after presenting the findings of studies 1-4, a discussion and synthesis of the collective findings will be presented, along with reflections on the limitations of the project and suggestions for future research.

Chapter 2: Literature Review

2.1 Overview of the literature review chapter

The goal of this literature review is to achieve the following:

1. Outline current theories on the underlying cognitive processes involved in online misinformation vulnerability.
2. Discuss factors associated with the tendency to believe online misinformation.
3. Discuss factors associated with the tendency to engage with online misinformation.
4. Highlight the role of reasoning bias as an explanatory factor for engagement and belief in online misinformation.
5. Explore the rationale for the consideration of non-clinical schizotypy and ASD traits within the context of online misinformation research.

First, an outline of the literature search strategy will be presented, detailing the approach to identifying relevant materials used in this literature review. Next, a summary of existing research investigating contributing factors to belief in online misinformation will be presented, followed by a summary of research exploring online engagement with misinformation. Research on schizotypal personality traits will then be discussed, highlighting their potential value in online misinformation research and known associations with conspiracy theory endorsement, cognitive biases, and a diametric association with non-clinical ASD traits. Finally, a brief review of existing misinformation interventions will be presented, along with the rationale for a proposed moderating role of schizotypal traits. After reviewing the contemporary literature on these subjects, an overview of the project's general hypotheses and underlying rationale will be presented.

2.2 Literature search

The current project sought to explore individual differences in personality and cognition as predictors of vulnerability to online misinformation, both in terms of belief and engagement. The literature reviewed in the current chapter focused on existing online misinformation research, as well as parallel research in the fields of conspiracy theories, heuristics and biases, social cognition, and pseudopathological personality traits.

While some of the literature covered in the review was identified organically, it was decided to supplement this literature using a more systematic approach. This was done to ensure that any relevant studies that were not found during the organic search process were accounted for. Furthermore, by using somewhat restrictive search terms and criteria, it was hoped that the results would contain only the most relevant studies among the considerable number that have explored online behaviour and misinformation (i.e., research that explores the relationship between social media activity, misinformation, and individual differences in personality and cognitive ability). This approach was adopted due to the relatively limited size and scope of the review (i.e., it was not a systematic review of misinformation research a whole) and the need to maintain focus on the core topics of the current project.

Among the restrictions imposed on the systematic literature search was the decision to only include articles reporting quantitative results. This decision was made for two reasons: 1) As the current project sought to utilise quantitative methodology it seemed appropriate to limit the systematic search to other quantitative studies that might help inform methodological choices and experimental design, and 2) Qualitative methodology is limited in its ability to address some of the specific constructs under investigation which typically rely on quantifiable data (e.g., cognitive style, reasoning biases, performance on cognitive tests). However, it is worth noting that qualitative data can of course provide valuable insights into many facets of the online misinformation phenomenon, such as providing clarity on user motivations and intentions when interacting with online content (e.g. Hadlington et al., 2023; Perach et al., 2023) or informing the design of quantitative experiments (e.g. Bahrami et al., 2019; Bastani et al., 2021; Urakami et al., 2022).

2.2.1 Eligibility

To be included in the literature review, studies were expected to fit the description of at least one of the following:

- Research that seeks to establish a theoretical framework for understanding online misinformation engagement or belief.
- Quantitative research exploring the correlates of online misinformation engagement or belief.
- Quantitative research exploring the correlates of belief and online engagement with conspiracy theories.
- Quantitative research exploring psychological correlates of social media activity.

- Quantitative research exploring the role of reasoning heuristics and biases in relation to misinformation vulnerability.
- Quantitative research exploring the cognitive and behavioural correlates of non-clinical ASD and Schizotypy.

2.2.2 Search strategy

The databases used as part of the systematic literature search consisted of PsychInfo and Web of Science, which were searched up to and including 6th September 2021. The search strategy aimed to identify research that has explored misinformation, disinformation, "fake news", and conspiracy theories alongside measures of personality, cognition, heuristics and biases, ASD and schizotypy, all within the context of social media activity.

The Boolean search that was used for this purpose was the following: (misinformation OR disinformation OR "fake news" OR conspira*) AND (schizotypy OR ASD OR autis* OR personality OR heuristic OR "cognitive bias" OR bias OR cognition) AND ("social media" OR Facebook OR Twitter OR Reddit OR Instagram OR Tiktok OR Youtube OR Whatsapp OR Snapchat OR Pinterest OR LinkedIn). Note that the social media platforms included in the search represent the most popular centralised platforms among English speakers (Pew Research Center, 2021a).

The results of this search strategy resulted in 163 articles, 42 from PsychInfo and 121 from Web of Science. After removing duplicate results, the total number of articles was reduced to 143. After having screened the titles and abstracts of each article and applying the previously outlined inclusion criteria, the final number of valid articles was 106. These articles (along with those that were discovered organically before and after the data collection phase) formed the basis of the following literature review.

2.3 Belief in online misinformation

Why do some people tend to believe online misinformation while others do not? This question has become increasingly important, given the widespread proliferation of online misinformation and its associated negative real-world consequences. By gaining a better understanding of the cognitive, social, and demographic risk factors that increase the likelihood of believing online misinformation, researchers can help guide the development of protective countermeasures, educational materials, and public policy. In the following section, research investigating the various factors thought to influence belief in online misinformation will be discussed.

2.3.1 Reasoning processes and belief in misinformation

Among the existing research aiming to understand belief in online misinformation, two prominent theories emerge, both rooted in the dual process account of reasoning and the dynamic interaction between intuitive reasoning (System 1) and analytical reasoning (System 2; Kahneman, 2011).

The first is the motivated System 2 Reasoning (MS2R) model, which places emphasis on the role of pre-existing beliefs and ideology in distorting the analytical reasoning process (Kahan, 2017; Sloman & Rabb, 2019). Motivated reasoning can be described as the tendency to form judgments and beliefs simply because they support one's sense of identity and worldview, resulting in decisions and beliefs that might lack objective accuracy (Kunda, 1990). Within the context of online misinformation, the MS2R account argues that social identity and ideological beliefs facilitate motivated reasoning in individuals engaged in System 2 (i.e., analytical) processing, resulting in an individual's discernment of truth becoming less objective when assessing information that panders to pre-existing values and beliefs. Therefore, it is suggested that greater levels of analytical scrutiny directed toward identity/belief-concordant misinformation would result in greater levels of acceptance and belief. This theory essentially claims that people become blinded by their existing beliefs to the point it compromises their ability to accurately perceive the truth using their analytical faculties.

The second theory, known as the classical dual-process account, suggests that engagement in System 2 processing assists in the rejection of false information and generally improves truth discernment (Bronstein et al., 2019; Pennycook & Rand, 2019a). Within this model, individuals who tend to believe online misinformation are thought to do so because they fail to engage their analytical faculties and instead rely on simpler System 1 (i.e., intuitive) reasoning processes, which are more

prone to judgement errors. Therefore, this theory suggests that those who employ greater levels of analytical scrutiny when assessing online misinformation would be less likely to be deceived into believing it (contrary to the claims of the MS2R theory).

While some studies have provided support for the MS2R account (e.g., Charness & Dave, 2017; Kahan, 2017; Kahan et al., 2017), the emerging consensus among the literature is that the classical dual-process account has demonstrated greater empirical support, indicating that engagement with analytical reasoning is associated with reduced levels of belief in online misinformation (e.g., Bryanov & Vziatysheva, 2021; Pehlivanoglu et al., 2021; Pennycook & Rand, 2019a, Pennycook & Rand, 2020, Sindermann et al., 2020). For example, Bago et al. (2020) demonstrated that by experimentally manipulating cognitive load in a manner that reduced the opportunity for participants to engage in analytical reasoning, they were more likely to believe inaccurate political headlines. In contrast, when the participants were given the opportunity to engage in analytical deliberation by removing the cognitive load, it was demonstrated that participants were less likely to endorse inaccurate political headlines. The findings were the same for politically concordant and discordant materials, implying that the analytical reasoning process was not significantly biased by personal beliefs and ideology. These results support the notion that intuitive reasoning processes are less effective at rejecting factually dubious information compared to analytical reasoning processes, regardless of the material's appeal to pre-existing beliefs and ideology.

2.3.2 Reasoning biases and belief in misinformation

Differences exist in the extent to which individuals are predisposed toward utilising their analytical reasoning abilities when encountering novel information or when forming judgements (Patel et al., 2019; Toplak et al., 2011). Such biases in reasoning are thought to reflect differences in cognitive style that result in the preferential utilisation of System 1 cognition (in the case of an intuitive reasoning bias) or System 2 cognition (in the case of an analytical reasoning bias).

Based on the classical dual-process account of reasoning, an analytical reasoning bias would result in two main outcomes: 1) Fewer instances of heuristic-driven reasoning, and 2) Increased application of analytical scrutiny and accumulated knowledge (with the reverse profile demonstrated by those exhibiting an intuitive reasoning bias). Given the previously established link between reduced analytical scrutiny and a tendency to believe online misinformation, it is reasonable to infer that such reasoning biases might differentiate between those more at risk of believing online misinformation

(i.e., those who display an intuitive reasoning bias) and those who may be more resilient (i.e., those displaying an analytical reasoning bias).

The influence of reasoning biases on misinformation belief has been explored using numerous different instruments (see Bronstein et al., 2019; Pennycook & Rand, 2020; Ross et al., 2021), but perhaps the most popular has been the Cognitive Reflection Test (CRT; Bialek & Pennycook, 2018; Frederick, 2005; Primi et al., 2016). The CRT is a performance-based cognitive measure designed to assess an individual's predisposition toward either analytical or intuitive reasoning strategies when engaged in problem-solving. The CRT does this by presenting participants with a series of questions that, at first glance, appear to have intuitively obvious answers. However, answering the test questions requires the participant to inhibit responding with the seemingly "obvious" answer, pay closer attention, and then engage in analytical reasoning to arrive at the unintuitive (but correct) answer. For example, consider the following question derived from the CRT:

A bat and ball cost \$1.10 in total. The bat costs \$1.00 more than the ball.

How much does the ball cost? _____ cents

The intuitive answer that quickly comes to many people when presented with this question costs 10 cents. However, this intuitive answer is incorrect. For the bat to cost \$1.00 *more* than the ball, the ball must cost 5 cents, and the bat must cost \$1.05 (for the combined total to equal \$1.10). The bat and ball question demonstrates how relatively simple questions can "lure" the inappropriate application of the quick and intuitive System 1 reasoning skills in place of the slow and considered System 2 responses that would be better suited to arriving at an accurate answer. Several versions of the CRT have been developed (see Manfredi & Nave, 2019; Thomson & Oppenheimer, 2016), all of which follow a similar approach to testing (i.e., posing logical questions that trigger incorrect intuitive responses).

Numerous misinformation studies have demonstrated CRT performance to be negatively correlated with the perceived accuracy of online misinformation and positively correlated with the perceived accuracy of true information (Pehlivanoglu et al., 2021; Pennycook & Rand, 2019a; Sindermann et al., 2020; Tandoc et al., 2021; Van Bavel et al., 2021). Other studies have also demonstrated that poorer CRT performance is generally associated with receptivity to factually

dubious claims (Pennycook et al., 2015a; 2015b). These results collectively imply that better CRT performance (indicative of an analytical reasoning bias) is associated with a better ability to discern true from false information.

Another key factor to consider when thinking about the potential impact of reasoning biases on truth judgements is the tendency for people to exhibit a "truth bias", in which novel information is generally considered true by default, with the process of disbelief requiring an additional (and cognitively effortful) step in processing (Stanley et al., 2022; Street & Masip, 2015). This simple reasoning bias is thought to reflect a schema of the world in which people are generally more likely to tell the truth than to lie. Therefore, unless we notice a reason to suspect the incoming information to be untrue, we tend to believe it. When considering the implications of truth bias in combination with the tendency to avoid cognitive effort and analytical reasoning (i.e., a heuristic reasoning bias), it is possible that a reluctance to expend cognitive resources and engage in analytical scrutiny might result in both a reduced detection of suspect qualities in misinformation content and a reduced tendency to engage in disbelief.

Furthermore, while an analytical processing bias is thought to reduce belief in misinformation by facilitating a more careful and critical approach to the assessment of incoming information, this process may not always be successful. It has been suggested that the effective utilisation of analytical reasoning in rejecting misinformation is reliant on the quality of accumulated knowledge that an individual possesses and draws upon. For example, the CRT's positive correlation with truth discernment is strongest when misinformation claims are implausible (Pennycook & Rand, 2019a), suggesting that when people do engage with analytical reasoning, they draw upon judgements of plausibility derived from their wider body of knowledge. These findings are also supported by studies indicating that higher levels of domain knowledge are associated with reduced belief in misinformation specific to that domain, such as greater political knowledge being shown to reduce belief in political misinformation (Brashier et al., 2021; Vegetti & Mancosu, 2020) and greater scientific knowledge negatively correlating with belief in science misinformation (Pennycook et al., 2020a; Pennycook & Rand, 2019c; Wang, 2021). Such findings may help us to understand the few studies that claim to demonstrate motivated reasoning in highly politicised participants who were shown to engage in analytical reasoning (e.g., Kahan, 2013), as these individuals may have been analytically applying a wider body of knowledge that had become distorted due to chronic exposure to misinformation and/or hyperpartisan indoctrination material. Therefore, while belief in misinformation

is suggested to often arise due to a lack of cognitive reflection and analytical scrutiny, it is also possible that possessing inaccurate or insufficient knowledge to draw upon when engaged in analytical processing can increase the tendency to believe misinformation.

2.3.3 Heuristics and belief in online misinformation

Having established an intuitive reasoning bias as a potential risk factor for misinformation belief, the question arises as to why some forms of online misinformation seem to appeal to our intuitive reasoning processes when others do not. The dual-process model of reasoning suggests that intuitive reasoning is largely mediated by the application of simple mental heuristics to familiar environmental cues and/or prototypical tasks (Gigerenzer et al., 2011) and that many systematic judgement errors associated with cognitive biases are due to the improper application of these heuristics (Schirrmester et al., 2020; Vreja, 2015). This perspective is supported by research that shows CRT performance to negatively correlate with many measures of heuristic reasoning, indicating poor CRT performance to be indicative of increased utilisation of mental heuristics (Del Missier et al., 2012).

There are many different types of mental heuristics (see Ceschi et al., 2019; Oreg & Bayazit, 2009), but a common theme among them is the substitution of a cognitively demanding task with a less demanding alternative. This process is thought to allow individuals to efficiently engage with the external environment without having to analyse the situation and expend valuable cognitive resources. However, the application of heuristics can also lead to a biased and inaccurate perception of reality. For example, the representativeness heuristic is a process whereby people form judgements based primarily on how much something adheres to a salient stereotype. Consider the following example from Kahneman (2011):

Tom is meek and keeps to himself. He likes soft music and wears glasses.

Which profession is Tom more likely to be: 1) Librarian, 2) Construction worker.

While many would suggest Tom to be a librarian due to his adherence to the salient stereotype, there generally tends to be far fewer librarians compared to construction workers (Kahneman reports the US ratio to be roughly 10:1). Therefore, from an analytical and statistical perspective, it is more likely for

Tom to be a construction worker. The application of the representative heuristic in this example allows the reader to make a snap judgement of Tom without having to form an analytical strategy to accurately answer the question, thereby reducing the need to exert cognitive effort.

It has been argued that online content tends to be processed in a heuristic manner due to the "hedonic mindset" of most users (i.e., most users tend to seek entertainment and relaxation from their online activities, as opposed to analytical problem-solving; Moravec, 2020). Furthermore, online misinformation can be designed to appeal to specific heuristics, resulting in a clear and intuitive message to the reader while simultaneously reducing the likelihood of triggering a more analytical response (Lee & Kim, 2016; Zidani & Moran, 2021). By appealing to heuristic reasoning, online misinformation can convince audiences through qualities other than meaningful evidence and analytical arguments, such as appeals to emotion, stereotypes, feelings of familiarity, identity, ideology, and other pre-existing biases (Bowman & Cohen, 2020; Lutz et al., 2020; Preston et al., 2021; Sanchez & Dunning, 2021a; 2021b; Weeks, 2015). For example, a common feature of political misinformation and hyper-partisan news coverage is to present arguments in an oversimplified, intuitively appealing, and emotionally evocative manner, thereby prompting the use of heuristic reasoning processes in a sympathetic audience (Ali & Zain-ul-Abdin, 2021; Swart & Broersma, 2021). Research has also suggested that those who are less predisposed to utilising intuitive/heuristic reasoning are subsequently less convinced by these types of superficial argumentation strategies, further emphasising the key role of heuristic-driven reasoning bias as a potential risk factor for misinformation vulnerability (Li et al., 2022).

While researchers have sought multiple perspectives to understand how heuristic-driven intuition facilitates belief in online misinformation (see Acerbi, 2019; De keersmaecker & Roets, 2017; Lee & Shin, 2021; Marie et al., 2020; Mena et al., 2020; Melki et al., 2021; Nadarevic et al., 2020; Pennycook & Rand, 2021), much attention has been focused on the heuristic effect of familiarity and prior exposure on subsequent accuracy judgments. A substantial body of research has demonstrated that information that has previously been seen or heard tends to be judged as more accurate (Dechêne et al., 2010; Unkelbach et al., 2019). This illusory truth effect (Hasher et al., 1977) has also been shown to apply to online misinformation exposure (Jalbert et al., 2020; Nadarevic et al., 2020; Smelter & Calvillo, 2020; Unkelbach & Speckmann, 2021). For example, in a study by Pennycook et al. (2018), it was demonstrated that a single incidence of prior exposure significantly increased the perceived accuracy of Facebook posts containing political misinformation. The same study also

demonstrated that the illusory truth effect was robust, appearing even in cases of low plausibility, political incongruence, and after being flagged by fact-checkers. It has also been demonstrated that with repeated exposure, misinformation is perceived as increasingly believable (Gibbons et al., 2005; Pennycook et al., 2018) and that this effect can occur even when claims are implausible and contradictory to acquired knowledge (Fazio et al., 2015; Fazio et al., 2019).

It has been suggested that the illusory truth effect can be explained as a byproduct of the fluency heuristic (Wang et al., 2016; Unkelbach, 2007). The fluency heuristic is a reasoning strategy that substitutes an objective judgement with an assessment of processing fluency (Oppenheimer, 2008). In other words, if something comes to mind easily and is processed quickly, smoothly and fluently, then it is more likely to be given additional weight when making a judgement. This heuristic is normally quite helpful in our day-to-day lives, as it facilitates simple decisions that do not require significant cognitive effort (for example, deciding on what you want to eat for a meal based on how readily a choice comes to mind).

Processing fluency has been suggested to act as a cognitive cue of information novelty, indicating whether the incoming information is familiar (and therefore processed fluently) or unusual (resulting in poorer processing fluency), with poor fluency indicating the need for greater analytical scrutiny and further inspection (Unkelbach et al., 2019; Walter et al., 2021). This perspective has been supported by experimental research demonstrating that when reasoning tests are presented in a way that reduces processing fluency (e.g., using hard-to-read fonts), participants tend to display an increase in analytical thinking and resistance to reasoning errors compared to those who were presented a high-fluency version of the test (Alter et al., 2007; Song & Schwarz, 2008). In terms of truth judgements, several studies have suggested a "fluency as truth" effect (e.g., Reber & Schwarz, 1999; Stanley et al., 2019). Processing fluency has also been suggested to play a role in promoting beliefs associated with political partisanship and confirmation bias, whereby information congruent with pre-existing beliefs and ideology tends to be believed uncritically due to its familiarity and ease of processing (Hernandez & Preston, 2013, Walter et al., 2021).

Therefore, it is suggested that when misinformation is presented in a manner that is both intuitively appealing (thereby avoiding activation of System 2 cognition) and familiar to the audience, there is a greater chance that the content will be incorrectly judged as accurate. Additionally, individuals who exhibit a heuristic reasoning bias are potentially even more likely to fall for this kind of

misinformation, as they are both more likely to rely on heuristic judgements and less likely to engage with System 2 (i.e., analytical reasoning).

2.3.4 Demographics and Individual differences associated with belief in online misinformation

2.3.4.1 Demographics and belief in online misinformation

Despite the global reach of online misinformation, much of the research literature has focused on so called “WEIRD” populations (i.e., Western, Educated, Industrialised, Rich, and Democratic), with a particular focus on political events within the UK and USA (e.g., Allcott & Gentzkow, 2017; Bennett & Livingston, 2018; Guess et al., 2019). However, there is now a growing body of research exploring online misinformation from a cross-cultural perspective (e.g., Arrese, 2024; Dabbous et al., 2022; Gupta et al., 2022; Humprecht et al., 2023), as well as increased representation of studies utilising participants from non-WEIRD countries (e.g., Batista Pereira et al., 2022; Lee et al., 2020; Leng et al., 2021; Sheehy et al., 2024; Unfried & Priebe, 2024). These studies highlight the role that differences in culture and societal structures play in moderating the risk of online misinformation.

Comparisons of belief in online misinformation across different nationalities have revealed significant differences. For example, Humprecht et al. (2020) reported differences in resilience to online disinformation across 18 European and North American countries. A cluster analysis indicated three groups of countries; one that was generally resilient to online disinformation and two that exhibited increased belief in disinformation. The group most resilient to online disinformation consisted of Canada and Western European democracies (characterised by consensus political systems and strong welfare states). In contrast, Southern European countries (characterised by entrenched political and/or ideological polarisation) were shown to be at greater risk of believing online disinformation. The final group was deemed the most vulnerable to online disinformation and was comprised only of the United States (characterised by low levels of trust in the media, greater presence of news “echo chambers”, and heavy politicization of news coverage). In a more recent and large-scale cross-cultural study, Arechar et al. (2023) recruited over 34,000 participants across 16 countries and 6 continents to explore belief in online COVID-19 misinformation. The study demonstrated that belief in online misinformation was more common within countries that demonstrated social collectivism, restrictive political systems, and an emphasis on hierarchical social structures (in the most extreme contrast, participants from India believed online COVID-19 misinformation twice as much as participants from the United Kingdom). These studies suggest that variability in belief in online misinformation across countries aligns with broader differences in

cultural practice, social and political systems, media regulation, and levels of trust in authoritative institutions.

However, it should also be noted that methodological issues limit the generalisability cross-cultural findings. For example, the acquisition of nationally representative participant samples is often very challenging (see Arechar et al., 2023) and many of the larger-scale studies rely on convenience samples which can lead to selection-bias. Furthermore, some non-WEIRD countries have poorly recorded norms for social media users, thereby making it difficult to determine how nationally representative a participant sample really is. Therefore, while we can be fairly confident that cultural and social differences are likely to influence belief in online misinformation, the exact nature of these differences has yet to be reliably established.

Some studies have indicated that ethnicity and racial identity influence belief in online misinformation, with ethnic minorities being more likely to believe online misinformation (e.g., Allington et al., 2023). It has been suggested that ethnic minorities may be more likely to believe misinformation and conspiracy theories because these types of narratives can help individuals make sense of their own experiences of victimization and social disenfranchisement (Douglas, Sutton, & Cichocka, 2017). Ethnic minorities may also experience greater levels of exposure to online misinformation, thereby increasing their risk of being deceived (Freelon et al., 2022). Furthermore, ethnic minority communities have historically been the targets of malicious campaigns perpetrated by more powerful social groups (e.g., the Tuskegee Syphilis Study on Black Americans in the United States) and may therefore have reason to be receptive to claims of conspiratorial plots against their community (Washington, 2006). However, it is worth noting that most studies have failed to report ethnicity as a significant predictor of misinformation belief once the role of other common explanatory variables were accounted for.

Reports on the relationship between gender and belief in online misinformation are inconsistent. While some studies have indicated men are more at risk (e.g., Unfried & Priebe, 2024; Xiao et al., 2021), others have suggested that women may be more at risk (e.g., Lai et al., 2020). However, most studies have not reported any significant gender differences in relation to belief in online misinformation.

Despite research linking older age with an increased risk of deception (Ruffman et al., 2012), lower rates of digital literacy (Brashier & Schacter, 2020), and increased exposure to misinformation (Guess et al., 2020a), age has not been demonstrated to be a reliable predictor of belief in online

misinformation. While some studies have shown older individuals to be more discerning when assessing online information accuracy (Sindermann et al., 2021), others have demonstrated a positive correlation between age and misinformation belief (Guess et al., 2019). It has been suggested that a positive correlation between belief in misinformation and age may partly relate to the effects of cognitive decline (Asp et al., 2012; Paige et al., 2019). Age-related cognitive decline is associated with difficulty engaging cognitive control processes that facilitate analytical scrutiny (Gazzaley, et al., 2005), thereby resulting in compromised judgement and inaccurate beliefs (Dodson et al., 2015). Ageing is also associated with reduced source memory and working memory (Spencer & Raz, 1995), deficits which have been suggested to promote belief in misinformation (Brydges et al., 2018; Mitchell et al., 2003).

Educational attainment has been shown to be positively correlated with truth discernment, with less educated individuals being more prone to believe online misinformation (Lai et al., 2020; Melki et al., 2021; Preston et al., 2021). This relationship may reflect the known protective influence of intelligence against belief in misinformation (Brydges et al., 2018; Sindermann et al., 2021) or may alternatively reflect the need for effective analytical reasoning abilities to achieve academic success (Ghanizadeh, 2017). Higher educational attainment may also indicate the possession of a more accurate body of knowledge to draw upon during analytical reflection, thereby better allowing individuals to identify factual inconsistencies and errors in misinformation content.

2.3.4.2 Political orientation and belief in online misinformation

Political orientation has been shown to influence reasoning, with individuals tending to believe information more readily if it is congruent with their existing political beliefs (Ditto et al., 2019; Hollander, 2018; Pereira et al., 2021; Vegetti & Mancosu, 2020). This same partisanship bias has also been demonstrated to influence belief in politically congruent misinformation (Allcott & Gentzkow, 2017; Faragó et al., 2020; Nikolov et al., 2021; Pennycook & Rand, 2019b). However, it is important to note that political bias plays a relatively lesser influence when compared to the perceived plausibility of the misinformation content, with most people being less likely to believe politically congruent misinformation than they are to believe accurate but politically incongruent information (Pennycook & Rand, 2021).

Research has also specifically suggested that individuals who subscribe to conservative political ideologies may be more likely to believe online misinformation (Calvillo et al., 2020; Garrett & Bond, 2021). It has been suggested that conservative politicians have stronger incentives to promote misinformation to their supporters due to a relative lack of value attributed to epistemic virtues among the political right (Baron & Jost, 2019). Exposure to online political misinformation has also been shown to be more common among conservatives (Chen et al., 2020; Wisker & McKie, 2021), as is the use of hyperpartisan social media platforms where political misinformation often propagates (Sipka et al., 2021; Zeng & Schäfer, 2021). Therefore, greater levels of belief in political misinformation among conservatives may be argued to be a result of heightened exposure.

However, there is also research indicating conservative ideology to be associated with an increased likelihood of believing non-political misinformation (Guess et al., 2019; Pereira et al., 2020), suggesting that conservative ideology may be associated with underlying information processing differences that facilitate a greater vulnerability to misinformation in general. Political conservatism has also been shown to be associated with a reduced reliance on confirmatory evidence when forming beliefs (Pennycook et al., 2020b) and a tendency to believe unsubstantiated claims when they are presented in the context of a potential threat (Fessler et al., 2017).

2.3.4.3 Personality and belief in online misinformation.

There are a limited number of studies that have explored the relationship between belief in online misinformation and personality traits. Most have focused on the "Big Five" traits of the FFM (openness, conscientiousness, extraversion, agreeableness, and neuroticism; McCrae and Costa, 2003). However, the results across these studies have been mixed.

For example, Calvillo et al. (2021) conducted a study in which US Mechanical Turk users were asked to judge the accuracy of true and false political headlines, the results of which were compared to self-reported five-factor personality traits. The results of the study indicated that higher levels of agreeableness, openness and conscientiousness were associated with better truth discernment toward political misinformation. In contrast, a similar study by Wolverton & Stevens (2019) demonstrated the opposite results, indicating that high levels of agreeableness, openness and conscientiousness were associated with reduced truth discernment toward fake news stories.

One point of consensus that may be emerging from the personality research on misinformation belief relates to the personality trait of extraversion, with several studies indicating that higher degrees

of extraversion were associated with an increased belief in online misinformation (Ahmed & Tan, 2022; Ahmed & Rasul, 2022; Calvillo et al., 2021; Lai et al., 2020; Sindermann et al., 2021; Wolverton & Stevens, 2019). This correlation between extraversion has been suggested to be the result of extraversion being associated with a tendency to process information using an "experiential" thinking style as opposed to a "rational" thinking style (Pacini & Epstein., 1999), both of which closely resemble the previously discussed intuitive/analytical reasoning biases.

Among the very limited number of studies that have deviated from the use of the FFM are two recent studies (Enders et al., 2023; Escolà-Gascón, 2020) that explored the link between belief in online misinformation DT traits (i.e., low-agreeableness traits associated with anti-social behaviour). Both studies reported a significant positive correlation between belief in misinformation and narcissistic traits (i.e., an inflated sense of self-importance combined with reduced empathy for others), while the study by Enders et al. (2023) also reported a significant positive correlation with psychopathy traits (i.e., antisocial behaviour and callousness). These findings further support the notion that personality traits relating to social functioning might provide insight into individual differences in misinformation vulnerability.

2.3.4 Summary

- Belief in misinformation can stem from a lack of System 2 (analytical) reasoning, as reflected in measures such as the CRT.
- Some individuals exhibit an intuitive reasoning bias that makes them more vulnerable to misinformation.
- The mental heuristics utilised in the intuitive reasoning processes guided by System 1 are easy to manipulate and can lead to judgement errors.
- The fluency heuristic is proposed to play a major role in facilitating intuitive truth judgements and as an explanation for the observed tendency for people to believe misinformation when they have been previously exposed to it.
- Demographic and personality features may play a role, potentially via processes associated with analytical/intuitive reasoning biases and the DT.
- Political orientation has also been shown to influence misinformation belief judgements.
- Belief in misinformation can also occur as a result of analytical reasoning that has become ineffective and distorted due to the application of inaccurate knowledge.

2.4 Engagement with online misinformation

Social media platforms are responsible for a great deal of exposure to misinformation, in part due to their algorithmically curated nature that tends to promote information "echo chambers" (Van Bavel et al., 2021). For example, content that prompts social media users to engage (i.e., interact via behaviours such as sharing, "liking", and commenting) tends to become amplified within social networks through the process of organic reach (Buchanan & Benson, 2019). Understanding the factors behind the organic reach of misinformation may help in efforts to stem its spread, as most misinformation propagated on social media is suggested to be shared and promoted by "real" users, as opposed to paid actors or bots (Vosoughi et al., 2018). However, it has also been demonstrated that those who engage with online misinformation represent a small but vocal minority of users (Chadwick et al., 2022).

This raises the question of why this minority of users engages with misinformation while others do not. It is hoped that by identifying the differentiating factors between those with a tendency to engage with misinformation and those who do not, we may gain some insight into the underlying cognitive processes, as well as some of the potential risk factors that might be used to identify high-risk demographics. In the following section of the literature review, an overview of studies exploring theories and correlates of online misinformation engagement will be presented. Research relating to underlying reasoning processes and biases will first be explored, followed by research into the key heuristic mechanisms and individual differences.

2.4.1 Reasoning process and engagement with online misinformation

One might assume that people share and otherwise promote online misinformation because they incorrectly believe it to be true (i.e., the "confusion" hypothesis of misinformation engagement). However, although there is research that supports a link between belief and engagement behaviour (e.g., Buchanan, 2020; Chen, 2016; Kim & Dennis, 2019), there is also growing evidence of a disconnect between accuracy judgements and intentions to engage with online content (Chen et al., 2021; Pennycook et al., 2020a; 2021). Contrary to the confusion hypothesis, this research suggests that individuals often choose to engage with online misinformation despite being able to discern its lack of accuracy. Two alternative theories to the confusion hypothesis have been suggested to account for the gap between accuracy judgements and sharing intentions: the preference hypothesis and the inattention hypothesis.

The preference hypothesis suggests that some people knowingly spread misinformation because, when it comes to the propagation of online information, they care less about accuracy than they do other motivational factors (e.g., social identity). In this scenario, individuals promote online misinformation when it facilitates a specific motive, such as disparaging out-group members, reflecting well on in-group members, or causing disruption to ideological opponents.

The inattention hypothesis provides a different perspective on the belief-engagement gap. This theory suggests that individuals generally place value on truth and accuracy. However, due to the context and presentation of misinformation materials, individuals often focus on appealing features of the content (e.g., appeals to intuition and emotion) and subsequently fail to explicitly consider accuracy before engaging. In this scenario, individuals react impulsively when deciding to engage with appealing misinformation content, but if asked to explicitly judge the accuracy of the same material, they would likely be able to identify misinformation as inaccurate.

A recent study by Pennycook et al. (2021) sought to directly compare the explanatory value of the confusion, preference and inattention hypotheses of misinformation engagement. In the study, 1002 US MTurk users were presented with true and false political headlines and then asked 1) Whether they would consider sharing them on social media, and 2) How accurate they judged the headline to be. While participants were much more likely to judge true headlines as more believable than misinformation headlines, the influence of perceived believability on sharing intentions was shown to be minimal. Sharing intentions for false headlines were, on average, 91% higher than their corresponding accuracy judgements, seemingly indicating that participants were willing to share information they did not believe to be accurate. Furthermore, it was demonstrated that among the false political headlines that were intended to be shared, only 33% were believed to be accurate, leaving 67% of sharing intentions unexplained by the "confusion" account. According to the preference hypothesis, participants were expected to value group identity (in this case, political partisanship) over truth judgements when sharing online content. While the study did show politically congruent materials to be shared more frequently, it was also shown that most participants reported accuracy to be the most important factor they considered when choosing what to share on social media. Additionally, it was shown that among the misinformation stimuli that were intended to be shared, only 16% of participants indicated that they were aware of its inaccuracy (roughly in line with other studies; Ardèvol-Abreu et al., 2020; Chadwick et al., 2018), implying that purposeful sharing of misinformation does occur, but can explain only a minority of responses. The inattention hypothesis

also suggests that most people have a desire to share accurate information but become distracted from attending to this goal and instead choose to engage based on other attention-grabbing aspects of the misinformation content. In support of this perspective, it was demonstrated that explicitly priming accuracy judgements prior to asking about sharing intentions reduced misinformation sharing by 51% among participants. These results suggest that the inattention-based account explained roughly half the incidents of misinformation sharing among the sample. Therefore, while the confusion, preference, and inattention perspectives on misinformation engagement may all be valid to a point, the inattention account captured the greatest proportion of engagement behaviour among the participants.

Similar results have also been found in other studies, whereby asking participants to explicitly consider the accuracy of misinformation content reduces their intentions to engage with it compared to those who are asked to about engagement intentions without the priming of accuracy judgments (Chen et al., 2021; McPhetres et al., 2021; Pennycook & Rand, 2019a). These findings have established further support for the inattention hypothesis and have brought about a greater focus on reasoning processes and biases in the exploration of online misinformation engagement.

2.4.2 Inattention, reasoning biases, and engagement with misinformation

As online misinformation engagement is suggested to arise in part due to a failure to suppress intuitive responses and apply analytical reasoning, it would stand to reason that individuals who are predisposed to utilising intuitive reasoning over analytical reasoning would be more likely to engage. It is also important to note that social media ecosystems are explicitly designed to promote engagement and capture attention by encouraging the use of intuitive cognition (Brady et al., 2020; Jang et al., 2019; Kozyreva et al., 2020), and therefore, individuals with an analytical information processing bias may be less likely to become distracted by the social media ecosystem, making them more likely to attend to their goals of sharing only accurate information.

In support of this perspective, research using the CRT has demonstrated that engagement with online misinformation is more common among those who display an intuitive reasoning bias, while those who display an analytical reasoning bias tend not to engage with inaccurate online content (Nurse et al., 2021; Pennycook et al., 2020b; 2021; Ross et al., 2021; Van Bavel et al., 2021). Reasoning bias captured by the CRT has also been suggested to influence the types of information environments individuals choose to interact with, with those predisposed to analytical reasoning demonstrating more engagement toward higher quality news sources (Mosleh, Pennycook, Arechar, &

Rand, 2021). Therefore, it seems when individuals are predisposed to engage with online content based on an impulsive and intuitive response (via appeals to biases and heuristics) instead of utilising their analytical reasoning abilities (i.e., explicitly thinking about content accuracy in the context of a wider body of acquired knowledge), they are more likely to engage with misinformation that they could have otherwise identified as false and avoided. Simply put, people sometimes engage and endorse unbelievable online content because they simply do not stop to ask themselves, "How likely is this to be true?".

2.4.3 Heuristics and biases that influence engagement with online misinformation:

If those who intuitively engage with online misinformation do not tend to consider accuracy judgements, what other characteristics motivate them to engage? Once again, it is suggested that heuristics and other simple reasoning strategies drive the System 1 reasoning processes that lead to engagement with online misinformation. It may also be the case that, since online engagement is often facilitated in very quick and simple online interactions that appeal to snap decisions and momentary feelings of urgency, heuristic reasoning processes may play a larger role in engagement intentions than they do for belief judgements.

As with belief judgements, the intention to engage with online misinformation has been shown to be associated with prior exposure and the fluency heuristic. It has been previously demonstrated that information that is more familiar is more readily shared with others (Alter & Oppenheimer, 2009). This is further reflected in the observed tendency for people to share online information when it is congruent with their existing beliefs and values (Pennycook & Rand, 2019b; Pennycook, Epstein, et al., 2021). Numerous studies have demonstrated that prior exposure to online misinformation content increases the subsequent likelihood of individuals further sharing it with others (Chadwick et al., 2018; Effron & Raj, 2020; Pennycook & Rand, 2020).

Interestingly, along with research emphasising the role of familiarity in promoting engagement with online misinformation, there is also evidence to suggest that unusual and novel misinformation tends to spread faster than accurate information across social networks (Hsu et al., 2020; Kumari et al., 2021; Vosoughi et al., 2018). Although unlikely to function via the fluency heuristic, it may be the case that the novel information is emotionally enticing enough to promote sharing due to other heuristic and memetic processes (Hodas & Lerman, 2014; Wu & Huberman, 2007). Additionally, it has been suggested that misinformation tends to be perceived as more interesting and novel than

accurate information (Vosoughi et al., 2018), which is concerning but unsurprising, considering it is not limited to the constraints of objective reality.

Another key aspect of misinformation content that influences engagement behaviour is the extent to which it produces an emotional response in the audience, with content that provokes intense emotions being more likely to attract engagement (Berger, 2014; Kümpel et al., 2015; Wollebæk et al., 2019). A factor analysis study by Chen et al. (2021) explored the characteristics of information that is more likely to be shared on social media platforms and suggested two potential explanatory factors. One factor reflected the participant's accuracy judgements and feelings of familiarity around the content (i.e., belief), while the other factor reflected the importance of the emotional evocativeness of the content (with high-arousal feelings such as anxiety, worry, anger, and excitement being associated with increased engagement). The same study demonstrated that misinformation tended to be more emotionally evocative and shared more frequently (in line with findings from Vosoughi et al., 2018). Similarly, the effects of "negative partisanship" (i.e., partisan bias with a focus on negativity towards out-group members, as opposed to positivity towards in-group members; Abramowitz & Webster, 2016; 2018) have been shown to promote engagement with politically congruent misinformation (Osmundsen et al., 2021; Weeks, 2015). There is also evidence to suggest that increased reliance on intuition and emotional reasoning is associated with an increase in engagement with online misinformation (Martel et al., 2020), further supporting the notion that when individuals focus on the emotional content of online misinformation, they are more likely to contribute to its proliferation.

Therefore, it is suggested that increased feelings of familiarity, novelty, and emotional evocativeness can be utilised in place of accuracy judgements when individuals engage with online misinformation based on their intuitive reasoning.

2.4.4 Demographics and Individual differences associated with engagement with online misinformation

2.4.4.1 *Demographics and engagement with online misinformation*

Cross-cultural comparisons of online misinformation engagement are relatively scarce. Sun & Xie (2024) conducted a meta-analysis incorporating misinformation studies from a diverse range of countries that suggested differences in culture influenced misinformation sharing. Specifically, it was

demonstrated that collectivism moderated the relationship between social media use and misinformation sharing (i.e., among collectivist cultures there was a stronger association between the amount of time spent on social media and the likelihood of sharing misinformation). Why this relationship was demonstrated is not clear, although it is noteworthy that collectivism has also been shown to be associated with an increased belief in misinformation (Arechar et al., 2023; Gupta et al., 2022), suggesting that collectivism may be associated with a general increase in vulnerability to online misinformation. A different approach was taken by Humprecht et al. (2023), who explored resilience to misinformation sharing across six countries (Belgium, France, Germany, Switzerland, the UK, and the US). The study demonstrated that countries differed in terms of predictors of misinformation engagement and relative resilience (e.g., Swiss participants were the least likely to spread misinformation, while US participants were most likely). Arechar et al. (2023) reported on cross-cultural comparisons of engagement discernment (i.e., the tendency for individuals to engage with accurate content while avoiding engagement with misinformation), demonstrating significant differences between participants from different countries. Collectively, these findings suggest that cultural differences likely play a role in moderating misinformation engagement (however understanding the exact nature of this relationship will further research).

Associations between age and the tendency to engage with online misinformation have been mixed. While a few studies suggest that older individuals are significantly more likely to engage with online misinformation compared to younger individuals (Grinberg et al., 2019; Guess et al., 2019; Unfried & Priebe, 2024), other studies have suggested the opposite (Buchanan, 2020; Vijaykumar et al., 2021). Furthermore, most studies fail to demonstrate any clear association with age once other explanatory variables are accounted for (such as cognitive ability and reasoning bias).

Similarly, there is limited evidence in support of gender differences in the tendency to engage with online misinformation, although the findings are mixed and sporadic. Some studies have suggested women are more likely to engage with online misinformation (Chen et al., 2015; Kozyreva et al., 2020), while others have demonstrated an association with men (Buchanan, 2020; Buchanan & Kempley, 2021; Kim, Sin, & Yoo-Lee, 2014; Unfried & Priebe, 2024). However, most studies have failed to demonstrate any significant gender effects.

2.4.4.2 Political orientation and engagement with online misinformation

Individuals who are particularly engaged with politics are more likely to share online political content, both true and inaccurate (Grinberg et al., 2019; Valenzuela et al., 2019). Furthermore,

partisanship bias has been shown to promote engagement with politically congruent misinformation (Osmundsen et al., 2021; Pennycook et al., 2018) and there is evidence to suggest that ideological concordance with misinformation content is significantly more effective at increasing engagement behaviour compared to belief judgements (Pennycook et al., 2021a). It has also been shown that those at the extreme ends of the political spectrum are more likely to share online political misinformation (Hopp et al., 2020), with some groups doing so intentionally to further their own political cause (Peralta et al., 2021).

However, as was the case with misinformation belief judgements, it has been suggested that those on the political right may be more likely to engage with online misinformation (Chadwick et al., 2022; Wisker & McKie, 2021). This association between conservative political beliefs and increased engagement with online misinformation may stem from the increased exposure to online misinformation experienced by conservatives (Allcott & Gentzkow, 2017; Guess et al., 2019), as well as underlying associations with differences in personality and reasoning among the demographic (Lawson & Kakkar, 2022; Pereira et al., 2021).

In summary, political orientation can serve to increase misinformation engagement via partisanship bias, motivated reasoning, familiarity, and individual differences associated with conservative demographics.

2.4.4.3 Personality and engagement with online misinformation

Several studies have demonstrated a significant link between personality and the tendency to engage with online misinformation, although there is little consistency between studies.

Some have indicated a negative correlation between misinformation engagement and both conscientiousness (Ahmed & Rasul, 2022; Ahmed & Tan, 2022; Buchanan, 2021; Lawson & Kakkar, 2022) and agreeableness (Ahmed & Tan, 2022; Buchanan, 2020; Buchanan & Benson, 2019; Lawson & Kakkar, 2022). These traits reflect pro-social behaviours relating to the adherence to social contracts and polite interpersonal conduct, which may help to explain why they are associated with reduced engagement with online misinformation (e.g., out of concern for social standing and reputation). Both agreeableness and conscientiousness have also been shown to correlate with better truth discernment (Calvillo et al., 2021), which may potentially influence misinformation engagement.

Other studies have demonstrated online misinformation engagement to be positively correlated with extraversion (Gumelar et al., 2018) and openness (Chen, 2016; Ross et al., 2009). As both these traits are associated with an increased desire for social interaction and communication (Lucas et al., 2000; McCrae, 1996), the observed relationship with misinformation engagement may stem from a general tendency to interact with online content in a social manner (e.g., commenting, sharing with others). There has also been evidence to suggest that online misinformation engagement might be negatively correlated with neuroticism (Chen, 2016; Ross et al., 2009), with suggestions that higher levels of neuroticism are associated with more careful social media activity, potentially as a means of avoiding social conflict and avoiding the negative emotions that they are particularly susceptible to (Tong, 2010). In contrast, those with low levels of neuroticism (who experience a relative lack of emotional volatility) may be more likely to obviously share controversial and potentially upsetting online content with others on social media, such as emotionally charged misinformation.

While the exact relationship between the Big Five personality traits and misinformation engagement is not entirely clear, personality traits have been demonstrated to be useful in understanding and predicting online engagement behaviour (Bachrach et al., 2012; Bessi, 2016; Calvillo et al., 2024). For example, by utilising Big Five traits in conjunction with the linguistic patterns of Twitter users, it is possible to develop neural network models that can identify those who are more likely to engage with misinformation ("spreaders"), as well as those more likely to refute it and warn others ("checkers"; Giachanou et al., 2020).

It may be possible for personality constructs outside of the Big Five to shed light on misinformation engagement behaviour. For example, DT traits have been demonstrated to predict different types of problematic online behaviour, such as trolling (Lopes & Yu, 2017), cyberbullying (Kircaburun et al., 2018), and compulsive internet use (Petit & Carcioppolo, 2020). Furthermore, two studies have reported a significant correlation between DT traits the tendency to share online misinformation. Buchanan & Kempley (2021) reported a positive correlation between online misinformation sharing and psychopathy traits, while Morosoli et al. (2022) reported a positive correlation between misinformation engagement and all three DT traits (i.e., narcissism, Machiavellianism, and psychopathy). These findings support the notion that in order to identify personality markers of "disordered" online social behaviour, we should look beyond the standard FFM and focus more on traits associated with unusual social behaviour and differences in reasoning.

2.4.5 Summary

- Social media content is spread via organic reach, facilitated by user engagement.
- Engagement on social media is quick and easy, requiring very little cognitive investment (and therefore facilitating impulsiveness and reactive cognition).
- Social media users do not simply share content they believe to be accurate.
- Intuitive reasoning processes sometimes stand in for accuracy judgements when individuals decide to engage with online content, including online misinformation.
- Those who display an intuitive reasoning bias are more likely to share misinformation due to their tendency to utilise heuristic reasoning.
- Processing fluency and emotional evocativeness are used as heuristic reasoning strategies when intuitively deciding to engage with misinformation.
- There are associations between demographics and misinformation engagement, but these tend to be inconsistent between studies.
- Political orientation has been shown to influence misinformation engagement, specifically when the content is consistent with political beliefs and reflects poorly on out-group members.
- Personality appears to influence online engagement, with studies indicating that differences in Big Five and DT traits correlate with misinformation engagement.

2.5 The potential contributions of Schizotypy and related pseudopathological personality traits to misinformation research.

The current project seeks to expand upon existing online misinformation research by drawing upon research on the set of personality traits collectively known as schizotypy. As the previous sections of this literature review have demonstrated, engagement and belief in online misinformation are both associated with intuitive reasoning biases, heuristic-driven judgement errors, and individual differences in personality and group identity that reflect social influences on behaviour and cognition. Similarly, research has demonstrated that elevated levels of schizotypal personality traits have been associated with greater intuitive reasoning biases, reliance on heuristic reasoning, and differences in social cognition and behaviour. Additionally, a considerable amount of research has demonstrated schizotypal traits to be associated with belief in socio-political conspiracy theories, an area of research that conceptually overlaps with misinformation research.

In the following sections, a brief overview of schizotypy as a construct will be presented, followed by a focus on its links to conspiratorial ideation. Next, some of the links between schizotypy and reasoning biases will be discussed, including specific reasoning biases that may be relevant to online misinformation vulnerability. Finally, drawing upon research that has suggested a diametric relationship between schizotypal and ASD traits, evidence will be presented to suggest that ASD traits may be associated with a reduced vulnerability to online misinformation.

2.5.1 Overview of schizotypy

Schizotypal personality traits were originally suggested to be a prodromal form of schizophrenia, in which many of the same behavioural and cognitive symptoms of schizophrenia are expressed (e.g., social difficulties, delusional beliefs, reduced cognitive capacity), but at sub-pathological levels (Claridge et al., 1996; Karlson, 1970). However, subsequent research demonstrated that most individuals with elevated schizotypy never "progress" to a clinical diagnosis (Chapman et al., 1994; Kwapil & Barrantes-Vidal, 2015) and that schizotypal traits are in-fact commonly expressed among the general populous (Grant et al., 2018; Mohr & Claridge, 2015).

It has also been argued that schizotypal traits may represent an evolutionary strategy that, when expressed optimally, facilitates mating success through the expression of desirable characteristics such as creativity, artistic ability, and sensitivity to the mental state of others (Acar & Sen, 2013; Beaussart et al., 2012; Burch et al., 2006; Del Giudice et al., 2014; Holt, 2019; Mohr &

Claridge, 2015; Nettle, 2006; Nettle & Clegg, 2006; Polner et al., 2018; Rawlings & Locarnini, 2008; Wang et al., 2018a). Therefore, it can be argued that schizotypal traits touch upon a set of characteristics associated with an adaptive behavioural/cognitive phenotype, with psychotic disorders such as schizophrenia representing a pathological manifestation of these otherwise adaptive characteristics (hence their conceptualisation as "pseudopathological" traits).

Schizotypal traits are usually described as belonging to one of three subcategories: positive schizotypy, negative schizotypy, and disorganised schizotypy (Kwapil & Barrantes-Vidal, 2015). Positive schizotypy refers to traits associated with cognitive-perceptual distortions and disturbances in the content of thought. Positive traits are associated with unusual experiences and beliefs, magical thinking, and a tendency to be suspicious of others (especially powerful institutions; see Dagnall et al., 2015). In contrast, negative schizotypy refers to traits associated with deficits or diminishments of cognition and expression. Such deficits are often expressed in the social domain, such as increased levels of social anhedonia, but can also be expressed as a lack of energy (anergia), speech problems (alogia), reduced motivation (avolition), and emotional flattening. Negative traits are often the most problematic forms of schizotypy and have been associated with reduced functionality and well-being. Finally, disorganised schizotypy traits are reflective of disruptions to the ability to plan, organise and engage efficiently with goal-oriented behaviour.

Perhaps the most relevant of these traits to misinformation research is positive schizotypy, as research has demonstrated positive traits to be frequently associated with the endorsement of unusual beliefs (e.g., supernatural/paranormal beliefs; Dagnall et al., 2016; Denovan et al., 2018; MacPherson & Kelly, 2011; Włodarski & Pearce, 2016), including belief in socio-political conspiracy theories (Dyrendal et al., 2021). In the next section of the literature review, the overlap between research into conspiracy theories and online misinformation will be discussed, as well as the relationship between schizotypy and belief in conspiracy theories and how it might help inform our understanding of online misinformation vulnerability.

2.5.2 Conspiracy theories, misinformation, and schizotypy.

Conspiracy theories have been defined as the unnecessary assumption of conspiracy when other explanations are more probable (Aaronovitch, 2009), and their psychological appeal has long been the focus of research (Goertzel, 1994; Hofstadter, 1966; McHoskey, 1995). While conspiracy theories are often thought of as fringe beliefs, it has been shown that many quietly harbour support for these beliefs (up to 50% of participants in some studies; Oliver & Wood, 2014; Wood & Douglas,

2015). Research interest in conspiracy theories began to increase in the mid-2000s due to concerns of increased conspiracy theory exposure associated with mainstream internet adoption (Butter & Knight, 2018). Proponents of conspiracy theories found a welcome home on the internet, where the ease of mass communication facilitated conspiracy theory exposure to those who had no prior interest in the subject and allowed for conspiracy theory-focused communities to form (Bessi et al., 2014; Wood & Douglas, 2015; Zeng & Schäfer, 2021). Similarly, research into the influence of misinformation on social media platforms saw a significant increase after the year 2015 due to events such as the Brexit referendum and Donald Trump's presidential election campaign in which "fake news" disseminated among social media was suggested to influence the outcomes and undermine the democratic process (Butter & Knight, 2020). However, much of this new wave of online misinformation research failed to build upon the earlier foundations laid out by conspiracy theory research on underlying social motivations, cognitive mechanisms, and other identified risk factors.

Some of the research exploring correlates of belief in conspiracy theories appear to mirror the online misinformation literature, such as prior exposure increasing accuracy judgements (Bessi et al., 2014), promotion of conspiracy theories being associated with reduced analytical thinking (Kantorowicz-Reznichenko et al., 2022; Lantian et al., 2021; Lazarevic et al. 2021; wang et al., 18 Dunning, 2021a; Stecula & Pickup, 2021; Tomljenovic et al., 2020), and evidence to suggest that conspiracy theories appeal to heuristics as a means of argumentation (Fong et al., 2021; Rizeq et al., 2021). However, notable in its lack of application among misinformation research is one of the more robust personality predictors of conspiratorial ideation: schizotypy.

Schizotypy has been repeatedly shown to predict the endorsement of conspiracy theories (Barron et al., 2014, Darwin et al., 2011; Dagnall et al., 2015; Denovan et al., 2020; Georgiou et al., 2019; 2021; Goreis & Voracek, 2019; Hart & Graether, 2018; March & Springer, 2019). In contrast, there is very little research exploring schizotypy and online misinformation vulnerability. A single study by Anthony and Moulding (2019) demonstrated that elevated schizotypal personality traits were associated with increased levels of belief in online political misinformation. Similarly, a single study by Buchanan and Kempley (2021) has shown individuals with higher levels of positive schizotypy are more likely to share online misinformation with others.

These studies suggest that the exploration of schizotypy within the context of online misinformation vulnerability is worthy of investigation. Furthermore, by drawing upon research into schizotypal cognition that has previously been applied in the context of conspiracy theory research,

we might be able to gain a better understanding of why schizotypy might be associated with increased vulnerability to online misinformation.

2.5.3 Schizotypal cognition and misinformation vulnerability

Vulnerability to online misinformation has been shown to be facilitated in part by heuristic-driven judgement errors, with those exhibiting an analytical reasoning bias being more resistant and those exhibiting an intuitive reasoning bias being more vulnerable. Similarly, it has been suggested that the link between schizotypy and conspiratorial beliefs may be mediated by an associated overreliance on heuristic processes when engaged in problem-solving (Barron et al., 2018). In line with this perspective, there is direct experimental evidence to suggest that schizotypal traits (particularly positive traits) are associated with increased utilisation of common heuristics and biases when engaged in reasoning and belief formation (Aldebot Sacks et al. 2012; Dagnall et al., 2016). There is also a sizable amount of research indicating that schizotypal personality traits are associated with an intuitive reasoning bias, indicated by performance on the CRT and related measures designed to identify a general predisposition toward intuitive thinking (Broyd et al., 2019; Georgiou et al., 2019; Grant et al., 2014; Pytlik et al., 2020; Sadeghiyeh et al., 2020). Therefore, given the established link between intuitive reasoning biases and susceptibility to online misinformation, schizotypal traits are likely to be a marker of increased vulnerability.

In addition to the general tendency to utilise intuitive reasoning, some of the specific reasoning biases and heuristics associated with schizotypal traits that have been suggested to play a role in promoting the endorsement of conspiracy theories may also be relevant to online misinformation research.

For example, schizotypy is associated with a tendency to distrust others and suspicion toward authority (Brotherton, 2015; Horton et al., 2014). This distrust of authority may promote belief and engagement with online misinformation that goes against mainstream narratives (e.g., embracing narratives that oppose official COVID-19 health information, as reported by Ferreira et al., 2022). Schizotypy is also associated with hypervigilance and heightened threat detection (Green et al., 2001; Ragsdale et al., 2013; Yu et al., 2015), which may make misinformation containing suggestions of threat more salient and convincing.

Similarly, schizotypy has been associated with a tendency to see patterns and agency in randomness, whereby ambiguous or random events are perceived as meaningful and purposeful (de Bézenac et al., 2015; Hart & Graether, 2018; van der Tempel & Alcock, 2015, Wang et al., 2018a). This tendency to see patterns and intentions behind random events may also increase receptivity to factually dubious narratives and "grand conspiracies" presented in online misinformation content. Furthermore, schizotypy is associated with a jumping-to-conclusions bias, in which individuals are more likely to form judgments based on relatively little supporting evidence (Hua et al., 2020; Le et al., 2019; Rodier et al., 2011). This apparent lack of concern over supporting evidence may have implications for online misinformation vulnerability, as individuals may be less capable of discerning accurate and inaccurate claims if they fail to attend to assess the quality of supporting evidence.

These findings collectively suggest that schizotypal personality traits function as a marker of an underlying cognitive phenotype that is significantly more influenced by reasoning biases and reliant upon the application of heuristics when forming judgments and making decisions. Given the suggestion that reasoning biases and the application of intuitive reasoning are key factors in promoting vulnerability to online misinformation, schizotypal personality traits should be explored as potential risk factors.

2.5.4 Overview of ASD traits, the diametric model of Autism-Schizotypy, and potential protective effects

While the focus on the current study is on non-clinical ASD traits, it is worth taking time to outline the distinctions between these traits and clinical ASD. ASD is a neurodevelopmental disorder associated with persistent and debilitating social deficits, combined with a tendency for individuals to engage in restrictive and repetitive patterns of behaviour, interests, or activities (American Psychiatric Association, 2013). Social difficulties associated with ASD are commonly linked to deficits of social-emotional reciprocity, communication (verbal and non-verbal), and relationship management. In contrast, the repetitive and restrictive component of ASD is commonly associated with stereotyped motor movement (i.e., "stimming"), an insistence on sameness, highly fixed special interests, and sensory issues. ASD has also been shown to be associated with numerous differences in cognitive functioning, such as atypical social cognition (Jones et al., 2018) and weak central coherence (i.e., a

tendency to focus on details, which can impair the ability to appreciate wider context and/or see “the big picture”; Booth & Happé, 2018).

Like the conceptualisation of schizotypy, the study of ASD traits began as an investigation into sub-clinical "autism-like" characteristics observed in the immediate relatives of clinical ASD patients (Bailey et al., 1998). However, as the concept of an autism spectrum gained traction, there has been growing recognition that ASD traits are expressed to varying degrees throughout the general population (English et al., 2021; Ruzich et al., 2015). This sub-clinical expression of ASD traits, known as the Broad Autism Phenotype (BAP; De Groot & Van Strien, 2017), has also been associated with a range of adaptive and socially desirable characteristics when expressed at optimal levels (e.g., superior memory, attention, and systemising ability; McDonald, 2021). Several quantitative measures of the BAP are available to researchers (see English et al., 2021; Hurley et al., 2007; Ingersoll et al., 2011), however the Autism Spectrum Quotient (AQ; Baron-Cohen et al., 2001) and its derivatives (e.g., Camodeca et al., 2019) tend to be the most widely utilised across the literature.

Although the relationship between schizotypy and ASD traits has not always been clear (see Nylander et al., 2008), it has been suggested that many of the developmental, behavioural, and cognitive characteristics associated with schizotypal traits are negatively correlated with ASD traits and that these traits represent opposite ends of a continuum that reflects opposing evolutionary strategies (Crespi & Badcock, 2008; Del Giudice et al., 2010; 2014; Dinsdale et al., 2013). In support of this diametric model, there is evidence to suggest that ASD traits are associated with an analytical reasoning bias (Brosnan et al., 2017; Lewton et al., 2019) and resistance to heuristic reasoning (Brosnan et al., 2016; Morsanyi, 2010; Zalla et al., 2014). These findings imply that ASD traits may represent a marker of underlying cognitive biases that exert the opposite influence to schizotypal traits, promoting analytical reasoning over intuitive reasoning (and therefore potentially influencing vulnerability to online misinformation). Furthermore, research suggests that ASD and schizotypy traits display opposite associations with unusual and non-empirical beliefs (with ASD traits being negatively associated with belief in spirituality, the paranormal, and other magical concepts, while schizotypy traits are positively associated with their endorsement; Crespi et al., 2019; Gray et al., 2011; Lindeman & Lipsanen, 2016). Therefore, ASD traits might also reflect a tendency to reject non-empirical or unsubstantiated beliefs, thereby potentially contributing to the rejection of online misinformation which often relies on argumentation based on unlikely, inaccurate, or outlandish claims.

Despite opposing influences on cognition and behaviour attributed to schizotypy and ASD traits in the diametric model, research also indicates that these traits can co-occur at elevated rates (Chisholm et al., 2015; Kincaid et al., 2017; Zhou et al., 2019) and that the co-expression of both traits might result in a compensatory "balancing" effect. For example, there is evidence to suggest the co-expression of ASD traits alongside schizotypal traits reduces the overreliance on reasoning heuristics normally associated with schizotypy (Abu-Akel et al., 2020) and that psychosocial functioning is improved among individuals that express elevated levels of both traits compared to those who predominantly one or the other (Abu-Akel et al., 2022). Therefore, it is also possible that ASD traits may serve to moderate the hypothesised influence of schizotypy on misinformation vulnerability.

Relatively little research has been conducted using ASD traits as predictors of online behaviour and experiences, with most existing research focusing on compulsive internet use and positive effects on well-being and mental health (e.g., Finkenauer et al., 2012; Mazurek, 2013; Ward et al., 2018). During the course of this literature review, no research investigating the role of ASD in relation to engagement and belief in online misinformation was identified. The current project will seek to contribute to this area of research by including ASD traits as a variable of interest under the assumption that ASD traits will influence an opposing effect to schizotypy on reasoning processes and receptivity to online misinformation.

2.5.5 Anti-misinformation interventions and schizotypy: potential moderating effects

Concerns over the proliferation of online misinformation has led to an increase in research aimed at developing effective interventions to mitigate its impact. These interventions employ various strategies, broadly categorized into media literacy education, inoculation techniques, behavioural nudges, and fact-checking/labelling (van der Linden, 2022).

Media literacy interventions have focused on enhancing individuals' critical thinking and analytical skills to evaluate information sources effectively. By teaching users how to identify credible information and recognise indicators of misinformation, these programs aim to reduce susceptibility to inaccurate online content (Guess et al., 2020b). Research has shown media literacy training to be effective at improving users' discernment toward misinformation, however the efficacy of this approach has been suggested to be dependent on the intensity and duration of the intervention (Tully et al., 2020). For example, intensive workshops have been found to be more effective than brief online tutorials (Vraga & Tully, 2021).

Inoculation strategies are based on the notion of "prebunking," whereby individuals are exposed to weakened forms of misinformation to build cognitive resistance against future exposures (Lewandowsky & van der Linden, 2021; McGuire, 1964). Gamified approaches like the "Bad News" game and "Go Viral!" have been successful in increasing resistance to misinformation by educating players on common manipulation tactics (Roozenbeek & van der Linden, 2019; Basol et al., 2021). Furthermore, inoculation interventions have been shown to produce lasting effects and appear to be effective across a range of different cultures and demographics (see van der Linden et al., 2021).

Behavioural nudges are subtle prompts designed to encourage users to reflect before sharing or believing content. Examples include prompts that ask users to consider the accuracy of information or to verify sources before posting (Pennycook et al., 2020). Research indicates that even minimal interventions, such as reminders to think about accuracy, can significantly reduce the spread of misinformation (Fazio, 2020).

Among the most commonly explored interventions are fact-checking approaches that involve the use of warnings and/or corrective feedback as a means of increasing discernment (Walter & Murphy, 2018; Whitehead et al., 2023). With this type of intervention labels or "flags" are commonly linked to online content and used to indicate that content has been disputed or debunked (Clayton et

al., 2020;). Fact-checking interventions can effectively reduce misinformation belief and engagement (e.g., Menna, 2020; Moravec et al., 2020; Pennycook et al., 2018; Walter et al., 2020).

Comparative studies have suggested that all interventions tend to have some positive protective effects, however their efficacy varies based on factors such as user demographics, context of delivery, and the specific topic of the misinformation content (Walter et al., 2021). Inoculation and media literacy interventions tend to have longer lasting effects, but they also require more resources to implement and greater levels of user engagement. Fact-checking and labelling approaches may be slightly less effective (especially among individuals with strong preexisting beliefs or distrust in authorities), however these types of interventions benefit from being highly scalable and effective after brief exposure (Nyhan & Reifler, 2015).

It has been suggested that these interventions aim to engage an individual's analytical reasoning (System 2) to override intuitive, heuristic-based reasoning (System 1; Moravec et al., 2020). As previously discussed, individuals with elevated schizotypy have been suggested to rely more on their intuitive reasoning abilities and exhibit resistance to analytical processing (Broyd et al., 2019). They may also display a reluctance to modify existing beliefs, even when presented with corrective information (Granger et al., 2016). Consequently, individuals with elevated schizotypy may find anti-misinformation intervention techniques to be less effective. To date there has been no research exploring the potential moderating effects of schizotypal traits on misinformation intervention techniques.

2.5.6 Summary

- Schizotypal personality traits are associated with unusual beliefs and underlying differences in cognition.
- Schizotypal personality traits have also been shown to predict endorsement of conspiracy theories and may also prove to be beneficial in online misinformation research.
- Schizotypal cognition is associated with an intuitive reasoning bias and increased reliance on heuristics, both previously shown to be associated with an increased vulnerability to online misinformation.
- Schizotypal cognition is also associated with a range of specific reasoning and perceptual biases that have direct implications for increasing online misinformation vulnerability (e.g., jumping to conclusions bias and BADE).
- Schizotypy and ASD traits have been suggested to exert opposing influences on reasoning, with ASD traits promoting analytical reasoning and suppression of heuristics.
- Therefore, both schizotypal and ASD traits seem worthy of exploration within the context of vulnerability to online misinformation as markers of underlying intuitive vs analytical cognitive phenotypes.
- Schizotypy may reduce the efficacy of intervention techniques designed to reduced online misinformation vulnerability, however there is currently no research exploring this possibility.

2.6 Overview of rationale and hypotheses.

Building upon the rationale outlined in existing online misinformation research, it is expected that reasoning errors associated with heuristic information processing will be a significant driver of online misinformation vulnerability (both in terms of increased belief and increased user engagement). Furthermore, it is suggested that biases in reasoning will further influence this error-driven misinformation vulnerability, as those who are predisposed to think more analytically will tend to make fewer reasoning errors (and therefore be less receptive to misinformation content), while those who think more intuitively will make more reasoning errors (and therefore become more vulnerable to the influence of misinformation).

Therefore, as schizotypal personality traits have been shown to be associated with an intuitive reasoning bias and a reliance on heuristics that appear to promote conspiratorial and factually unsubstantiated beliefs, these traits and their associated differences in cognition will be explored as potential risk factors for misinformation vulnerability. In contrast, since ASD traits have been suggested to exert opposing cognitive effects to schizotypy (e.g., an analytical reasoning bias and heuristic suppression), they will be explored as potential protective factors. Both schizotypy and ASD traits will also be compared alongside the CRT (one of the most utilised reasoning measures in misinformation research) to assess their potential value as predictors of misinformation vulnerability.

In summary, the hypotheses that will ultimately be tested in the current project are as follows:

1. Schizotypal traits will be associated with higher levels of belief and engagement toward online misinformation.
2. ASD traits will be associated with lower levels of belief and engagement toward online misinformation.
3. Measures of cognitive biases and heuristics associated with schizotypal cognition will be associated with higher levels of belief and engagement toward online misinformation.

In addition to these hypotheses, the project will also address some exploratory questions, such as the relationship between belief judgements and engagement, whether the pattern of variables that predict receptivity to misinformation differ from those that predict receptivity to accurate online information, and the extent to which partisanship plays a significant role in promoting misinformation vulnerability.

Chapter 3: Methodology

This chapter will aim to briefly outline the methodological approaches that will be employed in the project. This includes details on research design, participant recruitment, measures, procedure, and analysis that will apply to all research conducted as part of the project. However, the precise research methodology that will be utilised at each stage of the project will ultimately be informed by the findings of the preceding research. Therefore, the methodological approaches outlined below should not be considered an exhaustive list of the analyses and materials that will be used throughout the project but rather a general framework upon which specific methodology will take form at each stage of research.

3.1 Aims and Research Design

This doctoral project will aim to address the following research questions:

- *RQ1 - Can schizotypal personality traits predict misinformation vulnerability?*
- *RQ2 - Can non-clinical ASD traits predict misinformation vulnerability?*
- *RQ3 - Can the relationship between personality traits and misinformation vulnerability be explained by an association with reasoning biases?*
- *RQ4 – How do predictors of misinformation belief differ from predictors of misinformation engagement?*
- *RQ5 – Do schizotypal personality traits moderate the efficacy of existing interventions designed to reduce vulnerability to online misinformation?*

To address these questions, a positivist epistemological approach will be adopted, utilising empirical research methods drawn from the fields of cyberpsychology, misinformation research, and cognitive psychology. The project will employ quantitative analysis using data collected through psychometric questionnaires, performance on cognitive tests, and scenario-based measures. The initial phase of the project will focus on establishing the presence of correlational relationships between the personality measures of interest and vulnerability to misinformation. These findings will then be used to inform the development of an experimental study in the latter stages of the project exploring the potential moderating influence of schizotypy on anti-misinformation interventions.

3.2 Participants

Participant recruitment will be facilitated using the online platform Prolific (Prolific.com). Prolific offers access to individuals willing to take part in online research, allowing researchers access to a large and diverse pool of research participants. Prolific also facilitates the targeted recruitment of specific demographics, which can be used to select demographics that have previously been shown to display elevated vulnerability to online misinformation (thereby recruiting “high responders” to misinformation stimuli in an effort to amplify the detection of associated traits and reasoning biases).

3.3 Materials and Measures

The research materials used to carry out the project will largely consist of self-report psychometric questionnaires designed to assess aspects of personality and other individual differences. For example, one instrument that will be used is the Schizotypal Personality Questionnaire - Brief Revised Updated (SPQ-BRU; Davidson et al., 2016), a psychometric questionnaire designed to assess individual differences in schizotypal personality traits. This measure was designed to be brief and consists of 32 questions (describing characteristics associated with one of four classifications of schizotypy: disorganised traits, interpersonal traits, social anxiety traits, cognitive-perceptual traits). Participants are instructed to read the questions and respond to each item using a 5-point Likert scale.

Additionally, scenario-based behavioural tasks will play a central role in the assessment of participant’s social media behaviour and their potential vulnerability to misinformation. Based on the methodology outlined by Pennycook et al. (2021), participants will be presented with simulated social media content (i.e., images that replicate the format of online news articles that appear in the newsfeed of social media platforms such as Facebook). Participants will then be asked to: 1) indicate their desire to share or interact (i.e., engage) with the content, and 2) report their belief judgements toward the news story (i.e., to what extent do they believe in the accuracy of the presented information). The news stories presented to the participants will consist of a mix of accurate and inaccurate (misinformation) headlines derived from a pre-existing library of real-world social media content previously screened by fact-checking organisations (see Pennycook et al., 2021).

Finally, performance-based measures of cognition will be utilised to explore reasoning processes and the utilisation of mental heuristics among participants. Performance-based measures

are considered more reliable and less influenced by social desirability compared to self-report measures, thereby introducing a relatively objective measure of reasoning style that can be assessed alongside personality and misinformation vulnerability measures. One such performance-based cognitive measure that will be used is the Cognitive Reflection Test (CRT; Frederick, 2005), a test thought to reflect individual differences in the tendency to rely on heuristic reasoning processes when making judgements.

3.4 Procedure

All recruitment and testing of participants will take place online. The use of internet-mediated research methods was decided upon for several reasons: 1) Internet-mediated research has been shown to be reliable and comparable to “offline” studies (Clifford et al., 2015; Riva et al., 2003), 2) As the focus of the project is primarily to investigate online behaviour it can be argued that conducting the research over the Internet might be considered more ecologically valid, 3) The use of online participant recruitment platforms facilitates the testing of specific demographics of interest, 4) This research project started in September of 2020, during the COVID-19 viral pandemic “lock-down” that has resulted in government-mandated restrictions in physical contact between individuals as a means of reducing the spread of the virus. Therefore, an internet-based approach allows social science research to continue during this period of social distancing without causing any additional health risks to those involved.

However, conducting psychological research over the Internet can result in some unique challenges. For example, psychological testing is usually conducted in a controlled environment to reduce distractions and ensure similar testing conditions between participants. When presenting tests and measures in an online context, it is usually not possible to control the testing environment in this way. The relative anonymity of online research can also become problematic when assessing data quality. For example, online researchers are vulnerable to fraud, as participants can find ways to mask their identity and take part in paid tests multiple times. Similarly, online researchers may encounter inauthentic responses to studies generated by bots and other automated programs. These challenges must be taken into consideration and, where possible, mitigated during the design and data collection process at each stage of the research.

3.5 Data Analysis

The statistical methods that will be used during this project will draw upon those utilised in similar research exploring online behaviour, cognitive differences, and personality research. It is anticipated that most of the early analyses will be correlational, primarily utilising multiple regression to identify significant predictive relationships between variables. Additional tests of group differences (t-tests, ANOVA, etc.) may also be employed, along with any other suitable exploratory statistical procedure if deemed appropriate.

3.6 Summary

In summary, the current chapter provides an overview of the methodological framework that will be employed throughout the project. The goal of the project is to investigate a series of research questions that explore the relationship between personality traits, cognitive style, and vulnerability to online misinformation. The research questions will be addressed through a positivist epistemological approach, utilising quantitative analysis with data collected through self-report psychometric questionnaires, scenario-based measures, and cognitive tests. Participants will be recruited through the online platform Prolific, and the research will be conducted entirely online (which poses some additional challenges that will need to be addressed). The statistical analyses will include multiple regression and group comparisons, in addition to any other relevant exploratory techniques. Finally, it should be noted that the methodology at each stage of the project will be adjusted based on the findings of preceding research and, therefore, cannot be fully outlined in this chapter.

Chapter 4: Predicting Right-Wing Political Misinformation Vulnerability: Schizotypy, ASD Traits, and Heuristic Reasoning (Study 1).

The first study in the current project (Study 1) which will seek to explore the relationship between individual differences in personality, social cognition, and heuristic reasoning in relation to right-wing political misinformation vulnerability (i.e., the extent to which individuals believe and/or engage with right-wing political misinformation). Background information relevant to the study will first be summarised, covering topics relating to online misinformation, social media, and heuristic reasoning. A rationale will then be presented to justify the investigation of individual differences relating to schizotypy and non-clinical ASD traits, followed by the proposal of a series of formal hypotheses and additional exploratory research questions. The methodology and results of Study 1 are then described in detail, followed by a reflection on the study's findings and proposals for the next stage of research.

4.1 Introduction

4.1.1 Social media and misinformation exposure

Social media has become a major source of misleading information (i.e., misinformation), posing a threat to the future of democracy and civic discourse (Bennett & Livingston, 2018; Tucker et al., 2018). This issue is further exacerbated by online disinformation campaigns, with governments and private groups increasingly recognising the effectiveness of shaping worldviews through polarising and targeted disinformation disseminated via social media (Bradshaw et al., 2021).

Belief in misinformation spread on social media has led to serious negative outcomes, such as reduced adherence to COVID-19 guidelines (Imhoff & Lamberty, 2020; Mian & Khan, 2020) and the storming of the US Capitol (Munn, 2021). Furthermore, mere exposure to misinformation has been suggested to increase its perceived credibility due to familiarity effects (Allport & Lepkin, 1945; Pennycook et al., 2018; Pennycook & Rand, 2020). Therefore, reducing such exposure is crucial in mitigating its impact.

4.1.2 Engagement with misinformation and organic reach

As previously discussed, the spread of misinformation relies on individuals who share and interact with content, a process known as "organic reach" (Buchanan & Benson, 2019; Facebook, 2019). Notably, false information often spreads further and faster than truthful content (Vosoughi et al., 2018). Additionally, some people appear to share information that they themselves do not believe to be true (see Buchanan & Kempley, 2021). This might occur for multiple reasons, such as attempts to deceive, debunk, or mock. However, regardless of the intention of the user, acts of engagement serve to further increase the organic reach of online misinformation content.

The dissociation between social media users' sharing behaviour and their own beliefs was explored by Pennycook et al. (2021b), who demonstrated that reported sharing intentions for online misinformation did not always imply an underlying belief and may instead reflect errors of reasoning. It has also been demonstrated that when explicitly asked to assess the factuality of a misinformation article that the participant intended to share, they often did not have faith in its accuracy (Pennycook & Rand, 2019a). These results challenge the commonly assumed notion that individuals who share online misinformation are not capable of accurately assessing the truthfulness of the materials they share. Instead, it suggests individuals can share misinformation on social media that they themselves would not rate as accurate because they fail to think *explicitly* about its accuracy when deciding to share.

4.1.3 Individual differences that contribute to the spread of misinformation.

Understanding individual differences that contribute to misinformation spread and belief is essential for developing effective interventions (Bago et al., 2020; Bronstein et al., 2019). Cognitive styles, particularly reliance on intuition, may influence how individuals engage with and endorse misinformation.

4.1.3.1 *The role of heuristic reasoning.*

The dual-process model of reasoning describes two reasoning systems: the intuitive System 1 and the analytical System 2 (Evans & Stanovich, 2013; Kahneman, 2011). System 1 relies on heuristics to facilitate quick decision-making (Ceschi et al., 2019). Some individuals are more prone to utilising heuristics compared to others, potentially making them more susceptible to misinformation as a result of their reduced analytical scrutiny.

The CRT is designed to assess an individual's predisposition toward utilising heuristic reasoning over analytical reasoning when engaged in problem-solving, with poor performance on the test being associated with a heuristic reasoning bias (Frederick, 2005). CRT performance has been shown to negatively correlate with the perceived accuracy of inaccurate news headlines and positively correlated with the perceived accuracy of true headlines (Pehlivanoglu et al., 2021; Pennycook & Rand, 2019b), therefore implying that better CRT performance (i.e., an analytical reasoning bias) is associated with a better ability to discern true from false information. The connection between CRT performance and the ability to discern true from false information has received substantial support, including a study by Greene and Murphy (2020) that showed better CRT performance was associated with resilience to COVID misinformation. Another study by Pennycook et al. (2020a) demonstrated that CRT performance negatively correlated with social media engagement for false headlines, as well as negatively correlating with belief in false headlines.

Better CRT performance has also been shown to relate to wider social media behaviour, such as being more discerning with the types of accounts individuals choose to follow, which subsequently results in reducing the amount of misinformation they are exposed to (Mosleh et al., 2021). These findings imply that an individual's bias toward heuristic reasoning, as measured by the CRT, may play an important role in understanding how they assess and interact with online misinformation.

4.1.3.2 The role of personality factors

In addition to cognitive reflection, several studies have explored personality differences as predictors of engagement with online misinformation. Most of these studies have focused on the significance of "normal" personality traits, such as openness, conscientiousness, extraversion, agreeableness, and neuroticism (Buchanan, 2020; Buchanan & Benson, 2019; Giachanou et al., 2020; Lawson & Kakkar, 2022). While many of these studies found significant associations between personality traits and online engagement with misinformation, the results have been inconsistent.

However, these studies indicate that personality traits may be a fruitful avenue of research for those attempting to understand the individual differences that influence interactions with misinformation. Exploring personality traits beyond the Big Five is the next step in this process.

4.1.3.3 Exploring the role of schizotypy.

Building on conspiracy theory research, schizotypy has been identified as a predictor of conspiratorial ideation and may influence misinformation belief and engagement (Dyrendal et al., 2021; Goreis & Voracek, 2019).

The common conceptualisation of schizotypy follows a multidimensional structure built upon the classifications used to describe psychosis-related symptoms (such as those observed in schizophrenia patients). Schizotypal traits are usually described in terms of Positive, Negative, and Disorganised traits (Kwapil & Barrantes-Vidal, 2015). Of particular interest in the current study is the relationship between the cognitive-perceptual aspects of positive schizotypy and engagement/belief in online misinformation. Previous research has demonstrated that positive schizotypal traits are associated with the endorsement of unusual beliefs (e.g., paranormal beliefs; Dagnall et al., 2016; Denovan et al., 2018) and socio-political conspiracy theories (Barron et al., 2014, Denovan et al., 2020).

It has been suggested that the link between positive schizotypy and conspiratorial belief may be partially mediated by cognitive differences associated with positive schizotypy that promote the utilisation of heuristic reasoning processes (Barron et al., 2018; Hua et al., 2020; Orenes, 2012). Positive schizotypy has also been shown to be associated with poor performance of the CRT, indicating an association with a heuristic processing bias (Broyd et al., 2019). Therefore, it may be the case that positive schizotypy is associated with belief and engagement with online misinformation due to an association with heuristic reasoning errors. However, details on the nature of this potential relationship are currently unknown as there is very little research that has investigated the role of schizotypy in relation to online misinformation belief and engagement.

4.1.3.4 Exploring the role of ASD traits.

ASD traits may also be relevant due to their suggested diametric relationship with schizotypy (Crespi & Badcock, 2008).

ASD traits have previously been associated with reduced utilisation of heuristic reasoning (Brosnan et al., 2016; Morsanyi, 2010), as well as a moderating effect on the heuristic reasoning bias associated with schizotypal personality traits (Abu-Akel et al., 2020). ASD traits have also been shown to positively correlate with CRT performance, implying an association with an analytical-reasoning bias (Brosnan et al., 2017).

Relatively little research has been conducted using ASD traits as predictors of social media behaviour, with most existing research focusing on compulsive internet use and positive effects on wellbeing and mental health (e.g., Finkenauer et al., 2012; Mazurek, 2013; Ward et al., 2018). As far as we are aware, no research has been conducted investigating the role of ASD in relation to engagement and belief in online misinformation. If the proposed role of heuristic reasoning on misinformation engagement and belief is correct, we might expect to find ASD traits to be a protective factor due to their association with an analytical-reasoning bias.

4.1.4 Research questions and hypotheses.

Study 1 will seek to address the following research questions:

1. Can schizotypy and ASD traits predict vulnerability to political misinformation?
2. Does the CRT continue to play a significant role in predicting vulnerability to political misinformation once the role of schizotypy and ASD traits have been accounted for?

4.1.4.1 Hypotheses

The research questions above will be investigated by exposing participants to accurate and inaccurate news headlines and then collecting self-report measures of participant belief judgements and intentions to engage. These measures will be analysed alongside measures of the participant's personality traits and cognitive reflection ability to examine their relationship with measures of engagement and belief in misinformation stimuli. The collected data will then be analysed using a series of regression analyses.

It was predicted that the expression of positive schizotypal personality traits will be associated with increased scores on measures of misinformation engagement and belief. This hypothesis was based partly on the previously demonstrated link between cognitive-perceptual aspects of schizotypy and belief in conspiracy theories. As the role of schizotypy in relation to online misinformation may differ from its role in the belief of socio-political conspiracy theories, it was decided to include the full range of measures for schizotypal traits (i.e., positive, negative, and disorganised). While the full spectrum of schizotypal traits would be tested, an explicit hypothesis will only be made in relation to the cognitive-perceptual (i.e., positive) elements. Therefore, hypothesis 1 is:

H1a: Cognitive-perceptual schizotypy will be a significant positive predictor of misinformation engagement.

H1b: Cognitive-perceptual schizotypy will be a significant positive predictor of misinformation belief.

It was also predicted that increased levels of non-clinical ASD traits will be associated with reduced social media engagement and belief in relation to misinformation headlines. Therefore, hypothesis 2 is:

H2a: ASD traits will be a significant negative predictor of misinformation engagement.

H2b: ASD traits will be a significant negative predictor of misinformation belief.

Finally, it was hypothesised that better performance on measures of cognitive reflection will be associated with reduced social media engagement and belief in relation to misinformation headlines. Therefore, hypothesis 3 is:

H3a: CRT performance will be a significant negative predictor of misinformation engagement.

H3b: CRT performance will be a significant negative predictor of misinformation belief.

4.1.4.2 Exploratory research questions.

In addition to the hypotheses and research questions outlined above, the study also sought to explore several additional questions without forming a formal hypothesis regarding the outcome.

The first exploratory research question asked if the results of the analysis for misinformation headlines differed from an identical regression analysis using belief and engagement measures for accurate headlines. No formal hypothesis regarding the outcome of this comparison will be made. However, if heuristic reasoning was a driving factor in the engagement and belief of inaccurate headlines *only*, we may expect to see discrepancies in the significance and strength of the relationship with schizotypy, ASD traits and CRT/CRT2 between the two types of headlines.

The second exploratory research question relates to the efficacy of measuring political news-sharing habits to predict misinformation vulnerability. A recent study exploring social media engagement with misinformation content indicated that simply asking participants the extent to which they shared political news online was a powerful predictor of engagement behaviour (Buchanan & Kempley, 2021). By including this variable in the current study, we can both 1) Attempt to replicate these findings, and 2) Explore the predictive utility of measures of heuristic reasoning (i.e., schizotypy, ASD traits, and CRT/CRT2) beyond their association with online political news sharing behaviour.

4.2 Method

The study was conducted using the Qualtrics research platform, a popular online platform used to deliver survey materials. All participants were drawn from the Prolific research panel (www.Prolific.com). Hypotheses and primary analyses were preregistered using the AsPredicted platform (see Appendix A for a copy of the preregistration document). All statistical analysis was conducted using SPSS 25 for Windows.

4.2.1 Materials and stimuli.

Reliability was assessed for each measure included in the primary analysis. Alpha values presented below were all derived from the current dataset.

4.2.1.1 Schizotypal personality questionnaire – brief revised updated (SPQ-BRU; Davidson et al., 2016).

The SPQ-BRU is a self-report measure of schizotypal personality traits designed for use among non-clinical populations. The SPQ-BRU is an updated version of the *Schizotypal personality questionnaire – brief revised* (SPQ-BR, Cohen et al., 2010), which itself is a brief version of the full-length *Schizotypal Personality Questionnaire* (SPQ; Raine, 1991).

The SPQ-BRU consists of 32 questions measured using a 5-point Likert scale, separated into the following nine sub-scales: *No Close Friends* ($\alpha = .80$), *Constricted Affect* ($\alpha = .60$), *Eccentric Behaviour* ($\alpha = .85$), *Odd Speech* ($\alpha = .85$), *Unusual Perceptions* ($\alpha = .73$), *Magical Thinking* ($\alpha = .82$), *Ideas of Reference* ($\alpha = .82$), *Suspiciousness* ($\alpha = .78$), *Social Anxiety* ($\alpha = .89$). The 9 SPQ-BRU sub-scales form four higher-order factors: *Interpersonal* ($\alpha = .80$), *Cognitive-perceptual* ($\alpha = .88$), *Disorganised* ($\alpha = .86$), *Social Anxiety* ($\alpha = .89$). The Interpersonal (IP) factor is made up of the No Close Friends and Constricted Affect sub-scales, while the Disorganised (D) factor consists of the Eccentric Behaviour and Odd Speech sub-scales, and the Cognitive-perceptual (CP) factor consists of the Suspiciousness, Ideas of Reference, Magical Thinking and Unusual Perceptions sub-scales. The Social Anxiety (SA) Factor consists of only the Social Anxiety sub-scale. In terms of their relation to the classical conceptualisation of schizotypal traits, positive traits are represented by the CP domain, negative traits are represented by the IP and SA domains, and disorganised traits are represented by the D domain.

4.2.1.2 Autistic Spectrum Quotient – 9 (AQ-9; Jia et al., 2019).

To measure nonclinical ASD traits, it was decided to utilise a derivative of the AQ (Baron-Cohen et al., 2001) as this measure has previously been used by researchers to quantify the

expression of ASD traits within the nonclinical adult population (e.g. Baron-Cohen et al., 2001; Hoekstra et al., 2007; Wheelwright et al., 2010). To limit participant load and overall length of the testing phase the current study utilised the AQ-9, a brief measure adapted from the original full-length AQ. The AQ-9 consists of nine items scored using a seven-point Likert scale, separated into two subscales that consisting of *Social Communication* (SC; $\alpha = .85$) and *Attention to Detail* (AD; $\alpha = .74$). These two subscales reflect the core ASD traits of social-communication difficulties and restrictive and repetitive interests.

4.2.1.3 *Cognitive Reflection Test (CRT; Frederick, 2005)/Cognitive Reflection Test 2 (CRT-2; Thomson & Oppenheimer, 2016).*

The CRT ($\alpha = .69$) and CRT-2 ($\alpha = .57$) are both performance-based measures of “miserly information processing” (i.e., the tendency to utilise heuristic-based reasoning skills, as opposed to the more cognitively demanding analytical reasoning skills). These measures present participants with a series of questions in which the seemingly intuitive answer is incorrect, requiring the participants to inhibit their intuitive response and engage analytically with the question to arrive at the correct answer. For example, consider the following question derived from the CRT-2:

“If you’re running a race and you pass the person in second place, what place are you in?”.

The intuitive (and incorrect) answer is that you are now in first place, whereas the less obvious (but correct) answer is that you would now be in second place (see Appendix A for a full list of CRT and CRT-2 questions).

The CRT consists of three questions, whereas the CRT-2 consists of four questions. The CRT-2 was adapted from the CRT to create a similar measure that was: 1) Less familiar to research participants, and 2) Less reliant on a participants’ numeracy skills. In the current study, the items from both the CRT and CRT-2 were presented in succession (with the CRT-2 items being shown first, followed by the CRT items). The scores for both the CRT and CRT-2 were combined into a single variable named *CRT/CRT2* ($\alpha = .75$).

4.2.1.4 *Social Media News Engagement/Belief Task.*

This task involved showing participants a series of image stimuli simulating a news article headlines encountered on a social media feed. The stimuli consisted of six right-leaning partisan headlines that had previously been circulated on social media, derived from pre-tested materials made available by Pennycook et al. (2021a). An equal number of accurate (i.e., true) and inaccurate

(i.e., false) headlines were selected from the pre-tested library, with the aim of creating two sets of stimuli that were appealing to right-wing participants and roughly equal in terms of partisan appeal (see Appendix B).

Right-leaning headlines were used so that the headline stimuli were congruent with the political identity of the study's participants (participants were selected based on their right-leaning political identity; see section 4.2.3.2). Additionally, the decision to focus on right-wing stimuli at this initial stage was taken due to the relative abundance of right-wing misinformation on social media platforms, as well as evidence that suggests engagement with online misinformation is more prevalent among right-leaning individuals (Chen et al., 2020; Guess et al., 2019). Participants were shown the full set of stimuli twice. The first round of stimuli exposure was accompanied by self-report measures designed to assess engagement, while the second round was accompanied by measures of belief (see Figure 4.1 for the full set of stimuli). The reason for presenting engagement and belief measures separately was due to previous research suggesting that individuals are more likely to activate their analytical reasoning abilities when asked to reflect on their beliefs (Pennycook et al., 2021b). Therefore, to avoid externally priming participants with an analytical mindset when asking them to report engagement behaviour (thus potentially obscuring impacting influence on their own reasoning biases), engagement measures were collected first and separately from belief measures.

The intention to engage with the headline stimuli was assessed using four self-report measures, which probed the participant's likelihood of 1) "liking", 2) commenting, 3) sharing, or 4) reacting by posting an emoji. Each aspect of engagement was measured using a 6-point Likert scale. Cronbach's Alpha was calculated using all the engagement measures for misinformation headlines ($\alpha = .93$) and accurate headlines ($\alpha = .93$). These individual engagement scores were then summed and averaged to create two composite variables that would be utilised in the planned regression analyses.

Measures of belief in the factual accuracy of the presented headline were collected using a single self-report item per headline with the following question: "To the best of your knowledge, is the claim in the above headline accurate?". Participants responded to this question using a 4-point Likert scale. Cronbach's Alpha was calculated using all the belief measures for misinformation headlines ($\alpha = .55$) and accurate headlines ($\alpha = .58$). The reliability analysis fell short of normally accepted cut-off values (i.e., $\alpha > .70$; George & Mallery, 2003), however due to the nature of the stimuli this might be explained by the heterogeneity of the headline content (i.e., while headlines were selected based on

their appeal to right-wing partisanship, they inevitably differed on numerous other characteristics which might influence the extent to which an individual expressed belief in their accuracy). Belief measures for misinformation stimuli were combined and averaged, as were the measures of belief in accurate stimuli, for the purposes of the planned regression analyses.

4.2.2 Procedure.

Upon recruitment, participants were directed to the Qualtrics online testing platform where they were presented with a set of instructions informing them of the upcoming tasks, as well as requesting their consent and detailing their rights as a research participant (e.g., their right to withdraw from the study at any point). After providing their informed consent, the participants were presented with a questionnaire requesting demographic information. Collected demographic information consisted of the following: *Age, Gender, Country of residence, Education level, Political orientation, Political news-sharing habits, and Frequency of social media use*. Next, the participants were provided with the Social Media News Engagement and Belief Task. Following this, participants were presented the CRT-2, followed by the CRT. Participants were then presented with the SPQ-BRU, followed by the AQ-9. After completing these tasks, participants were asked to reconfirm their consent to use the data for the purposes of research.

After completing all questions, participants were presented with a debrief further explaining the purpose of the study and providing additional information resources alongside contact details of the researcher for any follow up queries. During the debrief, it was made clear to participants which of the presented stimuli were known to be misleading and a link to the UK government's SHARE checklist was made available. The SHARE Checklist was created by the UK Government to help assist the public in identifying misleading information online. See Appendix C to view all testing materials, including the debrief and participant information sheet.

Figure 4.1 - News headline Stimuli.

<i>Misinformation Stimuli (Fake Headlines).</i>	<i>Accurate headline stimuli (True Headlines).</i>
 <p>THELASTLINEOFDEFENSE.ORG</p> <p>Nancy Pelosi's Son Arrested For Murder</p>	 <p>REUTERS.COM</p> <p>Plant a trillion trees: Republicans offer fossil-friendly climate fix</p>
 <p>YOURNEWswire.COM</p> <p>Hillary Clinton Accepted \$30,000 Donation From NXIVM Child Sex Cult</p>	 <p>FOXNEWS.COM</p> <p>USPS flashback: Obama administration removed thousands of mailboxes</p>
 <p>WORLDNEWSDailyREPORT.COM</p> <p>Kenya: Authorities Release Barack Obama's "Real" Birth Certificate</p>	 <p>NYTIMES.COM</p> <p>Justice Dept. Says Facts Did Not Justify Continued Wiretap of Trump Aide</p>

Note: Images in the left column were used as misinformation stimuli, while the images in the right column were used as accurate stimuli.

4.2.3 Participants.

4.2.3.1 Power analysis.

An a priori power analysis was conducted in G*power 3.1 based on providing adequate power ($\alpha = 0.05$, power = 80%) for a multiple regression analysis. With a total of 12 preregistered predictor variables per regression model and an expected R^2 value of above 0.08 (based on previous research exploring similar variables, such as Buchanan & Kempley, 2021), a minimum sample size of 211 participants was required. To account for participant attrition, a total sample of approximately 250 was sought.

4.2.3.2 Participant recruitment.

Participants were recruited based on their political orientation. The study incorporated right-wing/conservative individuals (and right-wing news stimuli) for four reasons:

1. Political misinformation on social media tends to be hyper-partisan, polarising and designed to appeal to a specific group identity (Osmundsen et al., 2021; Rini, 2017). By using conservative participants and matching them to misinformation that is congruent with their political identity, the aim was to create a situation in which misinformation was likely to be effective, thereby creating an opportunity to study the additional factors (beyond political congruence) that might facilitate the efficacy of political misinformation.
2. Research indicates an asymmetry in the proliferation of political misinformation, with right-wing individuals being more prone to engaging with such materials (Wisker & McKie, 2021).
3. It has been suggested that right-wing politicians have a stronger incentive to spread misinformation due to the relative lack of value attributed to epistemic virtues by the political right (Baron & Jost, 2019).
4. Political Conservatism has been associated with a reduced ability to discern between true and false news headlines (Calvillo et al., 2020).

In addition, it was decided to specifically recruit US participants who had previously voted for Donald Trump in the 2020 presidential election. This decision was made to select participants who were likely to have already been exposed to a significant amount of political misinformation, considering that Donald Trump utilised misinformation regularly in his political campaigning (Evanega et al., 2020; Kessler et al, 2021; Ross & Rivers, 2018; The Guardian, 2020). It was hypothesised that this demographic might potentially be particularly susceptible to believing online misinformation and,

therefore, would be a good target demographic in the exploration of underlying cognitive processes that might promote belief in misinformation.

4.2.3.3 Inclusion criteria.

A sample of 251 participants was collected from the Prolific research panel. Each participant was paid £1.25 GBP for their involvement in the study. Inclusion criteria (facilitated using Prolific's audience filters) consisted of the following: 1) Age over 18, 2) US residents, 3) English as a first language, 4) US political spectrum: Conservative, 5) US political affiliation: Republican, Independent, Other, 6) US presidential election 2020: Donald Trump. Participant data was collected in three stages over four days. The first stage of recruitment used only the previously outlined inclusion criteria, while the second and third recruitment stages recruited only women to balance the gender ratio.

4.2.3.4 Excluding problematic responses.

Data was screened for problematic responses, and participants were excluded from the analysis using the following criteria: 1) Declining consent for the use of collected data, 2) Zero variance in the item responses to measures of schizotypy and ASD (indicative of "straight-lining"), 3) Reporting an age below 18, 4) Implausibly fast completion time (more than 2SD below mean completion time).

In addition to the exclusion criteria outlined above, participants were also assessed using fraud metrics provided by the Qualtrics platform. Qualtrics provides two measures of fraud: RelevantID and Google's invisible reCAPTCHA (Qualtrics, 2022). These metrics indicate the likelihood of a participant trying to take the survey multiple times (in the case of the RelevantID duplicate score), as well as the use of automated bots (in the case of the invisible reCAPTCHA and RelevantID fraud score). Participants were excluded from the analysis if: 1) a participant's RelevantID fraud score was shown to be greater than or equal to 30 (indicative of bot activity), 2) a participant's RelevantID duplicate score was shown to be greater than or equal to 75 (indicative of a duplicate response), 3) a participant's invisible reCAPTCHA score was shown to be below 0.5 (indicative of bot activity). Of the 24 participants who were flagged for exclusion from the data analysis, four were found to display zero variance in either the measures of schizotypy or ASD traits, three were flagged due to their reCAPTCHA score, five were flagged due to their RelevantID duplicate scores, and 16 were flagged due to their RelevantID fraud scores (please note, some participants were flagged on multiple markers of quality).

4.2.3.5 Final sample characteristics.

The final sample had an $n = 227$ and was 49% male, with a mean age of 43.29 (SD = 15.25). This sample size meets the minimum requirements outlined in the power analysis and, therefore, provides adequate statistical power for the proposed analysis. Please see Table 4.1 for a breakdown of the participant characteristics.

Table 4.1 - Participant demographic characteristics (n = 227)

Demographic variables		
	<i>n</i>	%
Gender		
Female	116	51.1
Male	111	48.9
Age		
18-30	55	24.2
31-40	50	22
41-50	40	17.6
51-60	46	20.3
61+	36	15.9
Highest educational level		
Less than High School	1	0.4
High School / Secondary School	31	13.7
Some post-school College or University	57	25.1
College or University undergraduate degree	94	41.4
Master's Degree	39	17.2
Doctoral Degree	2	0.9
Professional Degree (JD, MD)	3	1.3
Frequency of social media use		
Several times a day	153	67.4
About once a week	48	21.1
A few times a week	15	6.6
Every few weeks	4	1.8
Less often	4	1.8
Not at all	3	1.3
Political orientation (1=Strongly Democrat and 11=Strongly Republican).		
1-3	1	0.4
4-6	19	8.4
7-9	105	46.3
10-11	102	44.9
Frequency of political news sharing on social media		
Not at all	65	28.6
Very rarely	56	24.7
Rarely	34	15
Occasionally	59	26
Very frequently	13	5.7

4.3 Results

4.3.1 Data scoring and transformation.

4.3.1.1 Changes to the coding of Gender.

Upon the collection of participant data, it was noted that all the participants had self-reported their gender as either male or female (out of the 4 multiple choice options presented to participants, which consisted of *male*, *female*, *other*, and *prefer not to say*). As a result, gender was recoded into a binary variable for use in the regression analysis (women = 0, men = 1).

4.3.1.2 Scoring of CRT and CRT-2 items.

Participants were given a text box to respond to each of the CRT and CRT-2 questions. To convert these strings of text into a quantified score, the participant's answers were examined and manually scored by the researcher as a binary variable for each question (correct = 1, incorrect = 0). The sum of the CRT and CRT-2 questions was combined into the variable *CRT/CRT2* for use in the regression analysis.

4.3.2 Preliminary analysis.

4.3.2.1 – Data screening and descriptive statistics.

Data was screened for missing values, reliability, skewness, and kurtosis (see Table 4.2 for descriptive statistics of the variables utilised in the data). There were no missing values in the dataset. Of the variables included in the data analysis, measures of *engagement with false headlines* and the *frequency of social media use* were shown to be significantly positively skewed (i.e., a skewness statistic over the value of 1). See Appendix D for histograms of the belief and engagement measures, in addition to demographic features. Kurtosis was significant (+/- 3 in SPSS output; Field, 2013) in the case of *frequency of social media use*. However, due to the sample size used in the current study, the lack of normality in the distribution of these scores was thought to not pose a significant problem (see Schmidt & Finan, 2018). While in the past, researchers would routinely utilise logarithmic and square root transformations to change the distribution of skewed data, these acts of data transformation can obfuscate the interpretation of the results (Feng et al., 2014). It was therefore decided that the skewed variables would not be transformed and that nonparametric statistical approaches would be used to confirm the outcomes of the regression analysis.

4.3.2.2 – Gender differences.

Group differences between male and female participants were examined. A one-way ANOVA was used to test for differences between male and female participants for all the variables included in

the analysis (see Appendix E for descriptive statistics divided by gender). The assumption of homogeneity of variance was assessed for each variable and was not found to be violated.

Only IP schizotypy was shown to significantly differ between men and women according to the results of the ANOVA ($F(1,225) = 6.82, p = .01$), with men scoring significantly higher ($M=15.36, SD=5.04$) compared to women ($M=13.63, SD=4.94$). These results suggest that men and women in the current participant sample significantly differed in relation to the expression of interpersonal difficulties associated with schizotypy, and therefore gender should be included as a control variable in the regression analysis to account for this relationship. As gender was already planned to be used as a control variable, these results did not alter the originally proposed methodology.

Table 4.2 - Descriptive statistics for predictor and outcome variables used in the regression analysis.

Variables			Skewness		Kurtosis		Cronbach's Alpha (α)
	<i>M</i>	<i>SD</i>	Statistic	Std. Error	Statistic	Std. error	
Gender	.49	0.50	0.04	0.16	-2.02	0.32	-
Age	43.29	15.25	0.15	0.16	-1.05	0.32	-
Education level	3.69	1.04	0.14	0.16	0.32	0.32	-
Frequency of social media use	1.53	0.98	2.46	0.16	6.70	0.32	-
CRT/CRT2 scores	4.01	2.02	-0.29	0.16	-0.97	0.32	.75
Attention to detail (AD ASD)	4.11	1.28	-0.11	0.16	-0.54	0.32	.74
Social communication (SC ASD)	3.58	1.32	0.27	0.16	-0.45	0.32	.85
Cognitive-Perceptual (CP Schizotypy)	1.90	0.66	0.62	0.16	-0.13	0.32	.88
Interpersonal (IP Schizotypy)	2.41	0.84	0.37	0.16	-0.38	0.32	.80
Disorganised (D Schizotypy)	2.44	0.83	0.09	0.16	-0.55	0.32	.86
Social anxiety (SA Schizotypy)	2.79	1.11	0.04	0.16	-1.01	0.32	.89
Frequency of political news sharing on social media	2.56	1.30	0.24	0.16	-1.28	0.32	-
Engagement with false headlines	2.05	1.20	1.20	0.16	0.62	0.32	.93
Engagement with accurate headlines	2.43	1.23	0.68	0.16	-0.20	0.32	.93
Belief in false headlines	1.90	0.66	0.52	0.16	-0.30	0.32	.55
Belief with accurate headlines	2.71	0.66	-0.33	0.16	0.03	0.32	.58

4.3.3 Regression analysis

All preregistered hypotheses were tested using a series of multiple regression analyses. The first regression model would explore the predictive value of the four schizotypy domains assessed by the SPQ-BRU, the two ASD trait domains assessed by the AQ-9, cognitive reflection measures as assessed by the CRT/CRT2, and *misinformation engagement* scores on the outcome measure of *misinformation belief*. The second regression model would also utilise the same four SPQ-BRU domains, as well as the two AQ-9 domains and CRT/CRT2 scores; however, the outcome variable would be changed to *misinformation engagement* scores. Measures of *misinformation belief* will also be included as a predictor variable in this analysis. Both regression models included control variables, consisting of demographic measures (*age, sex, education level*) and *frequency of social media use*.

4.3.3.1 – Bivariate correlations.

Bivariate correlations were produced for all outcome measures and predictor variables included in the current study (see Table 4.3). The correlation matrix was assessed for signs of multicollinearity among predictor variables (e.g. a correlation between predictor variables $>.70$; Daoud, 2017). The only predictor variables which indicated signs of multicollinearity were the measures of CP schizotypy and Disorganised schizotypy ($r(225) = .70$). However, upon inputting these variables into the regression model, it was noted that the variance inflation factor (VIF) for each predictor variable was well with acceptable limits ($VIF < 5$), indicating no multicollinearity problems (Miles, 2014).

It was noted that one of the ASD domains, AD traits, was positively correlated with both CP schizotypy and D schizotypy. This was unexpected, considering that the AD measure was thought to tap into elements of analytical scrutiny and attention to detail, while CP and D schizotypy are more commonly associated with heuristic reasoning and disordered attention. Similarly, SC ASD traits were positively correlated with all schizotypy domains but displayed the strongest associations with SA and IP schizotypy (traits associated with social difficulties).

4.3.3.2 – Outcome of preregistered regression analysis.

Two regression models were constructed using the enter method in accordance with the preregistered analysis. The regression models were checked for homoscedasticity and normally distributed residuals by examining p-p plots and scatter plots. Both regression models were found to conform to the assumptions of homoscedasticity and normal distribution of residuals.

Model 4.1 sought to predict measures of engagement with fake headlines (see Table 4.4). The predictor variables entered into the regression model consisted of demographic variables (*age, gender, education level, frequency of social media use*), CRT/CRT2 scores, ASD traits (i.e., SC and AD measures), CP schizotypy scores, IP schizotypy scores, D schizotypy scores, SA schizotypy scores,

and self-reported belief in false headlines. The regression model was shown to be significant ($F(12,214) = 5.39, p < .001$), with an adjusted $R^2 = .19$. The significant predictor variables for this regression model were *cognitive-perceptual schizotypy scores* ($\beta = .34, p < .001$) and *belief in false headlines* ($\beta = .33, p < .001$).

Model 4.2 sought to predict measures of belief in false headlines (see Table 4.4). The predictor variables were identical to Model 4.1, except for the inclusion of *engagement with false headlines* in place of *belief in false headlines*. This regression model was also shown to be significant ($F(12,214) = 4.15, p < .001$) with an adjusted $R^2 = .14$. The significant predictor variables for this regression model were *CRT/CRT2 scores* ($\beta = -.13, p = .05$) and *engagement with false headlines* ($\beta = .35, p < .001$).

Table 4.3 - Bivariate correlations for predictor and outcome variables.

Variables	Correlation (Pearson's <i>r</i>)														
	Variables														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Gender	-.12	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Education level	-.03	.00	1.00	-	-	-	-	-	-	-	-	-	-	-	-
4. Frequency of social media use	.10	.03	-.02	1.00	-	-	-	-	-	-	-	-	-	-	-
5. CRT/CRT2 scores	.04	.09	.03	-.11	1.00	-	-	-	-	-	-	-	-	-	-
6. Attention to detail (ASD)	-.05	.11	.12	.09	.01	1.00	-	-	-	-	-	-	-	-	-
7. Social communication (ASD)	-.16*	.00	-.05	-.02	.13	-.05	1.00	-	-	-	-	-	-	-	-
8. Cognitive-Perceptual (Schizotypy)	-.36***	.01	-.05	.00	-.19**	.27***	.19**	1.00	-	-	-	-	-	-	-
9. Interpersonal (Schizotypy)	-.22***	.17**	-.02	-.09	.11	.10	.60***	.45***	1.00	-	-	-	-	-	-
10. Disorganised (Schizotypy)	-.35***	-.07	-.01	-.07	-.04	.21**	.31***	.70***	.49***	1.00	-	-	-	-	-
11. Social anxiety (Schizotypy)	-.35***	-.09	-.05	-.06	.01	.04	.54***	.45***	.45***	.56***	1.00	-	-	-	-
12. Frequency of political news sharing on social media	.04	.04	-.02	-.25***	-.16*	.05	-.12	.21***	.02	.04	-.02	1.00	-	-	-
13. Engagement with false headlines	-.04	.07	-.05	-.05	-.16*	.09	-.11	.27***	.00	.10	.01	.43***	1.00	-	-
14. Engagement with accurate headlines	.08	.09	.01	.02	-.17**	.15*	-.26***	.21**	-.07	-.01	-.12	.52***	.73***	1.00	-
15. Belief in false headlines	.09	-.10	.04	.10	-.20**	.09	-.10	.06	-.11	-.03	-.06	.11	.35***	.19**	1.00
16. Belief with accurate headlines	.05	-.03	-.01	.05	.02	.03	-.12	-.03	-.16*	-.03	.00	.09	.16*	.27**	.30**

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

Table 4.4 - Summary of regression analysis for Model 4.1 & Model 4.2.

Variables	Model 4.1 (DV = Engagement with false headlines)			Model 4.2 (DV = Belief in false headlines)		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Age	0.02	0.06	0.03	0.01	0.01	0.06
Gender	3.46	1.85	0.12	-0.44	0.26	-0.11
Education level	-0.66	0.85	-0.05	0.10	0.12	0.05
Frequency of social media use	-1.50	0.90	-0.10	0.17	0.13	0.09
CRT/CRT2 scores	-0.26	0.46	-0.04	-0.13	0.06	-0.13*
Attention to detail (AD ASD)	-0.04	0.18	-0.01	0.03	0.03	0.07
Social communication (SC ASD)	-0.17	0.18	-0.08	0.01	0.03	0.02
Cognitive-Perceptual (CP Schizotypy)	7.41	2.02	0.34***	-0.03	0.29	-0.01
Interpersonal (IP Schizotypy)	-0.89	1.51	-0.05	-0.09	0.21	-0.04
Disorganised (D Schizotypy)	-1.10	1.65	-0.06	-0.08	0.23	-0.03
Social anxiety (SA Schizotypy)	-0.19	1.10	-0.02	-0.02	0.15	-0.01
Engagement with false headlines	-	-	-	0.05	0.01	0.35***
Belief in false headlines	2.44	0.46	0.33***	-	-	-
Adjusted R²	.19			.14		
F	5.39***			4.15***		

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

Significant values in bold.

4.3.4 Exploratory hierarchical regression analysis.

Following the regression analysis as outlined in the preregistration document, it was decided to conduct several hierarchical regression analyses to explore: 1) Changes to the significance and strength of predictor variables at each stage of the regression, 2) The contribution of the *political news-sharing* measure to the regression model, and 3) The exploration of belief and engagement measures for true headlines as outcome variables using the same predictor variables utilised in the regression for fake headlines.

4.3.4.1 Structure of hierarchical regression models.

Four hierarchical regression models were constructed with the following measures as the dependent variable: *engagement with false headlines* for Model 4.3, *belief in false headlines* for Model 4.4, *engagement with accurate headlines* for Model 4.5, *belief in accurate headlines* for Model 4.6 (see Appendix F). All assumptions of multicollinearity, homoscedasticity and distribution of residuals required for regression analysis were found to be met for each regression model. Reliability statistics for belief and engagement measures for *accurate* headlines can be found in Table 4.2.

Predictor variables were entered into the hierarchical regression in 5 blocks using the enter method, in which Blocks 4 and 5 differed between regression models.

Block 1 consisted of the following demographic items: age, gender, education, frequency of social media use. At Block 2 CRT/CRT2 scores were added, followed by the measures of schizotypy (cognitive-perceptual, interpersonal, disorganised, and social anxiety domains) and ASD (attention to detail, social-communication traits) at Block 3.

For Model 4.3, belief in false headlines was added as a predictor variable in Block 4, followed by political news sharing in Block 5.

For Model 4.4, engagement with false headlines was added as a predictor in Block 4, followed by political news sharing at Block 5.

For Model 4.5, belief in *accurate* headlines was added as a predictor variable in Block 4, followed by political news sharing in Block 5.

For Model 4.6, engagement with *accurate* headlines was added as a predictor in Block 4, followed by political news sharing at Block 5.

The reasoning behind the hierarchical structure is as follows: Block 1 included demographic control variables that may have an influence on outcome variables, but for which there were no explicitly hypothesised relationships. Block 2 added CRT/CRT2 scores which have previously been shown to influence the outcome variables of interest, as well as test the proposed hypotheses relating

to CRT/CRT2 scores. Block 3 added schizotypy and ASD measures in order to explore their potential predictive power after accounting for control variables and CRT/CRT2 scores, as well as test the proposed hypothesis for schizotypy and ASD traits. Block 4 includes either belief or engagement measures for the type of headlines being assessed (e.g. if belief in false headlines is the outcome variable, the predictor variable added at this stage would be engagement with false headlines). The inclusion of this variable is based on previous research demonstrating the link between engagement and belief (e.g., Buchanan, 2020), as well as testing the robustness of the previously added variables found to be significant predictors of the outcome. Similarly, Block 5 adds the political news sharing measure to explore the predictive value of this variable and to examine the significance of the previously added variables once political news sharing behaviour is accounted for.

4.3.4.2 Outcome of the hierarchical regression analyses.

The results for each stage of the hierarchical regression analysis can be viewed in Appendix F. See Table 4.5 for a comparison of all hierarchical models at their final block.

Table 4.5 – A comparison of all hierarchical regression models at their final block.

Variables	Model 4.3 (DV = Engagement with false headlines)			Model 4.4 (DV = Belief in false headlines)			Model 4.5 (DV = Engagement with accurate headlines)			Model 4.6 (DV = Belief in accurate headlines)		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Gender	2.83	1.74	0.10	-0.44	0.26	-0.11	2.15	1.66	0.07	-0.09	0.27	-0.02
Age	-0.02	0.06	-0.02	0.01	0.01	0.07	0.07	0.06	0.07	0.00	0.01	0.01
Education level	-0.64	0.79	-0.05	0.10	0.12	0.05	0.34	0.76	0.02	-0.03	0.13	-0.02
Frequency of social media use	0.02	0.89	0.00	0.15	0.13	0.07	1.42	0.85	0.10	0.09	0.14	0.04
CRT/CRT2 scores	0.02	0.43	0.00	-0.13	0.06	-0.14*	-0.38	0.41	-0.05	0.08	0.07	0.08
Attention to detail (AD ASD)	-0.04	0.17	-0.01	0.03	0.03	0.07	0.15	0.16	0.05	0.00	0.03	0.01
Social communication (SC ASD)	-0.09	0.17	-0.04	0.00	0.03	0.01	-0.34	0.17	-0.15*	-0.01	0.03	-0.04
Cognitive-Perceptual (CP Schizotypy)	0.34	0.14	0.22***	0.00	0.02	0.00	0.34	0.13	0.22*	-0.02	0.02	-0.10
Interpersonal (IP Schizotypy)	-0.16	0.24	-0.06	-0.01	0.04	-0.04	0.07	0.23	0.02	-0.06	0.04	-0.15
Disorganised (D Schizotypy)	-0.02	0.19	-0.01	-0.01	0.03	-0.04	-0.17	0.19	-0.08	0.02	0.03	0.05
Social anxiety (SA Schizotypy)	-0.04	0.26	-0.01	-0.01	0.04	-0.01	-0.19	0.25	-0.06	0.07	0.04	0.15
Engagement with false headlines	-	-	-	0.05	0.01	0.37***	-	-	-	-	-	-
Engagement with accurate headlines	-	-	-	-	-	-	-	-	-	0.04	0.01	0.32***
Belief in false headlines	2.25	0.43	0.31***	-	-	-	-	-	-	-	-	-
Belief in accurate headlines	-	-	-	-	-	-	1.60	0.40	0.22***	-	-	-
Frequency of political news sharing on social media	3.85	0.69	0.35***	-0.08	0.11	-0.05	5.02	0.66	0.44***	-0.06	0.12	-0.04
Adjusted R²	.29			.14			.37			.07		
F	8.06***			3.87***			11.33***			2.25**		

* $p < .05$. ** $p < .01$. *** $p < .001$. Significant values in bold.

Model 4.3 (outcome variable: *engagement with false headlines*) was shown to be non-significant at Blocks 1 and 2. Block 3 was shown to be significant ($F(11,215) = 2.93, p = .001$) with an adjusted R^2 of .09. The significant predictors of this model consisted only of cognitive-perceptual schizotypy ($\beta = .38, p < .001$). Block 4 was also shown to be significant ($F(12,214) = 5.39, p < .001$) with an adjusted R^2 of .19. The significant predictors of this model were cognitive-perceptual schizotypy ($\beta = .34, p < .001$) and belief in false headlines ($\beta = .33, p < .001$). Block 5 was significant ($F(13,213) = 8.06, p < .001$) with an adjusted R^2 of .29. The significant predictors of this model were cognitive-perceptual schizotypy ($\beta = .22, p < .001$), belief in false headlines ($\beta = .31, p < .001$), and political news sharing ($\beta = .35, p < .001$).

Model 4.4 (outcome variable: *belief in false headlines*) was non-significant at Block 1. Block 2 was shown to be significant ($F(5,221) = 2.92, p = .014$) with an adjusted R^2 of .04. The significant predictor of this model was CRT/CRT2 scores ($\beta = -.19, p = .004$). Block 3 was shown to be non-significant ($F(11,215) = 1.73, p = .069$), indicating that the inclusion of schizotypy and ASD measures failed to contribute to the prediction of belief in false headlines and reduced the accuracy of the regression model. Block 4 was significant ($F(12,214) = 4.15, p < .001$) with an adjusted R^2 of .14. The significant predictors of this model were CRT/CRT2 scores ($\beta = -.13, p = .047$) and engagement with false headlines ($\beta = .35, p < .001$). Block 5 was significant ($F(13,213) = 3.87, p < .001$) with an adjusted R^2 of .14. The significant predictors of this model were CRT/CRT2 scores ($\beta = -.14, p = .040$) and engagement with false headlines ($\beta = .37, p < .001$). However, the political news sharing item added in Block 5 was found to be non-significant and did not increase the accuracy of the regression model, implying that the variable failed to contribute to the prediction of belief in false headlines.

Model 4.5 (outcome variable: *engagement with accurate headlines*) was shown to be non-significant at Block 1. Block 2 was significant ($F(5,221) = 2.45, p = .035$) with an adjusted R^2 of .03. The significant predictor of this model was CRT/CRT2 scores ($\beta = -.19, p = .005$). Block 3 was significant ($F(11,215) = 4.45, p < .001$) with an adjusted R^2 of .14. The significant predictors of this model were age ($\beta = .14, p = .045$), Social-communication ASD traits ($\beta = -.22, p = .011$), and cognitive-perceptual schizotypy ($\beta = .38, p < .001$). Block 4 was significant ($F(12,214) = 5.96, p < .001$) with an adjusted R^2 of .21. The significant predictors of this model were Social-communication ASD traits ($\beta = -.20, p = .020$), cognitive-perceptual schizotypy ($\beta = .38, p < .001$), and belief in true headlines ($\beta = .26, p < .001$). Block 5 was significant ($F(13,213) = 11.33, p < .001$) with an adjusted R^2 of .37. The significant predictors of this model were Social-communication ASD traits ($\beta = -.15, p = .043$), cognitive-perceptual schizotypy ($\beta = .22, p = .011$), belief in accurate headlines ($\beta = .22, p < .001$), and political news sharing ($\beta = .44, p < .001$).

Model 4.6 (outcome variable: *belief in accurate headlines*) was shown to be non-significant at Blocks 1, 2 and 3. Block 4 was significant ($F(12,214) = 2.43, p = .006$) with an adjusted R^2 of .07. The significant predictor of this model was engagement with accurate headlines ($\beta = .31, p < .001$). Block 5 was significant ($F(13,213) = 2.25, p = .009$) with an adjusted R^2 of .07. The significant predictor of this model was engagement with accurate headlines ($\beta = .32, p < .001$). However, as with Model 4.4, the political news sharing item was found to be a non-significant predictor and its inclusion in the regression model reduced its overall accuracy. This implies that the addition of the political news sharing variable failed to contribute to the prediction of belief in accurate headlines.

4.3.5 Confirmatory nonparametric correlations.

Several variables utilised in the analysis were shown to have a skewed distribution. As skewed data is generally suggested to reduce the power of regression analysis it was decided that nonparametric correlations would be computed for all significant predictor variables in order to provide assurance that the observed relationships were genuine. Spearman's rho, a correlational statistic that makes no parametric assumptions, was used to create a correlation matrix consisting of all outcome and significant predictors identified in the original parametric analyses (see Appendix G). It was shown that all significant relationships identified in the regression analysis were supported by the nonparametric correlation analysis (i.e., all variables shown to be significant predictors of outcome variables also demonstrated significant nonparametric correlations with the same outcome variables).

4.3.6 Summary of results.

In summary, engagement with false headlines was significantly predicted by CP schizotypy, belief in false headlines and news sharing behaviour. Engagement with accurate headlines was similarly predicted by CP schizotypy, belief in accurate headlines and news sharing behaviour. However, SC ASD traits were also shown to significantly predict engagement with accurate headlines (a relationship not observed with fake headlines).

Belief in false headlines was shown to be significantly predicted by CRT/CRT2 scores and engagement with false headlines. In contrast, belief in accurate headlines was significantly predicted only by engagement with accurate headlines.

4.4 Discussion

4.4.1 Summary of research aims and findings.

The current study sought to explore the relationship between measures of cognitive reflection, schizotypy and ASD traits in relation to measures of engagement and belief in misinformation headlines. The participant group was comprised of US residents who expressed a republican/conservative political identity, and the news headlines presented to the participants were selected based on their partisan appeal to this chosen demographic. It was hypothesised that traits associated with the promotion of heuristic reasoning (CP schizotypy and poor CRT/CRT2 performance) would be positively associated with misinformation belief and engagement, while those associated with reduced heuristic reasoning (ASD traits and good CRT/CRT2 performance) would be negatively associated with misinformation engagement and belief. The strength, significance, and predictive utility of these associations was examined using regression analysis.

The heuristic-reasoning hypothesis was partially supported by the results of the study, with CP schizotypy being shown to play a significant role in predicting engagement with false headlines and CRT/CRT2 scores being shown to significantly predict belief in false headlines. However, contrary to the outlined hypotheses, ASD traits failed to demonstrate any significant relationship with belief and engagement measures for misinformation headlines. Additionally, CP schizotypy failed to demonstrate any significant relationship with belief measures and CRT/CRT2 scores failed to demonstrate a significant role in predicting engagement measures (despite demonstrating a significant negative correlation with fake headline engagement).

In addition to testing the previously outlined hypotheses, exploratory analysis was conducted which demonstrated the benefit of using a measure of social media-based political news sharing behaviour to improve the prediction of engagement (but not belief) with misinformation headlines. Additional analysis was also carried out to compare how the findings of the regression analyses for belief and engagement with false headlines differed from a comparable set of regression analyses focused on the prediction of engagement and belief in accurate headlines. It was shown that CRT/CRT2 scores significantly predicted belief in false (but not true) headlines, while SC ASD was shown to significantly predict engagement with true (but not false) headlines. The interpretation of these findings and their links with existing research will be discussed below.

4.4.2 The relationship between CP schizotypy and engagement/belief in false headlines

It was hypothesised that CP schizotypy would act as a positive predictor of engagement (H1a) and belief (H1b) toward misinformation headlines.

Hypothesis H1a was supported, with results of the regression analysis demonstrating CP schizotypy to be positively correlated and a significant predictor of false headline engagement. These findings support the idea that CP schizotypy traits (and their associated cognitive biases) might promote engagement with misinformation encountered on social media. Furthermore, these results are in alignment with the single published study to date that has explored the relationship between positive schizotypy and misinformation engagement (see Buchanan & Kempley, 2021). Congruent with both the proposed role of heuristic-reasoning and findings of previous research (e.g., Broyd et al., 2019; Georgiou et al., 2019; Grant et al., 2014), CP schizotypy traits were associated with a preference toward mental heuristics over analytical reasoning when forming logical judgements (demonstrated by the negative association with CRT/CRT2 performance).

However, it was also shown that CP schizotypy also significantly predicted engagement with accurate headlines, raising the question of whether this trait is associated with an increased engagement with social media headlines in general. It is noteworthy however, that CP schizotypy retained its significance in the regression analysis after the addition of a measure of social media news sharing frequency, for both accurate and misinformation headlines. This implies that CP schizotypy significantly contributed to the observed engagement behaviour beyond its association with a general tendency to share political news. Instead, it is likely the case that the proposed heuristic mechanisms that promote engagement with online misinformation also apply to legitimate information, with individuals being more likely to engage with social media content when reacting to intuitive (as opposed to analytical) decision making processes. Additionally, both the accurate and inaccurate headlines were selected based on their partisan appeal to the conservative sample that was used in the current study. Previous research has demonstrated that politically congruent news attracts greater levels of engagement regardless of its veracity (Grinberg et al., 2019; Pennycook et al., 2021b)., suggesting that decisions to engage with politically congruent news are likely motivated by factors other than rationality and evidence (i.e., heuristic appeal). This might begin to explain why CP schizotypy was associated with greater engagement in both types of headlines, as their appeal to political identity was roughly equivalent, which may have promoted the salience of heuristic reasoning processes (e.g., confirmation bias, emotional bias and in-group favouritism).

Hypothesis H1b was not supported, as no aspect of schizotypy significantly predicted or correlated significantly with belief in false headlines. This outcome was unexpected, considering the previously reported role of schizotypy traits in predicting belief in conspiracy theories (e.g., Barron et al., 2014, Georgiou et al., 2019; 2021). Considering the conspiratorial nature of the presented political misinformation (i.e., the inaccurate headlines present a conspiratorial account of reality that is denied by the “mainstream”), it is surprising that schizotypy traits did not appear to play a significant role in predicting belief. Furthermore, Anthony & Moulding (2019) previously demonstrated a significant relationship between self-reported schizotypy traits and belief in misinformation among a sample of online participants, a finding that was not replicated. This may be the result of differences in methodology between each study, specifically those relating to the measure of belief in misinformation. Anthony & Moulding utilised a larger set of stimuli (30 items) that focused exclusively on stories relating to Hillary Clinton and Donald Trump, which may have potentially prompted a stronger emotional/heuristic response from participants. Additionally, the participant characteristics were different between the two studies, with the current study utilising only right-wing participants, while Anthony & Moulding tested a mix of political orientations (with the majority being left-leaning Clinton voters).

4.4.3 The relationship between ASD traits and engagement/belief in false headlines

It was hypothesised that ASD traits would act as negative predictors of engagement (H2a) and belief (H2b) in misinformation stimuli. This prediction was based on the understanding that ASD traits, as per the diametric model of Autism-Schizotypy (Crespi & Badcock, 2008), have been associated with an analytical reasoning bias and resistance to heuristic thinking (Brosnan et al., 2016; Zalla et al., 2014), traits which were expected to reduce vulnerability to dubious information.

Hypothesis H2a and H2b were not supported, as ASD traits failed to significantly predict either engagement or belief in misinformation headlines. ASD traits also displayed nonsignificant correlations with measures of engagement and belief in false headlines. This contrasts with prior research, which indicated that ASD traits might protect against endorsing unsubstantiated or non-empirical beliefs due to their link with analytical reasoning (Gray et al., 2011; Lindeman & Lipsanen, 2016).

CRT/CRT2 scores were also shown to lack any significant correlation with ASD measures, implying that ASD traits were not significantly associated with better performance on measures of analytical reasoning in the current sample (contrary to the findings of previous research, such as Brosnan et al., 2017). However, SC ASD traits did act as a significant predictor of engagement with

accurate news headlines, demonstrating a negative correlation. This could be linked to the social deficits often associated with ASD traits, which include reduced social engagement and interaction (American Psychiatric Association, 2013), potentially leading to reduced overall interaction with online content, especially accurate news, which might require more direct engagement.

The observation that these traits were significant in predicting engagement with accurate, but not inaccurate, news headlines was unexpected and deviates from the hypothesis originally proposed (that ASD traits would serve to increase analytical reasoning and therefore reduce engagement with dubious news headlines). One possible explanation is that, while ASD traits are associated with increased analytical reasoning, they may also contribute to a broader reduction in engagement behaviour across different types of online content due to the social communication deficits linked to these traits (Booth & Happé, 2018).

The significant negative correlation with engagement for accurate headlines may suggest that SC ASD traits reduce engagement behaviour overall, which would be congruent with the deficits of social behaviour and communication they are associated with. As noted in the literature, individuals with higher levels of ASD traits may exhibit reduced social-emotional reciprocity and communication (Jones et al., 2018), potentially leading to reduced engagement with social media and, by extension, online news content. However, if this were the case it is puzzling that such a relationship was not observed with engagement behaviour for fake headlines. The results suggest that either the influence of SC ASD on engagement is only important when the news headlines is based in fact, or that SC ASD reduces engagement generally but for some reason the headlines used as misinformation stimuli were less affected (perhaps due to different associated characteristics, such as increased novelty).

4.4.4 The relationship between CRT/CRT2 scores and engagement/belief.

Finally, it was hypothesised that CRT/CRT2 scores would act as a negative predictor of engagement (H3a) and belief (H3b) in misinformation stimuli.

Hypothesis H3a was partially supported, as it was demonstrated that CRT/CRT2 scores were significantly negatively correlated with engagement toward misinformation headlines. These findings were congruent with existing research linking poorer CRT performance to greater levels of misinformation engagement (e.g., Pennycook & Rand, 2019a; Sindermann et al., 2020). However, CRT/CRT2 scores were not found to be a significant predictor of misinformation engagement in the regression analysis. This suggests that engagement with false headlines was better predicted by other covariates included in the model (e.g., CP schizotypy) as opposed to CRT/CRT2 performance itself. Interestingly, a stronger negative correlation was noted between CRT/CRT2 performance and

engagement with accurate news headlines. Furthermore, the hierarchical regression model demonstrated that CRT/CRT2 performance was a significant negative predictor of engagement with accurate headlines at one stage of model. However, the predictive power of this association was weak (roughly 4% of explained variance) and the relationship was rendered non-significant after the addition of ASD and schizotypy measures to the regression model. This lack of predictive significance in the final stage of the model once again implies that the apparent value of CRT/CRT2 performance as a predictor of engagement behaviour might be better accounted for by correlates such as schizotypal traits.

It was surprising that CRT/CRT2 scores appeared to play a (marginally) bigger role in predicting engagement with accurate headlines compared to inaccurate headlines. The dual-process model of reasoning would suggest that reliance on System 1 thinking (indicated by poor performance on the CRT/CRT2) might promote engagement with misinformation due to reduced cognitive scrutiny (Toplak et al., 2011; Patel et al., 2019). Therefore, one might expect that false headlines, rather than accurate ones, would be more affected by this lack of cognitive reflection which can lead to judgment errors. Instead, we see little difference in the relationship between engagement toward accurate and inaccurate headlines (both being negatively correlated with CRT/CRT2 performance), implying that reduced cognitive reflection may potentially be associated with news engagement behaviour in general. It has been suggested that the architecture and mechanics of social media platforms are designed to appeal to the intuitive processing of System 1, therefore we might expect to see greater levels of overall engagement among those with a heuristic reasoning bias. It may also be possible that the use of headline stimuli that were matched in terms of partisan bias resulted in both accurate and inaccurate headlines appealing to identity-driven heuristics, which was most effective on individuals exhibiting a heuristic-reasoning bias.

Hypothesis H3b was supported, as CRT/CRT2 scores were also shown to act as a significant negative predictor of belief in false headlines in the regression analysis. This is in line with the broader body of literature demonstrating that individuals who perform poorly on the CRT, and thus rely more heavily on heuristic reasoning, are more susceptible to believing misinformation (e.g., Pennycook & Rand, 2019a; Pehlivanoglu et al., 2021). The observed results support the rationale of the heuristic-reasoning hypothesis: that an increased reliance on heuristic reasoning would be associated with an increased likelihood of believing misinformation.

4.4.5 The relationship between engagement and belief measures.

Measures of belief and engagement were included in the regression analyses to assess their predictive relationship toward the other (i.e., belief as a predictor of engagement, engagement as a predictor of belief) as well as test the robustness of schizotypy, ASD traits, and CRT/CRT2 as predictor variables once this relationship was accounted for.

Engagement and belief measures for false headlines were both shown to significantly predict the other in the regression analyses, as did belief and engagement measures for accurate headlines. These results suggest that engagement measures were a reliable predictor of underlying belief, and that belief measures were also a reliable predictor of social media engagement, regardless of headline type. For both true and false headlines, engagement was shown to be a stronger predictor of belief than belief was for engagement. These findings suggest that people tended to engage with content they found to be believable.

Interestingly, across all regression analyses, the inclusion of belief/engagement measures as a predictor variable did not render any of the ASD, schizotypy, or CRT/CRT2 variables (where identified as significant predictors prior to its inclusion) nonsignificant. This suggests that these additional predictor variables contributed uniquely to the prediction of misinformation vulnerability via mechanisms unrelated to the belief-engagement relationship (implying that people also engage with online content for reasons other than perceived accuracy).

4.4.6 Exploratory analysis

The study also sought to address following questions in an exploratory manner: 1) Did the inclusion of a measure of online political news sharing significantly contribute to the prediction of engagement and belief in misinformation headlines? 2) How do the results of the regression analyses for belief and engagement with false headlines differ from an identical set of regression analyses focused on accurate headlines?

4.4.6.1 The significance of the news sharing items for engagement/belief regression models.

The inclusion of the political news sharing measure from Buchanan & Kempley (2021) significantly contributed to the prediction of engagement with misinformation headlines (with higher self-reported news sharing positively correlating with engagement behaviour). It was also demonstrated that CP schizotypy retained its significance as a predictor of engagement after the addition of the news sharing item, indicating that CP schizotypy contributes to the prediction of fake

headline engagement beyond its association with political news sharing behaviour. Similarly, belief in misinformation also retained its predictive significance after the addition of the news sharing measure. Similar results were observed in the regression predicting engagement with accurate headlines, in which news sharing was shown to be a significant contribution to the model (both increasing its accuracy and acting as a significant predictor variable) while CP schizotypy, SC ASD, and belief in accurate headlines retained their statistical significance as predictors after the news sharing measure's addition. For both accurate and misinformation headline engagement measures, the news sharing item was shown to be the strongest predictor variable. These findings may serve future researchers who wish to study engagement toward political news content (both true and false). As previous researchers have struggled to acquire participant samples that actively engage with online news (due to this behaviour being relatively rare), the use of the news sharing item as a screening question would allow researchers to recruit participant samples who are more prone to political news engagement.

The inclusion of the political news sharing item did not contribute to the prediction of belief in false headlines, suggesting that being a frequent (or infrequent) news-sharer was unrelated to an individuals' tendency to believe misinformation. Political news sharing was also shown not to contribute to the prediction of belief in true news headlines, further implying that online news sharing behaviour had little impact on the extent to which participants believe the presented news headlines.

The fact that political news sharing was associated with measures of engagement, but not measures of belief, suggest a level of dissociation between participant's underlying beliefs and their sharing behaviour. This may be related to existing research demonstrating that individuals may engage and share news on social media platforms without thinking about its accuracy. It has been suggested that the engagement processes on social media is more reliant on impulsive and heuristic-driven reasoning, while the assessment of accuracy relies on effortful analytical reasoning. This might explain why measures of CP schizotypy, indicative of a predisposition toward heuristic reasoning, also appears to predict engagement better than belief.

4.4.6.2 Summary of differences and similarities between analysis of True headlines vs Fake headlines.

Belief in accurate and inaccurate headlines differed in their relationship with CRT/CRT2 scores, with CRT/CRT2 scores acting as a significant predictor of belief for inaccurate headlines only. Engagement was a significant predictor of both belief in accurate and inaccurate headlines.

Engagement with accurate and inaccurate headlines differed in relation to SC ASD, with SC ASD being shown to significantly predict engagement with accurate headlines, but not inaccurate

headlines. Engagement for both accurate and inaccurate headlines was significantly predicted by CP schizotypy, belief in the headline stimuli, and news sharing behaviour.

These results are largely inconsistent with the originally proposed theory, whereby indicators of heuristic reasoning would act as better predictors of belief and engagement in inaccurate (i.e. misinformation) stimuli. While the significance of CRT/CRT2 scores at predicting belief in inaccurate headlines (but not accurate headlines) supports this perspective, the significance of CP schizotypy in predicting engagement for both true and fake headlines does not. Additionally, the significance of ASD traits as a predictor of engagement with true headlines, but not fake headlines, also fails to support the originally proposed hypothesis.

4.4.7 Comments on the participant sample.

The participant sample that was used in the study was selected using a restrictive set of inclusion criteria. The inclusion criteria were designed to select US residents who self-identified as Conservative/Republican and had reported voting for Donald Trump in the 2020 US presidential election. These inclusion criteria were selected to maximise the likelihood of individuals engaging and believing in the presented political misinformation, so that the associated variables under investigation might be examined among a group of “high responders”. As a result of the restrictive inclusion criteria (and possibly due to the use of participants collected through Prolific) the participant sample used in the study displayed certain characteristics that must be recognised to put the acquired results in context.

For example, the sample was highly partisan, as demonstrated by responses to the political orientation demographic question. Roughly 68% of participants indicated a high degree of identification with the Republican party (scoring between 9 and 11 on an 11-point scale, with a score of 1 indicating “Strongly Democrat” and a score of 11 indicating “strongly Republican”). While it was always the intention of the study to look exclusively at right-wing participants, this partisan bias must be taken into consideration when assessing the generalisability of results.

The sample was also highly educated, with most participants (roughly 61%) possessing an undergraduate degree or higher. This is higher than the average number of US adults that possess an undergraduate degree (47.4%; OECD, 2021) and may be partly explained by the observation that participants on online recruitment platforms tend to have higher levels of education (Weinberg et al., 2014).

Participants were shown to be highly engaged in social media activity, with 67% of participants reporting that they use social media several times a day. This frequency of social media use is higher

than previously reported averages for US adults, which indicates between 30-49% of social media users (dependant on the platform) use their preferred social media several times a day (Duggan et al., 2015). Therefore, it should be recognised that the findings of the study might specifically reflect the characteristics of a demographic whose frequency of social media activity differs from the norm.

The sample also appeared to engage with news headlines at a high rate. Previous research has indicated that roughly 10-40% of social media users engage with fake headlines (Chadwick & Vaccari, 2019; Guess et al., 2019), whereas roughly 70% of the current sample was shown to indicate engagement with at least one of the presented fake headlines. The rate of engagement was even higher for true headlines (roughly 84%), indicating that the participant sample was unusually willing to engage with the presented news headlines.

The participants also demonstrated high levels of belief in the misinformation stimuli. Roughly 85% of participants indicated belief in at least one of the presented false news stories, although most participants did not rate the strength of their belief as being particularly strong. This is an alarmingly high percentage of participants who believed the assertions of false news headlines; however the rate of belief was higher for true headlines (with roughly 96% of participants indicating belief in at least one of the presented true headlines). These results indicate that most participants believed in the accuracy of false news headlines, but more believed in the accuracy of true news. This high level of belief may have been the result of only using politically congruent stimuli, thereby appealing to the participant's group identity which may have impacted measures of belief across stimuli type.

Therefore, the findings of the current study must be considered within the context of the participant sample that was utilised and should not be automatically generalised to populations that do not share these same unusual group characteristics.

4.4.8 Limitations

The study had several methodological limitations which impacted the interpretation and generalisability of the acquired results.

As discussed previously, the participant sample was not representative of general adult population of the US. Numerous characteristics of the sample were shown to differ from established norms and the sample was shown to be unusually receptive toward belief and engagement with the presented headlines. Furthermore, as the participant pool was selected from a group hypothesised to consist of individuals who may be more at risk of engaging and believing in misinformation, the

observed results may have been influenced by a relative lack of variance in belief and engagement measures. For example, the non-significant influence of schizotypy on misinformation belief may reflect a difference in the expression of schizotypy present universally amongst the participants, with the relative lack of variance potentially being responsible for the null findings.

In addition, all headline stimuli were selected to be politically appealing to right wing individuals. As true and false headlines were both equally appealing to group identity, this may have reduced the contrast between them in terms of associations with cognitive bias. It may be the case that by appealing to political identity individuals are more likely to engage and believe in news stories, regardless of their factuality. While misinformation stories tend to rely on heuristic processes to convince people to engage or endorse them, the same techniques can be applied to true news stories to increase their impact and dissemination.

The number of news stimuli was also relatively small, which may have inflated the role of specific news stories in the analysis. News headlines (both true and fake) are not a homogenous category, as each headline can differ from another in many ways (topic, tone, use of language, accompanying image, emotional response, etc.). It may be possible that using a wider range of headline stimuli would reduce the impact of any individual story on the analysis and may help clarify the qualities that differentiate true and fake headline in terms of belief and engagement.

Finally, as the study used a non-experimental correlational design, no assertions regarding causal relationships can be made. The significant relationships identified in the analysis do not necessarily cause individuals to believe or engage with news headlines, instead these relationships merely demonstrate that these variables appear to be linked.

4.4.9 Future research

Based on the findings of the current study the following suggestions for future research are recommended.

Due to the observed significance of CP schizotypy in predicting engagement behaviour (for both true and fake headlines) future research should continue to explore the role of schizotypy in the dissemination and belief of online misinformation. Schizotypy represents a relatively understudied aspect of individual differences that appear to play a significant role in misinformation engagement behaviour (based on the results of the current study). Future research may also further explore schizotypy as a predictor of belief, despite the null findings in the current study, based on the long-established link between belief in conspiracy theories and schizotypy. It would also be a good idea to

examine the interaction between schizotypy and strength of partisanship in a sample of participants who vary in terms of political identity, as this has yet to be done.

Despite ASD traits being shown not to significantly predict engagement or belief in false headlines, its significance as a predictor of true headline engagement indicates that ASD traits may still provide insight into individual differences associated with political news engagement on social media. It may also be the case that the unusual sample characteristics and choice of stimuli may have resulted in ASD traits seeming to be less influential than they really were. Therefore, future research may wish to further explore the potential protective role that ASD traits may have on belief and engagement with news headlines (both accurate and inaccurate) in other demographic groups or with a different selection of news stimuli.

Future research may also wish to explore other performance measures of cognitive bias and heuristic reasoning in addition to the CRT, especially those associated with schizotypy that might help researchers understand the desire to engage or believe in dubious online information (such as the jumping-to-conclusions bias). While CRT/CRT2 scores in the current sample significantly predicted belief in misinformation, the relationship was relatively weak. By exploring other performance measures of heuristic reasoning, it may be possible to both identify specific heuristic mechanisms that are associated with misinformation belief and expand the range of known useful cognitive testing procedures available to researchers in the field of online misinformation.

Future research may also consider the use of a political news sharing measure as a screening tool to acquire samples of participants that frequently engage with social media. As factors that contribute to online engagement are of particular interest to misinformation researchers, being able to increase the proportion of news sharers in a participant pool would allow for a closer examination of the variables associated with such behaviour (as well as focus recruitment in situations where participant numbers are limited due to the availability of funding/resources).

4.4.10 Conclusion

In conclusion, the current study sought to explore individual differences associated with heuristic reasoning (schizotypy, ASD traits and CRT/CRT2 scores) as predictors of belief and engagement with online political misinformation. It was shown that CP schizotypy traits were significant predictors of engagement with political misinformation stimuli, while schizotypy traits failed to significantly predict belief in misinformation stimuli. ASD traits also failed to significantly predict either engagement or belief in misinformation stimuli. CRT/CRT2 performance was shown to significantly predict belief in misinformation stimuli but had no significant relationship with levels of

engagement. It was also demonstrated that the inclusion of a measure of political news sharing significantly contributed to the prediction of engagement with misinformation stimuli, in addition to the other variables of interest.

Significant predictors of misinformation vulnerability were compared to those that predicted engagement and belief for accurate headlines. Belief in accurate and misinformation headlines differed in relation to CRT/CRT2 performance, which was only significant for predicting belief in misinformation headlines. Engagement for accurate and misinformation headlines differed in relation to SC ASD traits, which acted as a significant predictor of engagement with accurate headlines only.

In summary, the hypothesised relationships between measures associated with heuristic reasoning were partially supported (in the case of CRT/CRT2 performance as a predictor of misinformation belief and CP schizotypy as a predictor of misinformation engagement), however the overall results were largely inconsistent with the originally proposed hypotheses. The findings of the study must be considered within the context of the specific participant group that was utilised (e.g., right-wing, and highly engaged with social media) as well as the type of news stimuli that was used (all of which appealed to the participant's political orientation). Based on the findings of the study, further research should be conducted on the significance of schizotypy and ASD traits in relation to online misinformation (and potentially news sharing in general). Research should also further explore the relationship between performance measures of heuristic reasoning beyond the CRT (with reasoning biases associated with cognitive-perceptual schizotypy being a good place to start).

Chapter 5: Misinformation Vulnerability Across the Political Spectrum: Heuristic Reasoning, Schizotypy, and ASD Traits (Study 2)

5.1 Introduction

The second study in the current project (Study 2) aims to build upon the findings of Study 1 in the following ways: 1) Continuing the investigation of variables explored in Study 1 (schizotypy, non-clinical ASD traits, and cognitive reflection measures) using a more politically diverse participant sample, 2) Including a measure of political identity as an additional predictor of misinformation vulnerability, and 3) Including an additional test of reasoning bias that reflects an individual's tendency to jump to conclusions based on limited evidence. The rationale for this choice of methodology is detailed below.

5.1.1 Research questions prompted by the results of Study 1

The results of Study 1 provided partial support for the hypothesised significance of schizotypy, ASD traits and cognitive reflection as predictors of vulnerability to online political misinformation. However, the results of Study 1 generally revealed relationships that did not conform with hypothesised outcomes (for example, schizotypy traits failed to significantly predict belief in misinformation headlines). One of the potential limiting methodological factors that may have influenced the outcome of Study 1 was the restrictive characteristics of the participant sample, as only conservative-identifying individuals who had voted for Donald Trump in the 2020 US election were recruited. Therefore, to explore the validity of the findings from Study 1 while also expanding the scope of the project's ongoing investigation, the current study would seek to reexamine the same predictor variables using a more diverse participants sample, consisting of both left-wing (LW) and right-wing (RW) participants. Furthermore, to account for the potential significance of political identity in these new analyses, a measure of political orientation would also be incorporated as a predictor variable.

In addition to including a more varied participant group, it was decided that an additional measure of heuristic reasoning would be included alongside the CRT. This choice was made to enable the exploration of reasoning biases that the cognitive reflection paradigm may not have captured and to test the utility of a reasoning measure that had not been as widely used in misinformation research compared to the CRT. It was decided that a jumping-to-conclusions (JTC) bias measure (The Beads Task) would be utilised as an additional test of heuristic reasoning. The Beads Task has a long-

established use in the study of delusional ideation and has been shown to be related to schizotypal cognition, which itself has been suggested to play a role in reasoning and misinformation vulnerability.

A brief overview of relevant research discussing the potential role of these new predictor variables (political orientation and JTC bias) as predictors of misinformation vulnerability will be presented below.

5.1.2 Political orientation and misinformation vulnerability

As discussed in Chapter 2 (Sections 2.3.4.2 and 2.4.4.2), political orientation and strength of partisanship significantly influence belief in online political information. This effect is particularly strong among highly polarised individuals (Enders & Uscinski, 2021; Nikolov et al., 2021). Likewise, studies have shown that negative partisanship is a potent motivator for sharing political misinformation (Osmundsen et al., 2021; Pereira et al., 2021), with individuals at the extreme ends of the political spectrum being more likely to share political misinformation (Hopp et al., 2020; Peralta et al., 2021).

While vulnerability to politically congruent misinformation is a problem across the political spectrum, there has been evidence to suggest RW individuals may be more at risk (Guess et al., 2019; Jost et al., 2018; Pereira et al., 2021). For example, it has been shown that conservatives tend to be more exposed to online political misinformation (Allcott & Gentzkow, 2017; Wisker & McKie, 2021), as well as being more likely to share it with others (Nikolov et al., 2021; Guess et al., 2019). Belief in political misinformation has been shown to be more common among RW individuals (Garrett & Bond, 2021), as is COVID-19 misinformation (Calvillo et al., 2020).

It has also been suggested that individual differences may exist between LW and RW groups that might moderate misinformation vulnerability. For example, lower conscientiousness among RW individuals have been linked to higher engagement with misinformation (Lawson & Kakkar, 2022). Evidence also suggests that RW individuals may be less influenced by supporting evidence (Pennycook et al., 2020b) and less inclined to engage in analytical reasoning (Deppe et al., 2015).

Therefore, political orientation (particularly RW identity) may prove to be a highly significant factor when exploring vulnerability to political misinformation and would be a suitable addition to the variables of interest explored in the current study.

5.1.3 Jumping-to-conclusions and misinformation vulnerability

Information gathering and assessment of evidence are crucial for forming accurate judgements and the effective utilisation of analytical reasoning. Therefore, individual differences in the seeking, collection and assessment of evidence may be a good target for investigation when seeking to understand why some people believe and endorse questionable claims in the absence of supporting evidence. One such individual difference is the expression of a JTC bias, whereby individuals tend to quickly form overconfident judgements based on relatively little supporting evidence (Huq et al., 1988; Ross et al., 2015). It has been suggested that a JTC bias results from low thresholds for evidence quality combined with an increased weighting in the significance of perceived patterns (Broome et al., 2003).

The study of the JTC bias has a long-established use in the research of delusional ideation (Dudley et al., 2016) but has also been shown to be associated with positive schizotypal traits in numerous studies (Hua et al., 2020; Juárez-Ramos et al., 2014; Moritz et al., 2017). As we hypothesise that positive schizotypy might significantly influence misinformation vulnerability via the promotion of reasoning biases, it is possible that the JTC bias may play a significant role in explaining why individuals with elevated positive schizotypy traits might come to accept factually dubious information. Additionally, JTC bias has also been shown to be associated with some of the correlates of positive schizotypy that are hypothesised to promote misinformation vulnerability, such as a general predisposition to utilise heuristic reasoning strategies (Ross et al., 2016; Sanchez & Dunning, 2021b) and belief in socio-political conspiracy theories (Pytlik, Soll & Mehl, 2020).

Therefore, there is sufficient justification for including a measure of JTC bias in the current exploration of misinformation vulnerability. Furthermore, as there is currently very little research that has specifically explored measures of JTC with online misinformation vulnerability, this research will help bridge the gap in the current literature. Similarly, there appears to be a relative lack of online misinformation research utilising performance-based measures of analytical reasoning beyond the CRT. While the reason for this may simply be due to the CRT being an effective and efficient means of probing reasoning bias, it is worth exploring potential alternatives that might deliver new insights into the underlying cognitive processes that facilitate misinformation vulnerability.

5.1.4 Research questions and hypotheses.

Building upon the findings of Study 1 and the rationale outlined above, the current study will seek to address the following research questions:

1. Can schizotypy and/or ASD traits significantly predict vulnerability to misinformation among a politically diverse participant sample?
2. Does The Beads Task or the CRT significantly predict vulnerability to misinformation among a politically diverse participant sample?

5.1.4.1 Hypotheses

It was predicted that the expression of positive schizotypal personality traits (i.e. CP schizotypy) would be associated with higher scores on measures of engagement and belief in misinformation stimuli. Therefore, hypothesis 1 is:

H1a: Scores on the SPQ-BRU cognitive-perceptual schizotypy scale will be significant predictors of, and positively correlated with, the measure of false news engagement.

H1b: Scores on the SPQ-BRU cognitive-perceptual schizotypy scale will be significant predictors of, and positively correlated with, the measure of false news belief.

It was also predicted that higher levels of non-clinical ASD traits would be associated with reduced engagement and belief toward misinformation stimuli. Therefore, hypothesis 2 is:

H2a: Scores on all AQ-9 sub-scales will be significant predictors of, and negatively correlated with, the measure of false news engagement.

H2b: Scores on all AQ-9 sub-scales will be significant predictors of, and negatively correlated with, the measure of false news belief.

It was predicted that better performance on the CRT would be associated with reduced levels of engagement and belief toward misinformation stimuli. Therefore, hypothesis 3 is:

H3a: Scores on the CRT/CRT2 composite measure will be significant predictors of, and negatively correlated with, the measure of false news engagement.

H3b: Scores on the CRT/CRT2 composite measure will be significant predictors of, and negatively correlated with, the measure of false news belief.

It was also predicted that performance on The Beads Task indicative of a JTC would be associated with reduced levels of engagement and belief toward misinformation stimuli. Therefore, hypothesis 4 is:

H4a: Scores on the JTC measure will be significant predictors of, and negatively correlated with, the measure of false news engagement.

H4b: Scores on the JTC measure will be significant predictors of, and negatively correlated with, the measure of false news belief.

5.1.4.2 Exploratory research questions

In addition to the formal hypotheses and research questions outlined above, the study also sought to explore the following questions without forming a formal hypothesis regarding the outcome:

1. What role does political orientation play in predicting belief/engagement?
2. What are the differences between regression models predicting engagement/belief for LW vs RW stimuli?
3. What are the differences between regression models for accurate and misinformation headlines?

5.2 Method

Data collection was conducted using the Qualtrics research platform, with participants acquired from the Prolific research panel (www.Prolific.ac). Hypotheses and primary analyses were preregistered on AsPredicted (see Appendix H). All statistical analysis was conducted using SPSS 26 for Windows.

5.2.1 Materials and stimuli

Reliability was assessed (where appropriate) for each measure included in the primary analysis. Alpha values presented below were all derived from the current dataset.

5.2.1.1 Schizotypal personality questionnaire – brief revised updated (SPQ-BRU; Davidson et al., 2016).

The SPQ-BRU is a brief self-report measure of schizotypal personality traits designed for use among non-clinical populations (for more details, see Section 4.2.1.1). The questionnaire consists of 32 items measured using a 5-point Likert scale, separated into the following 9 sub-scales: *No Close Friends* ($\alpha = .85$), *Constricted Affect* ($\alpha = .65$), *Eccentric Behaviour* ($\alpha = .85$), *Odd Speech* ($\alpha = .88$), *Unusual Perceptions* ($\alpha = .73$), *Magical Thinking* ($\alpha = .85$), *Ideas of Reference* ($\alpha = .81$), *Suspiciousness* ($\alpha = .78$), *Social Anxiety* ($\alpha = .92$). These sub-scales form 4 higher-order factors: *IP schizotypy* ($\alpha = .85$), *CP schizotypy* ($\alpha = .88$), *D schizotypy* ($\alpha = .89$), *SA schizotypy* ($\alpha = .92$).

5.2.1.2 Autistic Spectrum Quotient – 9 (AQ-9; Jia et al., 2019).

The AQ-9 is a brief self-report measure designed to assess autism-related traits (for more details, see Section 4.2.1.2). The AQ-9 consists of 9 items scored using a 7-point Likert scale, separated into two sub-scales consisting of *SC-ASD* ($\alpha = .86$) and *AD-ASD* ($\alpha = .76$).

5.2.1.3 Cognitive Reflection Test (CRT; Frederick, 2005)/Cognitive Reflection Test 2 (CRT-2; Thomson & Oppenheimer, 2016).

The *CRT* ($\alpha = .74$) and *CRT-2* ($\alpha = .56$) are performance-based measures of “miserly information processing” (i.e., the tendency to utilise heuristic-based reasoning skills, as opposed to the more cognitively demanding analytical reasoning skills). For more details, see Section 4.2.1.3. The scores for both the *CRT* and *CRT-2* were combined into a single variable named *CRT/CRT2* ($\alpha = .74$).

5.2.1.4 The Beads Task (Garety et al., 2011; Ross et al., 2016).

The Beads Task paradigm (see Phillips & Edwards, 1966) is a performance measure designed to examine individual differences in data-gathering behaviour, including the tendency to jump to conclusions based on limited evidence. A computerised adaptation of the classical Beads Task was constructed for the purposes of the current study, with stimuli and instructions derived from Garety et al. (2011) and a fixed bead sequence derived from Ross et al. (2016).

The task involves presenting participants a sequence of virtual “beads” that have supposedly been drawn from one of two hidden jars, with each jar containing different proportions of red and black beads (one contains a 60/40 split of mostly black beads, while the other jar contains a 60/40 split of mostly red beads). Participants are first shown a single bead and asked if they would like to guess which jar the bead came from or whether they would like to see another bead drawn from the same jar before making their decision (see Figure 5.1 for examples of the task stimuli). This process is repeated until the participant indicates they are ready to make a guess, with a maximum number of 50 viewable beads being available before the participant is forced to decide.

The outcome measure of interest in The Beads Task is the number of “draws to decision” (i.e., how many beads the participant views before guessing which jar the bead came from). In previous research, JTC bias has been defined as decisions made after viewing fewer than three beads (although this classification has mostly been utilised in reference to delusional ideation and clinical research). The raw “draws to decision” score will be utilised as a predictor variable in the current study, with higher scores reflecting a tendency to seek supporting evidence/information before making decisions.

5.2.1.5 Social Media News Engagement/Belief Task.

This task has been adapted from the protocol used in Study 1 (see Section 4.2.1.4), with changes made only to accommodate the inclusion of additional headline stimuli. The task involves showing participants a series of images simulating online news headlines that might be encountered on a social media platform. The stimuli now consisted of a total of 12 news headlines, with half selected due to their RW political appeal and the other half selected to appeal to a LW political orientation. The stimuli were also evenly split between accurate and inaccurate (i.e., misinformation) headlines. Therefore, during the task, all participants would be shown three accurate LW headlines, three inaccurate RW headlines, three accurate RW headlines, and three inaccurate RW headlines.

See Appendix I for the full set of stimuli used in this task.

Headline stimuli were selected with the aim of creating sets of stimuli that were roughly equal in the degree of their partisan appeal (see Appendix B). Inaccurate LW and RW headlines were matched in relative partisan appeal, while true left-wing and right-wing were similarly matched.

Cronbach's Alpha was calculated using engagement scores for all misinformation headlines ($\alpha = .91$), all accurate headlines ($\alpha = .93$), all RW headlines ($\alpha = .91$), and all LW headlines ($\alpha = .86$). New variables were then computed by averaging each participant's collective engagement score for inaccurate RW headlines (*engagement with false RW headlines*), as well as the average engagement score for inaccurate LW headlines (*engagement with false LW headlines*), average engagement score for accurate RW headlines (*engagement with true RW headlines*), and average engagement score for accurate LW headlines (*engagement with true LW headlines*). Reliability was shown to be satisfactory for all these engagement variables ($\alpha > .70$; See Table 5.2).

Belief measures for RW misinformation headlines were averaged to create a new variable (*belief in false RW headlines*), as were responses to LW misinformation headlines (*belief in false LW headlines*), accurate RW headlines (*belief in true RW headlines*), and accurate LW headlines (*belief in true LW headlines*).

5.2.1.5 Political orientation.

Political orientation was measured using a 10-point scale (ranging from "strongly Democrat" to "strongly Republican"). This scale was reduced from the 11-point scale used in Study 1 to facilitate a forced choice paradigm and the coding of a binary political orientation variable (with participants who score 1-5 being coded as "Left-Wing" and those who score 6-10 being coded as "Right-Wing"). This variable was originally intended to be used in the primary analysis; however, it was ultimately decided that using the raw political orientation score would be more suitable due to it capturing a greater degree of variance.

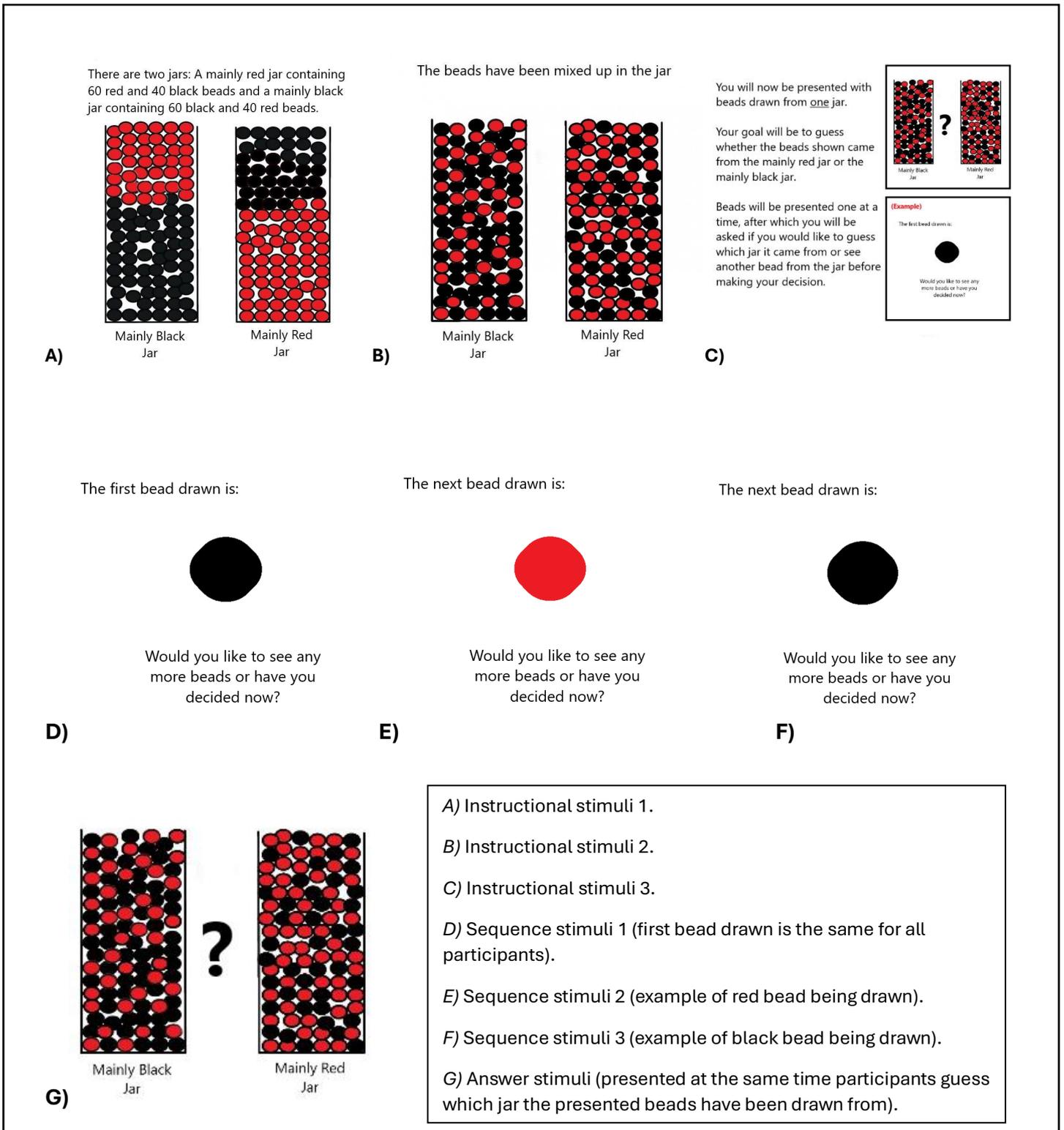
5.2.1.6 Political news sharing.

Political news sharing (i.e., the extent to which participants habitually shared political news on social media platforms) was measured using a 6-point scale, ranging from "not at all" to "very frequently".

5.2.1.7 Demographic measures.

In addition to the above measures, the following demographic variables were collected: *Age*, *Gender*, *Country of residence*, *Education level*, and *Frequency of social media use* (see Table 5.1 for a breakdown of participant characteristics).

Figure 5.1 - Visual stimuli for The Beads Task



5.2.2 Procedure.

The procedure was identical to that used in Study 1 (see Section 4.2.2), with the addition of The Beads Task, which was conducted after the modified Social Media News Engagement/Belief task and before the CRT-2. Upon completing the tasks, participants were asked to reconfirm their consent to use the data for the purposes of research and then presented with a debrief (see Appendix J to view all the materials used during data collection, including the debrief and participant information sheet).

5.2.3 Participants.

5.2.3.1 Power analysis.

An a priori power analysis was conducted in G*power 3.1 based on providing adequate power ($\alpha = 0.05$, power = 80%) for a multiple regression analysis. With a maximum of 15 predictor variables per regression model and an expected R^2 value of above 0.08, a minimum sample size of 248 participants was required. To account for potential participant attrition (estimated at 10%) and an additional 15 participants to pilot the survey, a total sample of 288 was sought.

5.2.3.2 Participant recruitment

This study aimed to recruit an equal number of participants from the left- and right-wing of the US political spectrum. To build upon the findings of Study 1, a wider variety of participants was sought. Not only did this involve including both LW and RW participants, but it also involved a wider range of political identities. Therefore, the inclusion criteria designed to target left-wing and right-wing participants were expanded to include those who identify as moderates, non-affiliated, or “others”. The main criterion that differentiated the two groups was voting choice in the 2020 US presidential election. The reasoning behind this decision was: 1) President Trump’s 2020 election campaign was steeped in online misinformation tactics, suggesting that those who endorsed his election may be more at risk of believing and/or engaging with online misinformation. Additionally, 2) it is arguable that the most significant issue currently dividing right- and left-wing in US politics is whether they endorse or reject “Trumpism” (with 2020 election choice acting as a proxy measure).

5.2.3.3 Inclusion criteria.

A sample of 288 participants was recruited from the Prolific research panel. Each participant was paid £1.50. GBP for their involvement in the study. Data was collected in two sessions, with the first session recruiting only right-wing participants and the second session recruiting only left-wing participants.

In session one, the inclusion criteria (facilitated by Prolific’s audience filters) consisted of the following: 1) Age over 18, 2) US residents, 3) English as a first language, 4) US political spectrum:

Conservative, Moderate, Other, N/A, 5) US political affiliation: Republican, Independent, Other, None, 6) US presidential election 2020: Donald Trump, 7) Having not taken part in the previous round of testing in Study 1.

In session two, the inclusion criteria consisted of 1) Age over 18, 2) US residents, 3) English as a first language, 4) US political spectrum: Liberal, Moderate, Independent, Other, None, 5) US political affiliation: Democrat, Independent, Other, None, 6) US presidential election 2020: Joe Biden.

In addition to these criteria, an equal mix of men and women was achieved in both sessions using the “balance sample” feature provided by Prolific. Each session was conducted over the course of four days.

5.2.3.4 Excluding problematic responses.

As outlined in the preregistration, data was screened for problematic responses, and participants were excluded from the analysis using the following criteria: 1) declining consent for the use of collected data, 2) zero variance in the item responses to measures of schizotypy and ASD (indicative of “straight-lining”), 3) reporting an age below 18, 4) implausibly fast completion time (more than 2SD below mean completion time).

Participants were also assessed using fraud metrics provided by Qualtrics (RelevantID, Google’s invisible reCAPTCHA; Qualtrics, 2022), with suspicious responses being excluded from the analysis.

Due to the use of Gender as a binary control variable in the main regression, recruited participants who reported a gender other than male or female in the demographic section of the survey were excluded from the analysis.

Of the seven participants who were flagged for exclusion from the data analysis, one was found to display zero variance in either measures of schizotypy or ASD traits, one was flagged due to a suspect RelevantID fraud score, and five were flagged due to indicating a non-binary Gender.

5.2.3.5 Final sample.

The final sample had an $n = 281$ and was 50.2% female, with a mean age of 37.07 ($SD = 14.11$; see Table 5.1 for a breakdown of participant characteristics). This sample size met the minimum requirements outlined in the power analysis and provided adequate statistical power for the proposed analysis.

Table 5.1 - Participant demographics, political orientation and news sharing characteristics (n = 281)

Demographic variables		
	n	%
Gender		
Female	141	50.2
Male	140	49.8
Age		
18-30	106	37.7
31-40	79	28.1
41-50	39	13.9
51-60	35	12.5
61-70	18	6.4
70+	4	1.4
Highest educational level		
Less than High School	3	1.1
High School / Secondary School	44	15.7
Some post-school College or University	74	26.3
College or University undergraduate degree	119	42.3
Master's Degree	30	10.7
Doctoral Degree	3	1.1
Professional Degree (JD, MD)	8	2.8
Frequency of social media use		
Several times a day	233	82.9
About once a week	23	8.2
A few times a week	14	5.0
Every few weeks	3	1.1
Less often	3	1.1
Not at all	5	1.8
Political orientation (1=Strongly Democrat and 10=Strongly Republican).		
1-2	78	27.8
3-4	43	15.3
5-6	58	20.6
7-8	52	18.5
9-10	50	17.8
Left-Wing (1-5)	138	49.1
Right-Wing (6-10)	143	50.9
Frequency of political news sharing on social media		
Not at all	69	24.6
Very rarely	88	31.3
Rarely	41	14.6
Occasionally	70	24.9
Very frequently	13	4.6

5.3 Results

5.3.1 Data scoring, screening, and sample characteristics

5.3.1.1 Scoring of CRT and CRT-2 items.

Participants were given a text box to respond to each of the CRT and CRT-2 questions. These answers were examined and then manually scored as a binary variable for each question (correct = 1, incorrect = 0). The sum of the CRT and CRT-2 questions were combined into the variable *CRT/CRT2* for use in the regression analysis, with higher scores indicating a greater tendency to engage in cognitive reflection.

5.3.1.2 Data screening and descriptive statistics.

Data was screened for missing values, reliability, skewness, and kurtosis (see Table 5.2). There were no missing values in the dataset, however significant skewness (skewness statistic > 1) was observed in the following variables: *Frequency of social media use, draws to decision (JTC), engagement with false RW headlines, engagement with false LW headlines, engagement with true RW headlines, and engagement with true LW headlines*. Kurtosis was significant (+/- 3 in SPSS output; Field, 2013) in the case of *frequency of social media use* and *engagement with false LW headlines*. However, due to the sufficiently large sample size used in the current study (i.e., more than 10 participants per predictor variable) these violations of skewness and kurtosis were thought to not pose a significant problem (Schmidt & Finan, 2018).

See Appendix K for histograms of belief and engagement measures, demographic features, and reasoning task performance.

5.3.2 Description of sample characteristics.

As with Study 1, most of the sample was highly educated (over 50% with an undergraduate degree or higher) and above the US average for possession of a college degree (47.4%; OECD, 2021).

The sample was positively skewed in terms of age, with the majority of participants being under the age of 40, alongside a wide range of older participants (the oldest participant was 82 years old).

Participants were also highly active on social media, with 83% indicating themselves to be frequent users of social media. This is higher than both Study 1 (67%) and previously reported norms for US adults (30%-49%; Duggan et al., 2015).

Similarly, 75% of participants reported a tendency to engage in political news sharing, indicating a high level of online political engagement.

Additionally, the distribution of political orientation scores indicated that LW participants were more polarised than to RW participants.

Like Study 1, participants were shown to exhibit high rates of engagement (substantially higher than the previously reported engagement rates of 10-40%; Chadwick & Vaccari, 2019; Guess et al., 2019).

Finally, the sample demonstrated high rates of belief in false headlines, with 96% of participants indicated a degree of belief in at least one of the misinformation stimuli. However, the degree of belief toward misinformation stimuli was generally weak compared to belief in accurate headlines.

Table 5.2 - Descriptive statistics for predictor and outcome variables used in the regression analysis.

Variables			Skewness		Kurtosis		Cronbach's Alpha (α)
	<i>M</i>	<i>SD</i>	Statistic	Std. Error	Statistic	Std. error	
Age (years)	37.07	14.11	0.78	0.15	-0.21	0.29	-
Education level	3.60	1.11	0.50	0.15	1.05	0.29	-
Frequency of social media use *	1.35	0.94	3.36	0.15	11.89	0.29	-
Frequency of political news sharing on social media	2.54	1.23	0.29	0.15	-1.15	0.29	-
Draws to decision **	5.01	3.90	1.35	0.15	2.52	0.29	-
CRT/CRT2	3.98	1.91	-0.23	0.15	-0.88	0.29	.74
AD-ASD	4.10	1.33	-0.19	0.15	-0.71	0.29	.76
SC-ASD	3.89	1.36	0.22	0.15	-0.63	0.29	.86
CP schizotypy	2.01	0.71	0.48	0.15	-0.55	0.29	.88
IP schizotypy	2.52	0.92	0.18	0.15	-0.83	0.29	.85
D schizotypy	2.66	0.96	0.16	0.15	-0.80	0.29	.89
SA schizotypy	3.32	1.19	-0.40	0.15	-0.91	0.29	.92
Political orientation ***	5.16	3.02	0.04	0.15	-1.31	0.29	-
Engagement with RW headlines (False) †	1.95	1.14	1.30	0.15	1.07	0.29	.84
Engagement with LW headlines (False) †	1.55	0.77	1.83	0.15	3.17	0.29	.78
Belief in RW headlines (False) ‡	1.87	0.67	0.40	0.15	-0.70	0.29	-
Belief in LW headlines (False) ‡	1.65	0.51	0.90	0.15	0.79	0.29	-
Engagement with RW headlines (True) †	2.07	1.12	1.01	0.15	0.18	0.29	.84
Engagement with LW headlines (True) †	1.70	0.87	1.53	0.15	2.00	0.29	.84
Belief in RW headlines (True) ‡	2.76	0.60	-0.27	0.15	0.09	0.29	-
Belief in LW headlines (True) ‡	2.76	0.62	-0.42	0.15	-0.03	0.29	-

*Lower values were indicative of more frequent social media use.

**Scores indicate the number of beads viewed before deciding on The Beads Task (maximum viewable = 50).

***1 = strongly Democrat, 10 = strongly Republican.

† Engagement measures utilised a 6-point Likert scale.

‡ Belief measures utilised a 4-point Likert scale.

5.3.3 Regression analysis

The preregistered analysis involved the use of four multiple regression models. The first model sought to predict *engagement with false RW headlines*, while the second model sought to predict *engagement with false LW headlines*. The third regression model attempted to predict *belief in false RW headlines*, and the fourth model would predict *belief in false LW headlines*.

The predictor variables used in these regression models consisted of demographic variables (*age, gender, education level, frequency of social media use*), performance on The Beads Task (*draws to decision*), performance on the two variants of the CRT (*CRT/CRT2*), ASD traits (*attention to detail and social communication*), schizotypy traits (*cognitive-perceptual, inter-personal, disorganised, social anxiety*), *political news sharing*, and political orientation.

As was the case in Study 1, all regression models predicting engagement behaviour will incorporate a belief predictor, while all regression models predicting belief will incorporate an engagement predictor. These predictor variables will be matched in terms of factuality (i.e., belief in accurate headlines would be used to predict engagement with accurate headlines) and political orientation (i.e., engagement with LW headlines would be used to predict belief in LW headlines). Therefore, *engagement with false RW headlines, engagement with false LW headlines, belief in false RW headlines, and belief in false LW headlines*.

5.3.3.1 Bivariate correlations

Bivariate correlations were calculated for all outcome measures and predictor variables included in the current study (see Table 5.3). Due to the large number of comparisons, a focus on effect size over p values was adopted when exploring correlational relationships (Sullivan & Feinn, 2012). Guidelines on effect size in individual differences research (Gignac & Szodorai, 2016) suggest that small, medium, and large effect sizes correspond to r values $\geq .15$, $.25$, and $.35$, respectively. While these values are lower than commonly utilised guidelines established by Cohen (1992), they are informed by the analysis of over 700 meta-analytically derived correlations derived from individual differences studies. Moreover, it has been suggested that these traditionally “small” effect sizes, within the context of individual differences, can have significant and substantial practical consequences (Nofhle & Robins, 2007; Ozer & Benet-Martínez, 2006). Therefore, only correlations that report $r \geq .15$ would be considered meaningful.

The correlation matrix was assessed for signs of multicollinearity (e.g. a correlation between predictor variables $>.70$; Daoud, 2017). The only predictor variables which indicated signs of multicollinearity were *engagement with false RW headlines* and *engagement with accurate RW*

headlines ($r(279) = .84$). However, these two predictor variables were never utilised at the same time in any of the regression models, thereby avoiding potential issues surrounding multicollinearity.

Table 5.3 – Pearson’s correlation matrix for all predictor and outcome variables

Variables	Correlation (Pearson's r)																				
	Variables																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Gender (M=1, F=-1)	1.00																				
2. Age	0.10*	1.00																			
3. Education level	0.05	0.13*	1.00																		
4. Frequency of social media use	0.14**	0.22***	0.15**	1.00																	
5. Frequency of political news sharing on social media	-0.01	0.05	-0.03	-0.25***	1.00																
6. Political orientation (low scores = LW, high scores = RW)	0.01	0.20***	-0.04	0.14**	-0.09	1.00															
7. Draws to decision (JTC)	0.01	-0.14**	0.05	-0.04	-0.04	-0.15**	1.00														
8. CRT/CRT2 scores	0.23***	-0.14*	0.09	-0.04	-0.12*	-0.11*	0.23***	1.00													
9. Attention to detail (ASD)	-0.02	-0.13*	0.00	-0.01	0.12*	0.02	0.03	0.06	1.00												
10. Social communication (ASD)	0.03	-0.02	-0.07	0.06	-0.08	-0.14**	0.06	0.08	0.06	1.00											
11. Interpersonal (IP Schizotypy)	0.06	-0.14**	-0.05	0.06	-0.03	-0.12*	-0.05	-0.03	0.15**	0.62***	1.00										
12. Cognitive-Perceptual (CP Schizotypy)	-0.12*	-0.35***	-0.12*	-0.07	0.13*	-0.09	-0.12*	-0.07	0.36***	0.22***	0.48***	1.00									
13. Disorganised (D Schizotypy)	-0.11*	-0.42***	-0.13*	-0.13*	0.05	-0.28***	0.10	0.13*	0.32***	0.28***	0.43***	0.58***	1.00								
14. Social anxiety (SA Schizotypy)	-0.14*	-0.30***	-0.14*	-0.04	-0.07	-0.28***	0.09	0.05	0.15**	0.61***	0.51***	0.40***	0.52***	1.00							
15. Engagement with false RW headlines	0.03	0.05	-0.06	-0.03	0.28***	0.53***	-0.16**	-0.19**	0.08	-0.15**	-0.04	0.15**	-0.15**	-0.12*	1.00						
16. Engagement with false LW headlines	0.10*	-0.12*	-0.13*	-0.08	0.28***	-0.24***	-0.02	0.01	0.03	0.00	0.11*	0.20***	0.19**	0.09	0.24***	1.00					
17. Belief in false RW headlines	-0.12*	-0.06	-0.13*	-0.06	-0.05	0.50***	-0.13*	-0.11*	0.04	-0.15**	-0.12*	0.05	-0.24***	-0.19**	0.48***	-0.02	1.00				
18. Belief in false LW headlines	0.03	-0.23***	-0.05	-0.11*	-0.03	-0.34***	-0.04	-0.03	0.03	0.10*	0.11*	0.19**	0.13*	0.15**	-0.21***	0.25***	-0.04	1.00			
19. Engagement with accurate RW headlines	0.07	0.07	-0.01	-0.04	0.33***	0.44***	-0.17**	-0.20***	0.05	-0.10*	-0.06	0.12*	-0.14*	-0.13*	0.84***	0.33***	0.38***	-0.15**	1.00		
20. Engagement with accurate LW headlines	0.18**	0.02	0.04	-0.10*	0.38***	-0.23***	0.03	0.01	0.03	-0.07	-0.01	0.08	0.06	-0.06	0.27***	0.62***	-0.05	0.07	0.42***	1.00	
21. Belief in accurate RW headlines	0.07	0.02	-0.03	-0.05	0.03	0.26***	-0.10*	-0.04	0.06	-0.16**	-0.18**	-0.10	-0.19**	-0.15**	0.28***	-0.03	0.41***	-0.13*	0.31***	0.04	1.00
22. Belief in accurate LW headlines	0.13*	-0.09	0.04	-0.12*	-0.02	-0.33***	0.03	0.05	-0.04	-0.05	-0.04	-0.12*	0.04	0.11*	-0.29***	0.05	-0.13*	0.30***	-0.20***	0.16**	0.28***

Small effect size ($r > .15$) is highlighted in green. **Medium** effect size ($r > .25$) is highlighted in yellow. **Large** effect size ($r > .35$) is highlighted in red.

Effect size guidelines derived from Gignac & Szodorai, 2016.

* $p < .05$. ** $p < .01$. *** $p < .001$. All significance tests were two-tailed.

5.3.3.2 Outcome of pre-registered regression analysis.

Four regression models were constructed using the enter method in accordance with the preregistered analysis (See Table 5.4). The regression models were inspected for signs of homoscedasticity and normally distributed residuals by examining p-p plots and scatter plots of predicted values and residuals. All regression models were found to conform to the assumptions of homoscedasticity and normal distribution of residuals. The presence of multicollinearity was assessed via the VIF values of the regression coefficients, which were shown to be within acceptable limits (i.e., no VIF values were shown to exceed 3). Therefore, multicollinearity was determined not to pose any issues.

Model 5.1a sought to predict *engagement with false RW headlines* using the following predictor variables: *age, gender, education level, frequency of social media use, draws-to-decision, CRT/CRT2, AD-ASD, SC-ASD, CP schizotypy, IP schizotypy, D schizotypy, SA schizotypy, political orientation rating, and self-reported belief in false RW headlines*. The regression model was shown to be significant ($F(15,265) = 17.53, p < .001$), with an adjusted of $R^2 = .47$. The significant predictor variables for this regression model were *Gender* ($\beta = .116, p = .015$), *CP schizotypy* ($\beta = .167, p = .012$), *SA schizotypy* ($\beta = .157, p = .028$), *Political orientation* ($\beta = .423, p < .001$), *Belief in false RW headlines* ($\beta = .275, p < .001$), and *Political news sharing* ($\beta = .304, p < .001$).

Model 5.2a sought to predict *engagement with false LW headlines* using the following predictor variables: *age, gender, education level, frequency of social media use, draws-to-decision, CRT/CRT2, AD-ASD, SC-ASD, CP schizotypy, IP schizotypy, D schizotypy, SA schizotypy, political orientation rating, and self-reported belief in false LW headlines*. The regression analysis was significant ($F(15,265) = 17.53, p < .001$), with an adjusted $R^2 = .18$. The significant predictor variables for this regression model were *education level* ($\beta = -.112, p = .049$), *political orientation* ($\beta = -.129, p = .042$), *belief in false LW headlines* ($\beta = .190, p = .002$), and *political news sharing* ($\beta = .277, p < .001$).

Model 5.3a sought to predict measures of *belief in false RW headlines* using the following predictor variables: *age, gender, education level, frequency of social media use, draws-to-decision, CRT/CRT2, AD-ASD, SC-ASD, CP schizotypy, IP schizotypy, D schizotypy, SA schizotypy, political orientation rating, and self-reported engagement with false RW headlines*. The regression analysis was significant ($F(15,265) = 12.89, p < .001$), with an adjusted $R^2 = .39$. The significant predictor variables for this regression model were *gender* ($\beta = -.141, p = .006$), *age* ($\beta = -.154, p = .007$), *CP schizotypy* ($\beta = .135, p = 0.48$), *D schizotypy* ($\beta = -.249, p < .001$), *political orientation* ($\beta = .269, p <$

.001), *engagement with false RW headlines* ($\beta = .317, p < .001$), and *political news sharing* ($\beta = -.147, p = .007$).

Model 5.4a sought to predict measures of *belief in false LW headlines* using the following predictor variables: *age, gender, education level, frequency of social media use, draws-to-decision, CRT/CRT2, AD-ASD, SC-ASD, CP schizotypy, IP schizotypy, D schizotypy, SA schizotypy, political orientation rating*, and self-reported *engagement with false LW headlines*. The regression analysis was significant ($F(15,265) = 5.15, p < .001$), with an adjusted $R^2 = .18$. The significant predictor variables for this regression model were *age* ($\beta = -.170, p = .009$), *CP schizotypy* ($\beta = .155, p = .047$), *political orientation* ($\beta = -.309, p < .001$), *engagement with false LW headlines* ($\beta = .189, p = .002$), and *political news sharing* ($\beta = -.149, p = .014$).

Table 5.4 – Summary of regression analysis outcomes for Model 5.1a, Model 5.2a, Model 5.3a, and Model 5.4a.

Variables	Model 5.1a (DV = Engagement with false RW headlines)			Model 5.2a (DV = Engagement with false LW headlines)			Model 5.3a (DV = Belief in false RW headlines)			Model 5.4a (DV = Belief in false LW headlines)		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Gender †	0.26	0.11	0.12*	0.18	0.09	0.11	-0.18	0.07	-0.13*	0.06	0.06	0.05
Age	0.00	0.00	0.01	0.00	0.00	0.00	-0.01	0.00	-0.16**	-0.01	0.00	-0.17**
Education level	0.03	0.05	0.03	-0.08	0.04	-0.11*	-0.05	0.03	-0.09	0.00	0.03	0.00
Frequency of social media use	-0.01	0.06	-0.01	0.04	0.05	0.05	-0.06	0.04	-0.09	-0.04	0.03	-0.08
Frequency of political news sharing on social media	0.28	0.04	0.30***	0.17	0.04	0.28***	-0.08	0.03	-0.15**	-0.06	0.03	-0.15*
Draws to decision (JTC)	-0.01	0.01	-0.02	0.00	0.01	-0.01	0.00	0.01	-0.02	-0.01	0.01	-0.07
CRT/CRT2 scores	-0.04	0.03	-0.07	0.01	0.02	0.03	0.00	0.02	0.01	-0.03	0.02	-0.09
Attention to detail (AD ASD)	-0.01	0.04	-0.01	-0.04	0.03	-0.07	0.03	0.03	0.05	0.01	0.02	0.03
Social communication (SC ASD)	-0.10	0.05	-0.12	-0.07	0.05	-0.12	0.02	0.03	0.04	0.05	0.03	0.12
Interpersonal (IP Schizotypy)	0.00	0.08	0.00	0.05	0.07	0.06	-0.02	0.05	-0.03	-0.03	0.04	-0.06
Cognitive-Perceptual (CP Schizotypy)	0.27	0.10	0.17**	0.09	0.09	0.09	0.13	0.06	0.14*	0.11	0.06	0.15*
Disorganised (D Schizotypy)	-0.12	0.08	-0.10	0.08	0.06	0.09	-0.17	0.05	-0.25***	-0.07	0.04	-0.13
Social anxiety (SA Schizotypy)	0.15	0.06	0.16*	0.01	0.05	0.02	-0.06	0.04	-0.10	-0.02	0.04	-0.05
Political orientation ‡	0.16	0.02	0.42***	-0.03	0.02	-0.13*	0.06	0.01	0.27***	-0.05	0.01	-0.31***
Belief in false RW headlines	0.43	0.10	0.25***	-	-	-	-	-	-	-	-	-
Belief in false LW headlines	-	-	-	0.29	0.09	0.19**	-	-	-	-	-	-
Engagement with false RW headlines	-	-	-	-	-	-	0.18	0.04	0.32***	-	-	-
Engagement with false LW headlines	-	-	-	-	-	-	-	-	-	0.13	0.04	0.19**
Adjusted R²	.47			.18			.39			.18		
F	17.53***			4.97***			12.89***			5.15***		

Significant predictor variables reported in bold.

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

†Gender: -1 = women, 1 = man. ‡Political orientation: 1 = strongly Democrat, 10 = strongly Republican.

5.3.4 Exploratory analysis.

Several exploratory analyses were performed. The first of these was a series of hierarchical regression models that included analyses of accurate headlines. Next, data from Study 1 and Study 2 were reanalysed to address the potential predictive utility of alternative schizotypy measures (i.e., lower-order subscales in place of domain-level measures) and alternative approaches to calculating engagement/belief measures (i.e., utilising measures of discernment).

5.3.4.1 Hierarchical regression

Following the preregistered analysis, several hierarchical regression analyses were performed. As was the case in Study 1, these hierarchical regressions were used to 1) Explore changes to the significance and strength of individual predictor variables at different stages of the regression and 2) Explore and compare belief/engagement measures for true headlines as outcome variables, using the equivalent predictor variables utilised in the regression for false headlines.

5.3.4.1.1 Structure of hierarchical regression models.

Eight hierarchical regression models were constructed with the following measures as the dependent variable: *engagement with false RW headlines* for Model 5.1b, *engagement with false LW headlines* for Model 5.2b, *belief in false RW headlines* for Model 5.3b, *belief in false LW headlines* for Model 5.4b, *engagement with true RW headlines* for Model 5.5b, *engagement with true LW headlines* for Model 5.6b, *belief in true RW headlines* for Model 5.7b, *belief in true LW headlines* for Model 5.8 (see Appendix L).

All assumptions of multicollinearity, homoscedasticity and distribution of residuals required for regression analysis were found to be met for each regression model. Reliability statistics for engagement measures for true headlines can be found in Table 5.2.

Predictor variables were entered into the hierarchical regression in 6 blocks using the enter method, with the variable entered at Block 5 differing between regression models:

- Block 1 consisted of demographic items: *age, gender, education, and frequency of social media use*.
- Block 2 added *CRT/CRT2* scores and *draws-to-decision* from The Beads Task.
- Block 3 added schizotypy domain measures (*CP schizotypy, IP schizotypy, D schizotypy, SA schizotypy*) and ASD measures (*AD-ASD, SC-ASD*).
- For Model 5.1b, *engagement with false RW headlines* was added at Block 5.
- For Model 5.2b, *engagement with false LW headlines* was added at Block 5.
- For Model 5.3b, *engagement with true RW headlines* was added at Block 5.
- For Model 5.4b, *engagement with true LW headlines* was added at Block 5.

- For Model 5.5b, *belief in false RW headlines* was added at Block 5.
- For Model 5.6b, *belief in false LW headlines* was added at Block 5.
- For Model 5.7b, *belief in true RW headlines* was added at Block 5.
- For Model 5.8b, *belief in true LW headlines* was added at Block 5.
- Block 6 added the *political news sharing* variable.

The rationale behind this hierarchical structure is as follows:

Block 1 included demographic control variables that may have an influence on outcome variables but for which there were no explicitly hypothesised relationships.

Block 2 added The Beads Task and CRT/CRT2 performance scores, both of which have been previously shown to reflect heuristic reasoning biases and predict belief and/or engagement with online misinformation.

Block 3 added schizotypy and ASD measures to explore their potential predictive utility after accounting for control variables and heuristic reasoning bias.

Block 4 introduces a measure of political orientation, which has previously been demonstrated to predict engagement/belief in political media. Including this predictor after personality and reasoning bias measures will allow for a greater understanding of 1) The underlying relationships between predictor and outcome variables that would otherwise likely be obfuscated by the influence of political orientation, and 2) the potential mediating or moderating effects of political orientation on other significant predictors.

Block 5 added either a belief or engagement measure, matched in terms of political orientation, depending on the type of headlines being assessed as an outcome variable. For example, if the outcome variable was *belief in false RW headlines*, the predictor variable added at this stage would be *engagement with false RW headlines*. The inclusion of these variables is based on previously demonstrated predictive relationships between measures of engagement and belief (e.g., Buchanan, 2020), in addition to testing the robustness of the previously added variables as significant predictors (i.e., once the link between engagement and belief is accounted for, do other predictors remain significant?).

Finally, the rationale for including the *political news sharing* variable in Block 6 is once again to test the robustness of previously established relationships (i.e., to explore the remaining significance of previously added variables once a direct measure of online political news sharing frequency is

accounted for). Please note that the results for the final block of models 5.1b-5.4b are identical to the outcomes of models 5.1a-5.4a.

5.3.4.1.2 Outcome of hierarchical regression analyses

The full results for each hierarchical regression analysis can be viewed in Appendix L. A comparison of these regression models at their final block is also viewable in Table 5.5. A brief description of any notable changes in the significance of predictor variables observed throughout the stages of the hierarchical analysis will be presented below.

Model 5.1b (**outcome variable:** *engagement with false RW headlines*) demonstrated both draws-to-decision and CRT/CRT2 performance to act as a significant predictor at Block 2. After including schizotypy and ASD measures (Block 3), both measures of analytical reasoning were rendered nonsignificant, with the JTC measure failing to act as a significant predictor again at any stage of the analysis. This implies that any predictive relationship between the outcome variable and draws-to-decision was better explained by other variables in the analysis (e.g., CP schizotypy). When including political orientation scores (Block 4) and measures of belief in false RW headlines (Block 5) CRT/CRT2 once again significantly contributed to the prediction of the outcome variable, indicating that once the influence of belief and political orientation were controlled for CRT/CRT2 performance was a useful predictor of the engagement with false RW headlines. However, this relationship was rendered nonsignificant after accounting for the role of political news sharing at Block 6, suggesting that CRT/CRT2 performance may have influenced engagement with false RW stimuli via a shared association with news sharing behaviour. CP schizotypy was shown to significantly predict the outcome variable as soon as it was included in the regression model. While the strength of this predictive relationship diminished as more explanatory factors were introduced (Blocks 4-6), CP schizotypy continued to act as a robust predictor of belief in false RW stimuli. This suggests that CP schizotypy contributes to the regression model even when directly controlling for the shared underlying associations with measures of belief, political orientation and news sharing. It may be the case that CP schizotypy captures something beyond these other measures that contributes to RW misinformation engagement. Finally, SA schizotypy significantly predicted the outcome only after controlling for news sharing behaviour (Block 6), implying that differences in social anxiety were useful predictors of engagement with false RW stimuli only after accounting for a shared relationship with news sharing behaviour. Model 5.1b was also shown to be the best at predicting the outcome variable (achieving an adjusted R^2 of .47), with the greatest explanatory contribution to the model (i.e., resulting in the largest significant increase in F) being the inclusion of political orientation measures.

Model 5.2b (**outcome variable:** *engagement with false LW headlines*) demonstrated that CP schizotypy did not significantly contribute to the prediction of the outcome variable until after controlling for the influence of political orientation (Block 4). After controlling for the predictive value of belief judgements (Block 5) CP schizotypy once again failed to demonstrate a significant contribution to the regression model, implying that at least part of the predictive relationship of CP schizotypy was derived from a shared association with underlying beliefs in false LW headlines. Gender was a significant predictor until the very last block, indicating that gender may have been significant earlier due to an underlying association with political news sharing behaviour. Similarly, education level acted as a significant predictor only at the final step of the regression, indicating that differences in education level were useful for predicting the outcome variable only after accounting for the differences in political news sharing behaviour. Model 5.2b achieved an adjusted R^2 of .18, with the greatest explanatory contribution to the model being the inclusion of news sharing measures.

Model 5.3b (**outcome variable:** *engagement with true RW headlines*) demonstrated CP schizotypy to act as a significant and robust predictor of the outcome variable throughout the analysis (Blocks 3-6). As with Model 5.1b, the strength of the relationship was shown to diminish with the inclusion of other predictors (indicating a shared predictive relationship) but remained significant, implying that the variable contributed to the model beyond an influence on belief, political orientation, or political news sharing. Similarly, CRT/CRT2 was shown to act as a significant predictor of the outcome variable from its inclusion until the end of the analysis (Blocks 2-6). This robust relationship with the CRT/CRT2 measures was observed for this regression model only, implying that cognitive reflection may have a particularly significant role in predicting engagement with true RW headlines. Model 5.3b achieved an adjusted R^2 of .39, with the greatest explanatory contribution to the model being the inclusion of political orientation measures.

Model 5.4b (**outcome variable:** *engagement with true LW headlines*) indicated that strength of belief in true LW headlines failed to significantly predict subsequent engagement (its addition to the regression failed to significantly improve model accuracy), implying that the potential explanatory value of underlying belief measures was better accounted for by the other variables in the model. CP schizotypy was briefly significant in Block 5, however after the controlling for the influence of news sharing behaviour in Block 6 the predictive utility of CP schizotypy was reduced and rendered nonsignificant. This suggests that the CP schizotypy may have been predicting engagement with true LW headlines via a shared association with news sharing behaviour. Additionally, gender was shown to be a robust predictor throughout the entire analysis. Model 5.4b achieved an adjusted R^2 of .20, with the greatest explanatory contribution to the model being the inclusion of news sharing measures.

Model 5.5b (**outcome variable:** *belief in false RW headlines*) displayed a robust association with D schizotypy, which was a significant predictor upon entry in the model until the end of the analysis. There was also a less robust relationship with CP schizotypy, which was significant upon entry into the model, but rendered NS in Block 5 after controlling for engagement intentions. In block 6 CP schizotypy became a significant predictor again, after controlling for the role of news sharing behaviour. Collectively, these results imply that schizotypal traits appear to be useful predictors of belief in false RW headlines. Education level was shown to be significant in Block 3, but then rendered nonsignificant until the end of the analysis after controlling for political orientation in Block 4, implying that belief in RW misinformation is better explained by political motivations rather than degree of education. Model 5.5b achieved an adjusted R^2 of .39, with the greatest explanatory contribution to the model being the inclusion of political orientation measures.

Model 5.6b (**outcome variable:** *belief in false LW headlines*) displayed a robust association with age acting as a significant predictor variable throughout the analysis, suggesting age to be a reliable predictor of belief in false LW headlines even when controlling for the influence of all other predictor variables. Like Model 5.5b, CP schizotypy displayed an inconsistent pattern of significance as a predictor variable, becoming significant in Block 4 after controlling for the influence of political orientation, NS in Block 5 after accounting for engagement intentions, and significant again after additionally controlling for the role of political news sharing at Block 6. Model 5.6b achieved an adjusted R^2 of .18, with the greatest explanatory contribution to the model being the inclusion of political orientation measures.

Model 5.7b (**outcome variable:** *belief in true RW headlines*) was shown to be the worst performing regression analysis, achieving a total adjusted R^2 of .13 with political orientation contributing most to the model (despite being NS as the end of the analysis). At Block 5 the regression model significantly predicted belief in true RW headlines but displayed no significant individual predictor variable coefficients. The addition of news sharing in Block 6, while failing to significantly increase the predictive power of the model, resulted in AD-ASD traits and intent to engage with the headlines to become significant predictors of belief in true RW stimuli. This model was also the only one to not have political orientation as a significant predictor. Overall, these results suggest that the predictors utilised in the regression may have been poor at capturing underlying influences on belief in true RW headlines, but AD-ASD traits and engagement intentions may have tapped into some of these influences.

Model 5.8b (**outcome variable:** *belief in true LW headlines*) displayed a robust association with gender, as well as CP schizotypy, SA schizotypy, and SC-ASD traits. The strength of the predictive

relationships for these variables were shown to remain stable despite the inclusion of other explanatory variables, implying that ASD traits and schizotypy traits predicted belief in true LW headlines beyond influence shared with political orientation, intent to engage with the stimuli, and news sharing behaviour. Frequency of social media use acted as a significant predictor of belief in true LW headlines, until it was rendered NS by accounting for the role of political orientation in Block 4. This suggests that differences in the frequency of social media use that were associated with belief in accurate LW headlines are better explained via strength and direction of political identity. Model 5.8b achieved an adjusted R^2 of .16, with the greatest explanatory contribution to the model being the inclusion of political orientation measures.

Table 5.5 - Comparison of significant predictors of all hierarchical regression outcomes at final block.

Outcome measure	Stimuli Type	
	False	True
Engagement:	<p>Adjusted R² = .47</p> <ul style="list-style-type: none"> ○ Political orientation ($\beta = .42, p < .001$) ○ Political news sharing ($\beta = .30, p < .001$) ○ False RW Belief ($\beta = .28, p < .001$) ○ CP schizotypy ($\beta = .17, p = .012$) ○ SA schizotypy ($\beta = .16, p = .028$) ○ Gender ($\beta = .12, p = .015$) 	<p>Adjusted R² = .39</p> <ul style="list-style-type: none"> ○ Political orientation ($\beta = .43, p < .001$) ○ Political news sharing ($\beta = .34, p < .001$) ○ CP schizotypy ($\beta = .20, p = .003$) ○ True RW belief ($\beta = .18, p < .001$) ○ CRT/CRT2 ($\beta = -.11, p = .035$) ○ Gender ($\beta = .11, p = .031$)
	<p>Adjusted R² = .18</p> <ul style="list-style-type: none"> ○ Political news sharing ($\beta = .28, p < .001$) ○ False LW Belief ($\beta = .19, p = .002$) ○ Political orientation ($\beta = -.13, p = .042$) ○ Education ($\beta = -.11, p = .049$) 	<p>Adjusted R² = .20</p> <ul style="list-style-type: none"> ○ Political news sharing ($\beta = .34, p < .001$) ○ Political orientation ($\beta = -.19, p = .002$) ○ Gender ($\beta = .18, p = .003$)
Belief:	<p>Adjusted R² = .39</p> <ul style="list-style-type: none"> ○ False RW Engagement ($\beta = .32, p < .001$) ○ Political orientation ($\beta = .27, p < .001$) ○ D schizotypy ($\beta = -.25, p < .001$) ○ Age ($\beta = -.15, p = .007$) ○ Political news sharing ($\beta = -.15, p = .007$) ○ Gender ($\beta = -.14, p = .006$) ○ CP schizotypy ($\beta = .14, p = .048$) 	<p>Adjusted R² = .13</p> <ul style="list-style-type: none"> ○ True RW engagement ($\beta = .25, p < .001$) ○ AD-ASD ($\beta = .12, p = .045$)
	<p>Adjusted R² = .18</p> <ul style="list-style-type: none"> ○ Political orientation ($\beta = -.31, p < .001$) ○ False LW Engagement ($\beta = .19, p = .002$) ○ Age ($\beta = -.17, p = .009$) ○ CP schizotypy ($\beta = .16, p = .047$) ○ Political news sharing ($\beta = -.15, p = .014$) 	<p>Adjusted R² = .16</p> <ul style="list-style-type: none"> ○ Political orientation ($\beta = -.28, p < .001$) ○ SA schizotypy ($\beta = .23, p = .006$) ○ CP schizotypy ($\beta = -.22, p = .006$) ○ SC-ASD ($\beta = -.17, p = .036$) ○ Gender ($\beta = .15, p = .012$)

Note: all regression models were shown to be significant via ANOVA ($p < .001$).

Variables ordered by contribution to the regression model (β value).

5.3.4.2 Reanalysis of regression data from Studies 1 and 2 using individual SPQ-BRU sub-scales.

Studies 1 and 2 to have that demonstrated schizotypy traits can act as significant predictors of political misinformation vulnerability. However, all analyses so far have utilised domain-level schizotypy subscales (i.e., *IP schizotypy*, *CP schizotypy*, *D schizotypy*, and *SA schizotypy*) instead of the nine individual sub-scales from which the domain-level measures are derived (i.e., *No Close Friends*, *Constricted Affect*, *Eccentric Behaviour*, *Odd Speech*, *Unusual Perceptions*, *Magical Thinking*, *Ideas of Reference*, *Suspiciousness*, and *Social Anxiety*). While this approach has proven somewhat effective, the question arises as to whether we might gain insight into the underlying nature of the relationship between schizotypy and misinformation vulnerability if we were to utilise the lower-order subscales? Perhaps utilising this more granular approach to schizotypal trait measurement might highlight the significance of specific domain subcomponents.

To address this question, a series of modified regression models were constructed using the previously utilised data from Studies 1 & 2 (see **Appendix M** for a detailed breakdown of the analyses). These new regression models were created to reinvestigate previously conducted analyses that resulted in schizotypy traits acting as a significant predictor of either belief or engagement with misinformation stimuli, however in place of using domain-level SPQ-BRU measures the lower-order subscales were used instead.

The results of this reanalysis did demonstrate that some of the lower-order subscales were able to highlight the specific relationships underlying domain-level measures (e.g., misinformation engagement in Study 1 was shown to be significantly predicted by the Unusual Experiences subscale, while right-wing misinformation engagement in Study 2 was significantly predicted by Magical Thinking). However, it was also demonstrated that when using the domain-level measures of schizotypy that more significant relationships were identified compared to the analyses using lower-order subscales (e.g., domain-level analysis revealed a significant relationship between cognitive-perceptual schizotypy and belief in both left and right-leaning misinformation, while analyses using lower-order subscales failed to demonstrate a significant relationship between misinformation belief and any of the individual subscales that collectively form the cognitive-perceptual domain measure).

Therefore, the findings appear to imply that the use of domain-level PSQ-BRU measures is preferable, both due to the measure's ability to reveal significant relationships with misinformation vulnerability measures that would otherwise go unnoticed and due to the fact that use of the domain-level measures allowed for the inclusion of fewer predictor variables to be utilised in the regression models (thereby maintaining statistical power).

5.3.4.3 Reanalysis of regression data from Studies 1 and 2 to explore the utility of discernment measures as predictor variables.

Previous misinformation research has made use of truth discernment measures (e.g., Pennycook & Rand, 2021), a measure that acts similarly to the concept of sensitivity in signal detection theory (see Batailler et al., 2022). Truth discernment is calculated by subtracting scores of belief in misinformation stimuli from scores of belief in accurate stimuli, resulting in a metric that indicates an individual's sensitivity to accuracy when forming belief judgements (with positive values indicating a tendency to believe accurate stimuli more than inaccurate stimuli). Given the current focus on engagement behaviour, might calculating discernment scores based on the relative engagement of participants with true and false stimuli be a useful predictor variable? Perhaps factors such as schizotypy promote misinformation engagement and belief via an influence of one's ability identify and engage only with accurate content?

See Appendix N for details on the exploratory report on the use of both truth and engagement discernment measures as predictors of misinformation vulnerability using data from Study 1 & 2. The results of this brief report indicated that discernment measures may have some predictive utility (e.g. there appears to be evidence to suggest that CP schizotypy predicts poorer discernment in engagement behaviour), however it was decided that these variables would not be included in further analyses. This decision was made primarily due to the fact that discernment measures appeared to provide no additional value to the pre-existing regression models predicting misinformation vulnerability, in addition to practical limits on the number of predictor variables that can be included in each regression models (i.e., including more predictor variables requires larger sample sizes to maintain statistical power, which would then require the acquisition of additional funding that was not originally budgeted for).

5.4 Discussion

5.4.1 Summary of research aims and findings.

Study 2 sought to explore the relationship and predictive utility of non-clinical schizotypy traits, ASD traits, and analytical reasoning task performance in relation to online political misinformation vulnerability measures. Participants consisted of a mixed group of US residents who exhibited support for a range of LW and RW political ideologies. These participants were exposed to a series of news headlines that differed in terms of political appeal and objective factuality, after which they were asked to self-report the extent to which they believed in the accuracy of the content and whether they would engage with the headlines had they encountered it on social media.

It was hypothesised that characteristics associated with an analytical reasoning bias (i.e., better performance on tasks of analytical reasoning, elevated ASD traits) would significantly predict a reduced tendency to believe and engage with false headlines. In contrast, characteristics associated with a heuristic reasoning bias (i.e., poorer performance on analytical reasoning tasks, elevated schizotypy traits) would significantly predict an increased tendency to believe and engage with false headlines. These hypotheses were explored using a series of multiple regressions (see Table 5.3).

The results of the regression analyses demonstrated that cognitive-perceptual schizotypy was significantly associated with higher levels of belief and engagement with false RW headlines, as well as belief in false LW headlines. Elevated socially-anxiety schizotypy traits were also shown to predict heightened engagement with false RW headlines. Disorganised schizotypal traits were (unexpectedly) demonstrated to be significant negative predictors of belief in false RW headlines. In comparison, ASD traits were demonstrated to be nonsignificant predictors of belief/engagement with false headlines when assessed alongside other predictor variables, contrary to the proposed hypotheses. Similarly, measures of analytical reasoning (i.e., cognitive reflection measures and The Beads Task performance) also did not significantly predict any of the belief/engagement outcomes for false headlines after accounting for the role of other predictors.

In addition to the outlined hypotheses, the following exploratory research questions were also investigated: 1) What role does political orientation play in predicting belief/engagement? 2) What are the differences between regression models predicting engagement/belief for LW vs RW stimuli? 3) What are the differences between regression models for accurate and misinformation headlines?

The results of the exploratory analysis (see Table 5.5) demonstrated that political orientation was a significant predictor of belief and engagement (nonsignificant only when predicting belief in true RW headlines). It was also demonstrated that individuals tended to believe and engage with politically

congruent headlines (true and false). When comparing predictors of belief/engagement for LW and RW outcomes differences were observed in the pattern and strength of predictor variables. Generally, belief and engagement with RW headlines was better predicted by the variables included in the analysis. Similarly, when comparing the regression output for models predicting belief and engagement with true vs false headlines differing patterns of significant predictor variables were observed. The interpretation of findings for both the primary and exploratory analysis will be discussed below.

5.4.2 The relationship between schizotypy and engagement/belief in false headlines.

It was hypothesised that the expression of CP schizotypy traits would be positively correlated, and significantly predict, engagement (H1a) and belief (H1b) in false news headlines when utilised in a regression analysis.

Hypothesis H1a was partially supported, with the regression analyses demonstrating CP schizotypy to a positive predictor of engagement with false RW headlines, but not false LW headlines (despite demonstrating a significant positive correlation with CP schizotypy, see Table 5.2). These results suggest that while CP schizotypy is positively correlated with engagement toward false headlines across both sides of the political divide, engagement with false LW headlines was better predicted by other covariates.

Furthermore, SA schizotypy traits were also shown to significantly correlate and predict engagement with false RW headlines. While the primary focus of the schizotypy analysis was on the role of CP traits, SA traits may potentially capture aspects of underlying social anxiety and withdrawal that could exacerbate the influence of CP traits on reasoning skills. It has been demonstrated in previous research that heightened social anxiety can increase reliance on heuristic reasoning (Vroiling et al., 2016) and that social isolation can result in increased expression of positive schizotypal traits (Le et al., 2019; Lincoln et al., 2021). Taken together, these results provide partial support to the underlying notion that cognitive differences associated with CP schizotypy (and potentially other schizotypal traits) may promote misinformation engagement.

Hypothesis H1b was supported, with belief in both LW and RW false headlines being positively correlated and significantly predicted by individual differences in CP schizotypy. These results appear to suggest that CP schizotypy is associated with greater belief in political misinformation, and that this relationship is expressed across the political divide. This would be congruent with the proposed hypothesis, suggesting that reduced analytical reasoning and increased heuristic reliance associated with schizotypal cognition plays a role in facilitating misinformation vulnerability. However, it was also

demonstrated that D schizotypy traits significantly predicted belief in false RW stimuli (and to a greater extent compared to CP traits). In contrast to CP traits, D traits were shown to negatively correlate with belief in false RW stimuli, while also positively correlating with CRT/CRT2 performance. While these results do not negate the confirmation of H1b, it does challenge the notion that all expressions of schizotypal traits are associated with reduced analytical reasoning and greater belief in misinformation.

5.4.3 The relationship between ASD traits and engagement/belief in false headlines.

It was hypothesised that the expression of ASD traits would be negatively correlated, and a significant negative predictor, of engagement (H2a) and belief (H2b) in false news headlines.

Hypothesis H2a was partially supported; ASD traits did not significantly predict engagement with false LW or RW headlines, but a significant negative correlation was observed between SC-ASD traits and engagement with false RW headlines in the bivariate analysis. However, contrary to the proposed hypothesis, AD-ASD traits were shown to positively correlate (although weakly and non-significantly) with all engagement and belief measures for false headlines, suggesting that AS-ASD traits were unlikely to be associated with protective effects against misinformation.

Hypothesis H2b was also partially supported. It was shown that ASD traits did not significantly predict belief in false headlines in the regression model, however a significant negative correlation was observed between SC-ASD traits and belief in false RW headlines. However, it was also demonstrated that SC-ASD traits displayed a significant positive correlation with belief in false LW stimuli, contrary to the expectation of a protective effect against misinformation. Once again, AD-ASD traits were shown to trend towards a positive correlation with measures of belief in false headlines.

These results imply that while SC-ASD traits were generally associated with less belief and engagement with false RW headlines, other variables included in the analysis were better at predicting these outcomes. Why this relationship was observed only for RW stimuli is unclear, as is the observation of a significant positive correlation with false LW headline engagement. It may be the case that these relationships were driven by underlying differences between political demographics, as LW political orientation was positively correlated SC-ASD traits in the current sample. This may help to explain why SC-ASD appeared to be associated with rejection of RW materials and acceptance of LW materials in the zero-order correlations, but not in the regression models where political orientation was included as a covariate.

These findings also indicate that AD-ASD traits may not be associated with resistance to misinformation at all, which goes against the notion that an increased attention to detail would

translate into greater reliance on evidence and rationality. Instead, it may be the case that AD-ASD traits tap into aspects of rigidity, hyperfixation, and increased pattern salience that do not promote objective reasoning, despite the application of an analytical thinking style (for an example of ASD-associated analytical thinking facilitating belief in conspiracy theories see Georgiou et al., 2021a). Research has also suggested that AD-ASD traits can significantly overlap with aspects of positive schizotypy (Nenadić et al., 2021), which might explain the association with belief in false headlines.

It may also be the case that AD-ASD traits in this sample may have been influenced by the co-expression of schizotypy, as ASD and schizotypy have a complicated and intertwined relationship that is still somewhat unclear (see Chisholm et al., 2015 for an overview). Theorists who have explored the diametric model of Autism-Schizotypy have suggested that co-expression of these traits can result in a balancing effect which moderates their cognitive effects (Abu-Akel et al., 2020; Crespi & Badcock, 2008). Both measures of ASD traits were shown to significantly positively correlate with all schizotypy domains in the current study, further suggesting a common underlying relationship. It is also noteworthy that neither of the ASD traits were shown to significantly correlate with the performance measures of analytical thinking, implying that elevated ASD traits did not translate to better analytical reasoning in the current sample (contrary to the findings of previous research, such as Brosnan et al., 2017). These findings imply that ASD traits did not act as expected (i.e., as an indicator of an analytical cognitive phenotype), suggesting that they may not be a fruitful avenue of investigation moving forward.

5.4.4 The relationship between CRT/CRT2 performance and engagement/belief in false headlines.

It was hypothesised that the CRT/CRT2 scores would be negatively correlated, and a significant predictor, of engagement (H3a) and belief (H3b) in false news headlines.

Hypothesis H3a was partially supported, with CRT/CRT2 scores failing to significantly predict engagement with false headlines, but significantly and negatively correlating with engagement with false RW headlines. Hypothesis H3b was also partially supported, as CRT/CRT2 scores again did not significantly predict belief with false headlines but they did demonstrate a significant negative correlation (although the effect size of this correlation was negligible).

These results suggest that, while other variables included in the analysis were better at predicting the misinformation vulnerability, superior CRT/CRT2 performance was associated with reduced belief/engagement with false RW headlines (congruent with previous research outlining the

relationship between superior CRT performance and reduced misinformation vulnerability, such as Pehlivanoglu et al., 2021; Pennycook & Rand, 2019b). This implies that a reduced tendency to engage with analytical reasoning is associated with an increased vulnerability to RW misinformation, but not LW misinformation. However, why this asymmetry was observed is not entirely clear.

One possible explanation is that political orientation might influence underlying cognitive processes that contribute to misinformation vulnerability. Analytical thinking may play a more significant protective role against RW misinformation due to the nature of the RW information landscape. For example, greater levels of exposure to political misinformation have been reported among the political right (Allcott & Gentzkow, 2017; Wisker & McKie, 2021) and conservative politicians have been suggested to be less concerned with factual accuracy in their political messaging (Baron & Jost, 2019). This increased exposure to inaccuracies and political misinformation among RW individuals may therefore result in the strengthening of heuristic cues that promote receptivity to false information (e.g., processing fluency, confirmation bias), thereby leaving those who exhibit a heuristic reasoning bias to be less able to identify falsehoods.

Alternatively, the correlation between RW misinformation vulnerability and CRT/CRT2 performance may reflect political motivations, as superior CRT/CRT2 performance was associated with a LW political orientation (mirroring previous research findings such as Deppe et al., 2015). CRT/CRT2 performance was also shown to significantly correlate with D schizotypy in this sample, which itself appeared to show an association with pro-LW bias (i.e., positively associated with belief/engagement with LW stimuli, while negatively associated with RW stimuli).

5.4.5 The relationship between The Beads Task performance and engagement/belief in false headlines.

It was hypothesised that the expression of performance on The Beads Task (i.e., higher number of draws-to-decision) would be negatively correlated, and a significant predictor, of engagement (H4a) and belief (H4b) in false news headlines. The rationale for this hypothesis was based on a higher number of draws-to-decision being indicative of an analytical reasoning style, superior probabilistic reasoning, and a desire to consider evidence when forming decisions (Huq et al., 1988; Ross et al., 2015).

Hypothesis H4a was partially supported, with draws-to-decision failing to significantly predict engagement with false headlines in the regression model while displaying a significant negative correlation. Hypothesis H4b was also partially supported, with draws-to-decision again failing to

significantly predict belief in false headlines, but significantly and negatively correlating with belief in false RW headlines.

These results suggest that greater draws-to-decision was associated with reduced belief and engagement with false RW headlines, implying that a tendency for JTC is associated with vulnerability to RW misinformation. However, the predictive power of this relationship was nonsignificant when compared alongside other explanatory variables utilised in the regression. For example, CP schizotypy was significantly negatively correlated with draws-to-decision (mirroring previous research such as Hua et al., 2020; Juárez-Ramos et al., 2014), which may have accounted for the negative zero-order correlation observed between The Beads Task performance and receptivity to RW misinformation.

Regarding *The Beads Task* performance among the current sample, just under 30% of participants demonstrated performances that would qualify as indicating a JTC reasoning bias in clinical research (i.e., viewing fewer than 3 beads before guessing it's source). This frequency of non-clinical participants displaying a JTC bias appears to be in line with previous research (e.g., Özen-Akın & Cinan, 2022) and further supports the notion that JTC bias can influence reasoning among the non-clinical population (Ross et al., 2015).

It should be noted that these results may also have been influenced by the emphasis on completion time that many participants exhibit on platforms such as Prolific, as it is in the best interests of users to complete the presented materials as quickly as possible to maximise their hourly pay-rate. Given the role of time constraints in potentially intensifying reliance on heuristic reasoning (Kahneman, 2011), this factor might have contributed to a higher frequency of impulsive responses, impacting the association between JTC tendencies and misinformation susceptibility.

As with the CRT/CRT2 measure, the only significant relationships between this measure of reasoning and belief/engagement outcomes were for RW materials. As previously suggested, this may reflect an asymmetrical role of analytical reasoning in protecting against RW vs LW misinformation. Alternatively, as greater draws-to-decision were significantly associated with a LW political orientation the rejection of RW materials by those who score highly on *The Beads Task* may stem from underlying political motivations.

5.4.6 Other significant predictors of engagement/belief in false headlines.

The results of the regression analyses predicting belief/engagement measures for false headlines also indicated that several variables not included in the hypotheses acted as significant predictors.

Gender was shown to significantly predict outcome measures for RW stimuli, with men being more likely to engage with RW misinformation and women being more likely to believe RW misinformation. This is congruent with past research has indicated that men are more likely to engage with online misinformation (e.g., Buchanan, 2020; Kim, Sin, & Yoo-Lee, 2014). The increased likelihood of women believing false RW materials was an unexpected result. Potential explanations include the fact that men tended to score higher on the CRT/CRT2 while women exhibited higher rates of CP schizotypy, however these variables did not influence the significance of gender as a predictor when incorporated into the same regression analysis suggesting other underlying factors.

Age was also shown to significantly predict belief measures for both RW and LW stimuli, with older age being associated with reduced belief in misinformation. It may be the case that older individuals have acquired greater expertise in politics and are therefore less likely to believe dubious political information. This is supported by previous research findings of older individuals being more discerning towards inaccurate news reports (Sindermann et al., 2021), although some studies have indicated the opposite (e.g., Guess et al., 2019).

Education level was shown to predict engagement with false LW material, with higher levels of education being associated with less engagement with LW misinformation. These findings are congruent with previous studies (e.g., Melki et al., 2021 & Preston et al., 2021), potentially reflecting greater expertise and/or cognitive ability as a protective factor against engagement with misinformation. However, it is not clear why this relationship would be restricted to engagement with LW misinformation alone, as well as not extending to measures of belief.

Political news sharing was shown to significantly predict all belief/engagement measures for false headlines, regardless of political appeal. Higher levels of political news sharing were shown to be associated with greater degrees of engagement with both LW and RW misinformation (congruent with both Study 1 and Buchanan & Kempley, 2021). In contrast, political news sharing was also shown to be associated with reduced belief in misinformation across the political divide. While the sharing of political news being associated with greater level of misinformation engagement (which includes sharing news articles) is intuitively understandable, the association between increased news sharing and reduced belief in misinformation is not so clear. It might be the case that greater news sharing represents investment in politics, therefore being more politically engaged, better informed, and prone to rejecting belief in political misinformation (see Vegetti & Mancosu, 2020). However, it has also been suggested that greater political knowledge can also increase receptivity to politically congruent misinformation (see Jardina & Traugott, 2019; Nyhan et al., 2013), which brings into question the potential protective effects of political sophistication. It may also be the case that the

association between political news sharing and increased in misinformation engagement could stem from the purposeful engagement of false information, either for the purposes of debunking or to propagate further for deceptive purposes. Alternatively, news sharing may tap into a need to share and interact with online information regardless of its accuracy (perhaps to instigate discussion or debate).

Finally, political orientation was also shown to significantly predict all measures of belief/engagement with false headlines (discussed as part of the exploratory analysis below).

5.4.7 Summary of exploratory analysis

5.4.7.1 Description of the relationship between political orientation and engagement/belief measures.

Political orientation acted as a significant predictor in 7 of 8 regression models exploring belief and engagement outcomes (only nonsignificant in predicting *belief in true RW headlines*) and was shown to support previous suggestions of a partisan bias in receptivity toward congruent political media regardless of accuracy. These findings align with existing research on political identity that has suggested individuals tend to believe and engagement more with politically congruent information (e.g., Pereira et al., 2021; Osmundsen et al., 2021).

Regarding measures of headline engagement alone, *political orientation* was shown to be a more powerful predictor of RW engagement compared to LW engagement. This might imply that individuals who identify as RW are more driven to engage with online political media based on political motivations (e.g., affective partisanship, protection of social identity, deferral to group norms and a reasoning heuristic). These findings are congruent with existing research that has suggested RW individuals to be more prone to engagement with politically congruent misinformation (Chadwick et al., 2022; Wisker & McKie, 2021). The strength of political orientation as a predictor was also (marginally) higher in regression models predicting engagement with true stimuli in comparison to false stimuli. This could imply that engagement with congruent political information that is factually accurate is preferred by those who invest more in political identity (congruent with previous research that has demonstrated that partisans prefer to engage with accurate information; Pennycook et al, 2021b).

Turning to measures of belief, *political orientation* significantly predicted belief in LW stimuli (regardless of factuality) and belief in false RW stimuli. Why political orientation did not significantly predict belief in accurate RW headlines is unclear (although it should be noted that most variables explored in the study were shown to be ineffective at predicting this particular outcome). It would also seem that political orientation played a bigger role in predicting belief in misinformation compared to accurate headlines. Like the analysis of engagement measures, *political orientation* was shown to be

the strongest predictor of *belief in false RW stimuli*. This might suggest that increased strength of political identity (particularly among the political right) is associated with sub-optimal reasoning strategies that facilitate inaccurate beliefs. Such results are consistent with the literature indicating a possible heuristic-driven reasoning pattern among RW individuals, wherein quick judgments may align more strongly with political identity than with evidence-based accuracy (Sanchez & Dunning, 2021a).

In summary, strength and direction of *political orientation* were shown to significantly predict all regression outcomes except *belief in true RW headlines*. It was shown that individuals tended to believe and engage with materials that matched their political identity, regardless of factuality. All outcomes measuring vulnerability to misinformation stimuli, both LW and RW, were significantly predicted by measures of *political orientation* (although this predictive relationship was stronger for RW stimuli). Therefore, political orientation appears to be a particularly important factor when trying to understand factors that promote misinformation vulnerability, as well as engagement and belief in accurate political news content.

5.4.7.2 Description of differences and similarities between analyses for LW and RW headlines.

5.4.7.2.1 Engagement with false headlines – LW vs RW comparison

When comparing regression models that predicted engagement with false RW stimuli with those that predicted engagement with false LW stimuli, several similarities and differences were noted.

In terms of similarities, measures of political orientation, belief in the accuracy of the presented stimuli, and online political news sharing behaviour were demonstrated to significantly predict misinformation engagement regardless of political alignment (although it was a more powerful predictor for RW misinformation). In terms of differences, education was shown to act as a significant predictor of engagement with LW misinformation only, while engagement with RW misinformation was uniquely predicted by gender, SA schizotypy and CP schizotypy.

These results suggest that while shared underlying political ideology, strength of beliefs and news sharing tendencies were associated with bi-partisan engagement with political misinformation, specific factors contributed differently to the promotion of misinformation across the left-right divide. While greater education may be associated with reduced engagement with LW misinformation, this does not seem to be the case for RW misinformation. In addition, men were more prone to engaging with RW misinformation, as were individuals who displayed greater expression of SA and CP schizotypal traits (thought to contribute to reasoning biases).

5.4.7.2.2 Engagement with true headlines – LW vs RW comparison

Comparing similarities and differences in predictors of engagement with true LW and RW headlines demonstrated that gender, political orientation and news sharing significantly predicted stimuli engagement regardless of political appeal. It was also demonstrated that measures of CRT/CRT2 performance, CP schizotypy and belief in the accuracy of the presented stimuli were also significant predictors of engagement with true RW headlines only.

These results suggest that being male, sharing political ideology in line with the presented stimuli, and a tendency to share political news online may be associated with being more prone to engage with factually accurate headlines across the political divide. The results also suggest that those who engage with accurate RW headlines tend to exhibit a reduced utilisation of analytical reasoning, alongside increased CP schizotypy traits and greater belief in the accuracy of the presented stimuli.

5.4.7.2.3 Belief in false headlines – LW vs RW comparison

Comparing predictors of belief in false headlines for LW and RW stimuli revealed that age, CP schizotypy, political orientation, political news sharing, and intentions to engage with the stimuli were significant (for both LW and RW stimuli). However, it was also shown that gender and D schizotypy acted as significant predictors of false RW stimuli alone.

These results suggest that belief in both LW and RW political misinformation was associated with individuals who were younger, expressing higher levels of CP schizotypy, and who were less likely to share online news with others but did express intent to engage with the presented materials. It was also once again shown that congruence between the political orientation of the participant and stimuli was associated with increased acceptance. In addition, these findings suggest that women were more likely to believe RW misinformation, while greater expressions of D schizotypy were associated with reduced belief in RW misinformation.

5.4.7.2.4 Belief in true headlines – LW vs RW comparison

When comparing regression models predicting belief in true headlines for both LW and RW stimuli it was revealed that there were no shared significant predictor variables. Belief in true RW stimuli was significantly predicted by AD-ASD traits and the intention to engage with the presented headlines. In contrast, belief in true LW stimuli was significantly predicted by gender, SC-ASD, CP schizotypy, SA schizotypy, and political orientation.

These results therefore suggest that there may be significantly different underlying processes associated with promoting belief in accurate news headlines, depending on its political content.

Belief in accurate RW headlines was associated with greater intentions to engage with the materials and heightened expression of AD-ASD traits (associated with a greater attentiveness to detail and cognitive rigidity). Belief in accurate LW headlines was instead shown to be associated with being male, identifying as LW, greater expression of SA schizotypy, reduced expression of CP schizotypy, and lower expressions of SC-ASD traits (associated with fewer social and communication deficits).

5.4.7.2.5 Predictors of both engagement and belief in headlines – LW vs RW comparison

When comparing common predictors of both engagement and belief in LW stimuli it is shown that political orientation acts as a significant predictor in all models. In comparison, the only shared predictors across all RW stimuli were the engagement/belief variables, in which belief measures were predicted by the intention to engage and engagement measures were predicted by measures of belief in the accuracy of the materials. This variable essentially tested the notion that people interact, share, and otherwise engage with content they believe in.

These findings suggest that belief and engagement with LW headlines, regardless of being true or not, might be more influenced by political orientation compared to RW headlines. This potentially suggests a tendency to defer to judgements of accuracy and intent to engage with LW headlines based on motivations of political identity, rather than strength of personal belief. In contrast, being likely to believe and engage with RW headlines was more associated with the strength of belief in the presented headlines and the intent to engage with believed materials. This may indicate that belief and engagement with RW headlines may be more associated with a desire to generate online social activity around political topics individuals personally believe in, potentially reflecting stronger motivations based on strength of personal conviction, rather than acting based on group identity.

5.4.7.2.6 Summary of differences and similarities between RW and LW analyses.

Predictors of headline engagement were shown to display patterns of similarities and differences when comparing LW and RW stimuli.

In terms of similarities, engagement with both LW and RW headlines was shown to be significantly predicted by political orientation, with congruence between political identity and political appeal of the stimuli associated with greater levels of headline engagement. Engagement across the political divide was also shown to be predicted by an individual's tendency to share online political content, with those who tended to share more political media being more likely to engage with the presented headlines.

Differences were noted between predictors of LW and RW engagement, with gender, elevated CP schizotypy and higher belief measures significantly predicting greater RW engagement.

Additionally, engagement with accurate RW headlines was uniquely associated with poorer CRT/CRT2 performance, while engagement with inaccurate LW headlines was uniquely associated lower education levels.

Similarities between LW and RW regression models predicting belief measures were less obvious, as there were no significant predictors of belief in LW and RW headlines shared across all regression models. It was demonstrated however, that belief in RW headlines (true and false) was associated with greater levels of intent to engage with the presented stimuli, while belief in RW misinformation was associated with being female and expressing greater levels of D schizotypy. Belief in accurate RW headlines was shown to be associated with a heightened expression of AD-ASD traits.

Belief in both true and false LW headlines was associated with political orientation (i.e., identifying as LW) and differences in the expression of CP schizotypy traits (associated with an increased belief in false LW stimuli, but reduced belief in true LW stimuli). Belief in true LW headlines was uniquely associated with being male, greater expressions of SA schizotypy, and reduced SC-ASD traits. In contrast, belief in false LW headlines was associated with being younger, intending to engage with the presented stimuli, and a reduced tendency to share online political news.

Finally, belief and engagement with all LW stimuli was collectively associated with the strength of LW political orientation, while belief and engagement with all RW stimuli was predicted by corresponding engagement/belief measures. This might suggest that interactions and receptivity to LW headlines are reliably explained by the effects of political identity, while interactions and receptivity to RW headlines are reliably explained by the strength of personal beliefs and the desire to participate in corresponding online social advocacy.

5.4.7.3 Description of differences and similarities between analysis of true headlines vs false headlines.

When comparing the regression models predicting outcomes for true headlines vs false headlines patterns of similarities emerged (some of which have been touched on in the previous sections).

In the analyses focused on false headlines, engagement was significantly predicted by belief measures, news sharing, and political orientation (indicating that those who regularly shared political news, believed in the content of the false headlines and displayed a common political ideology were more likely to engage with all false stimuli). Common factors promoting belief in false headlines were shown to be *political orientation, news sharing, engagement, age, and CP schizotypy* (implying that belief in false headlines was associated with congruent political content of the headline, being less

likely to share political news, intending to engage with the presented false headlines, being younger, and expressing elevated CP schizotypy traits).

In the case of true headlines, all measures of engagement shared the significant predictors of gender, news sharing and political orientation (indicating that being a man, having sympathy toward the political leanings of the headline, and being a frequent news sharer was associated with engagement with true stimuli). In contrast there were no predictors of belief in true headlines that were shown to be shared across all the analyses.

5.4.8 Limitations

While this study aimed to improve upon the generalisability of the findings of Study 1 by increasing political diversity, the sample should still not be considered as being fully representative of the general public. As with Study 1, the sample of participants exhibited a high level of education and social media interaction, out of the typical range reported for the US public. In addition, only those who had voted in 2020 were selected as participants. The voter turnout in the 2020 presidential election was roughly 62% of the voting age population (electproject.org), therefore selecting only for those who had cast a vote in 2020 limits the generalisability of the findings to non-voters. Additionally, it is worth noting that any participants who identified their gender as non-binary were excluded from the analysis.

As observed in Study 1, the participant sample appeared to be particularly prone to online engagement with political headlines. While 21% of participants did not engage with any misinformation stimuli, 79% indicated an intent to engage with at least one of the misinformation headlines. This is a high engagement rate compared to previously reported values (e.g., 10%-20%; Chadwick & Vaccari, 2019; Guess et al., 2019), indicating that the participant sample may have been unusually prone to online engagement and not representative of the general public. Some of these unusual characteristics may be a result of recruiting participants from an online pool, thereby selecting for people who are more engaged in online services (such as Prolific and potentially social media) and more likely to spend time interacting with others online. In addition, the LW and RW cohorts appeared to differ in terms of polarisation, with LW participants being more polarised. This introduced differences between the two political sub-groups that were not accounted for in the experimental design and therefore may have obfuscated results.

Furthermore, this study was limited by methodology common to Study 1 and other similar misinformation studies, in which the number of real-world news stimuli used to acquire engagement and belief measures is relatively small and their content idiosyncratic. The relatively small number of

misinformation stimuli simply cannot capture the full range of misinformation expressed on social media platforms and other online news outlets, thereby limiting any findings in terms of ecological validity. In addition, the small number of stimuli means that individual headlines may have exerted an exaggerated influence in the analysis. While attempts were made to balance stimuli in terms of partisan appeal there were many other aspects in which the headlines differed from each other (e.g., appeals to emotion). One way to address this issue without substantially increasing the number of stimuli (and duration of testing) might be to utilise a much larger pool of headline stimuli, from which participants would be shown a smaller semi-random selection.

Finally, causal inferences could not be established due to the correlational design of the study. While speculation about potential causal relationships can be suggested based on the results of the regression analyses one must keep in mind the golden rule: correlation does not equal causation.

5.4.9 Conclusion

5.4.9.1 Summary of key findings from Study 2

The results of Study 2 indicated that CP schizotypy was a significant bi-partisan predictor of belief in misinformation headlines, and a significant predictor of engagement with RW misinformation headlines. In addition, other measures of schizotypy were also shown to significantly predict misinformation vulnerability (SA and D traits), suggesting that the construct may be associated beyond the influence of CP traits.

ASD traits failed to demonstrate a significant predictive relationship with measures of misinformation vulnerability, suggesting that any explanatory value they possessed was better captured by alternative variables. In addition, neither measure of ASD demonstrated a particularly strong relationship with the performance measures of analytical thinking, undermining the rationale for their inclusion as an “analytical” personality phenotype. Additionally, measures of analytical reasoning (The Beads Task and CRT/CRT2) did not significantly predict misinformation vulnerability when assessed alongside other predictor variables.

Political orientation was shown to be a robust predictor of bi-partisan misinformation vulnerability, with engagement and belief shown to be higher when the stimuli matched the participant’s political orientation (i.e., partisanship bias). There was also evidence of for an asymmetrical presentation of predictors for misinformation vulnerability toward RW and LW stimuli.

Similarly, receptivity to accurate headlines compared to misinformation headlines were shown to differ in some ways (for example, ASD traits were shown to significantly predict belief measures for accurate headlines while failing to significantly predict any of the misinformation outcomes), while

also sharing similarities (e.g., news sharing habits as a predictor of engagement, partisanship bias, CP schizotypy as a promoter of RW engagement).

5.4.9.2 Comparison to Study 1 and collective findings.

The results of Study 1 implied that CP schizotypy was a significant predictor of RW misinformation engagement, while also suggesting that CRT/CRT2 performance was a significant predictor of belief in RW misinformation. It was also shown that ASD traits and CP schizotypy were significant predictors of engagement with accurate RW headlines. Some of these findings were supported by Study 2, such as the significance of CP schizotypy in predicting RW engagement. However, after expanding the political range of stimuli/participants and controlling for the influence of JTC & political orientation it was shown that CRT/CRT2 scores no longer significantly predicted RW misinformation belief (despite displaying a significant negative correlation). It was also shown that low SC-ASD no longer significantly predicted more engagement with accurate RW headlines (again, despite a significant negative correlation).

Taking into consideration the collective findings of studies 1 & 2 several results appear to be consistent. First, CP schizotypy appears to act as a significant predictor of misinformation vulnerability, with a stronger relationship observed for misinformation engagement over belief, and for RW stimuli over LW stimuli. CP traits appear to also significantly predict engagement with accurate RW headlines. Second, ASD traits do not appear to significantly contribute to the prediction of misinformation vulnerability when assessed alongside schizotypy measures and other included variables (although ASD traits may have more explanatory potential as predictors of receptivity to accurate headlines). Third, while better performance on measures of analytical reasoning tended to correlate (weakly) with reduced misinformation engagement this relationship appears to be better captured by other variables (e.g., political orientation, CP schizotypy, news sharing habits).

It is also interesting to note that in both studies the regression model predicting belief in accurate RW headlines achieved the lowest amount of explained variance, with relatively few significant predictor variables. This suggests that for some reason the personality and cognitive variables of interest were not as useful when predicting belief in accurate RW headlines, suggesting that other key factors beyond heuristic/schizotypal cognition may play a significant role.

5.4.9.3 Goals moving forward.

Building upon the findings of studies 1 & 2, the next stages of research will seek to further understand how schizotypal personality traits relate to misinformation vulnerability. It has been

established that CP schizotypy traits (and at times other schizotypal traits) seem to be involved in promoting belief and engagement with false political information. However, exactly why and how these traits might be involved with misinformation vulnerability is not clear. Therefore, the next stages of research will aim to focus on more a detailed analysis of individual schizotypal traits and the utilisation of schizotypy measures that may be better suited at capturing the manifestations of non-clinical schizotypy. Additionally, attempts will be made to further reveal the underlying cognitive and behavioural correlates of CP (i.e. positive) schizotypy that might be involved in facilitating misinformation vulnerability (beyond the establish associations with cognitive reflection, JTC, and increased news sharing habits).

It is not clear that including ASD measures has significantly contributed to the prediction of misinformation vulnerability. It may be the case that due to their conceptual overlap with the schizotypy measures that they failed to uniquely contribute to the predictive models. Additionally, across both studies ASD measures failed to significantly positively correlate with analytical reasoning measures and AD-ASD traits tended to positively correlate with CP schizotypy, undermining the rationale for their inclusion in the analysis as a marker of analytically driven cognition. Given the lack of significant findings so far, exploration of ASD traits will cease for now to allow for a more comprehensive focus on schizotypy.

Finally, having explored the contribution of CRT and JTC measures alongside schizotypy and other significant predictor variables it appears that these measures were not particularly useful. While they do exhibit the types of relationships with misinformation vulnerability we might expect (i.e., better performance associated with increased scepticism and reduced engagement), these measures did not capture anything that wasn't better explained by other factors such as schizotypy, news sharing habits and partisan bias. By exploring additional measures of reasoning, beyond CRT and JTC, it may be possible to identify other reasoning biases relevant to misinformation vulnerability.

Chapter 6: Schizotypy, Cognitive Closure, and Conspiratorial Beliefs in Right-Wing Misinformation Vulnerability (Study 3)

6.1 Introduction

6.1.1 Summary of prior findings and direction of ongoing research

The results of Study 1 and Study 2 indicate that schizotypal personality traits can be used to predict vulnerability to online political misinformation (particularly RW misinformation). The pattern emerging from the results so far appears to specifically implicate cognitive-perceptual (i.e. positive) schizotypy traits as a potential risk factor associated with increased vulnerability to misinformation, particularly in relation to misinformation engagement. Furthermore, schizotypal traits were shown to contribute to the prediction of misinformation vulnerability even when the influence of other significant explanatory variables were accounted for (e.g., partisanship bias, online sharing habits, accounting for strength of beliefs and desire to share media).

Based on prior findings, part of this unique contribution of schizotypy to the prediction of misinformation vulnerability appears to stem from its association with the expression of reasoning biases that promote the use of intuition over analytical reasoning (i.e., a heuristic-reasoning bias). This bias in reasoning was captured by poor performance on cognitive measures such as the Cognitive Reflection Task and the Beads Task, with scores on these measures being shown to negatively correlate with the expression schizotypy traits (with positive/cognitive-perceptual traits displaying the strongest relationship). However, schizotypal cognition is associated with numerous cognitive biases and reasoning errors beyond the tendency to jump to conclusions or over rely on intuition (Aldebot Sacks et al. 2012; Dagnall et al., 2016). It is possible that some of these other schizotypal reasoning biases might also account for differences in vulnerability to online political misinformation and should therefore be investigated.

The current study will seek to expand upon previous findings by further probing the relationship between schizotypy and the tendency to both believe and/or engage with online political misinformation. This will be achieved by adapting the previous experimental design to incorporate an alternative, potentially superior, measure of schizotypal traits, while also exploring additional schizotypy-related biases of reasoning and cognitive style as potential “mechanisms” contributing to the schizotypy-misinformation relationship. The current study will also restrict participant recruitment so that only RW participants are recruited. This choice was made based on the observation in Study 2 that the schizotypy-misinformation relationship appeared to be stronger for RW content. Therefore,

the current study will focus on RW misinformation stimuli and recruit only RW participants to maximise the expression of misinformation vulnerability and associated underlying risk factors.

It is hoped that using stronger schizotypy measures and exploring additional explanatory schizotypal mechanisms will provide additional clarity to the previously established link between schizotypy and misinformation vulnerability. These adaptations in methodology and their associated rationale are expanded upon in detail below.

6.1.2 Alternative schizotypy measure – the Multidimensional Schizotypy Scale

In the two previous studies schizotypal personality traits have been assessed using the SPQ-BRU (Davidson et al., 2016), a brief form of the widely utilised Schizotypal Personality Questionnaire (SPQ; Raine, 1991). The SPQ and its derivatives have frequently been used in research linking schizotypy to conspiratorial beliefs (e.g., Barron et al., 2018; Bruder et al., 2013; Dagnall et al., 2015; March & Springer, 2019), and to a lesser extent misinformation vulnerability (e.g., Bronstein et al., 2019; Buchanan & Kempley, 2021). This legacy of use in schizotypy research influenced the decision to use this schizotypy measure during the initial phases of the current project (to facilitate a clearer comparison with existing studies). However, in recent years a newer and potentially superior psychometric measure of schizotypy has been developed: the Multidimensional Schizotypy Scale (MSS; Kwapil et al., 2018a).

The MSS was designed to overcome numerous shortcomings identified in older schizotypy measures such as the SPQ, the Oxford-Liverpool Inventory of Feelings & Experiences (O-LIFE; Mason et al., 1995), and the Wisconsin Schizotypy Scales (Chapman et al., 1976; 1978; Eckblad & Chapman, 1983). For example, other schizotypy measures have been criticised for their lack of conceptual clarity. Many of the older schizotypy questionnaires include measures characteristics that go beyond the core traits of schizotypy, extending into associated comorbidities (e.g., depression, anxiety, ADHD, ASD traits). As a result, these measures lack alignment with the current conceptualisation of schizotypy and suffer from a lack of construct validity. The MSS sought to address this issue by ensuring the questions included in the measure directly relate to the core traits of schizotypy as they are currently conceptualised by researchers (e.g., a clear distinction between positive, negative, and disorganised traits).

Other advantages that the MSS claims over previous schizotypy measures include: 1) The establishment of a clear factorial structure that aligns with the three-factor model of schizotypy, 2) Avoidance of out-dated language, 3) Focusing on trait vs episodic experience to distinguish negative schizotypy from comorbid depressive symptoms, 4) Being designed using modern techniques in scale

development, 5) Superior psychometric properties, and 6) The MSS was designed and validated with online sampling applications in mind (Kwapil et al., 2018b).

Given the advantages of the MSS over other schizotypy measures it would be sensible to utilise it going forward in the project. However, the full-scale MSS is quite a long questionnaire (77 items). Given practical concerns over participant load and the increasing the amount of time required for participants to complete their tasks (thereby increasing cost of participant testing), it would have been impractical to incorporate the full measure into the current analyses. Therefore, the current study will utilise a brief version of the MSS, the Multidimensional Schizotypy Scale - Brief (MSS-B; Gross et al., 2018b), which is roughly the same length as the SPQ-BRU. Furthermore, the MSS-B has undergone extensive validation and has been shown to demonstrate a high degree of concordance with the full-scale MSS (Gross et al., 2018a; Kemp et al., 2020).

It is hoped that by using the MSS-B as the measure of schizotypy in place of the SPQ-BRU that the current study might achieve greater sensitivity and conceptual clarity in the analysis of schizotypal traits and their associations with misinformation vulnerability measures (for example, the MSS-B will be able to better establish a direct link between positive schizotypal traits and misinformation vulnerability, without the concerns over construct validity associated with the SPQ and its derivatives).

6.1.3 Schizotypy and Need for Cognitive Closure.

The Need for Cognitive Closure (NFCC) is a well-established measure of cognitive style, associated with a reduced tolerance for ambiguity and the desire for an answer (often *any* answer) that might explain ambiguous or confusing situations (Kruglanski & Webster, 2018; Webster & Kruglanski, 1994). It has been suggested that individuals who possess this cognitive trait display a tendency to “seize and freeze”; they readily “seize” upon any available explanation to reduce their sense of uncertainty, and then “freeze” these beliefs firmly in place making them harder to modify though the use of additional explanatory information and evidence.

NFCC may play a role in moderating misinformation vulnerability, as conspiracy theories and other types of misinformation often serve to provide meaning and explanations during complex and confusing events (e.g., shifts in societal norms, geopolitical tensions, public health emergencies; Pereira et al., 2020; Wheeler, 2021). Furthermore, research exists that suggests the NFCC reasoning bias is associated with both increased belief in online misinformation (Marchlewska et al., 2018) and elevated schizotypal personality traits (Colbert & Peters, 2002; Ramos & Torres, 2016). NFCC has also been linked to an emotional thinking style (Swami et al., 2014), suggesting that the trait might further

contribute to the heuristic-reasoning bias and reliance on emotional/intuitive thinking that is thought to promote vulnerability to online misinformation.

Therefore, it was decided that NFCC would be explored in the current study as a potential explanatory factor mediating/moderating the relationship between schizotypy and misinformation vulnerability. It was decided to use the Need for Closure Scale – 15 (NFCS-15; Roets & Van Hiel, 2011) scale due to its balance between being of short and displaying satisfactory psychometric properties.

6.1.4 Schizotypy and generic conspiratorial beliefs.

Part of the initial rationale for exploring schizotypy as a predictor of misinformation vulnerability was that schizotypal traits have been shown to be associated with belief in conspiracy theories (Barron et al., 2018). As the study of conspiracy theories and online misinformation appear to share a considerable degree of conceptual overlap it made sense to explore this important explanatory factor within the context of belief and engagement with online misinformation to see if it provided similar predictive utility as it for conspiratorial beliefs (which it did).

However, we have not yet directly accounted for the role of individual differences in conspiratorial beliefs in any of the analyses, and instead we have relied on positive schizotypy traits to act as a proxy measure of “conspiracy-receptivity” when interpreting results. This leaves questions about how exactly conspiratorial beliefs relate to misinformation vulnerability.

For example, might it be possible that conspiratorial beliefs fully mediate the relationship between schizotypy and misinformation vulnerability? It’s possible that schizotypal cognition ultimately promotes misinformation vulnerability simply because it is associated with more conspiratorial beliefs. Or perhaps conspiratorial beliefs are associated with specific forms of misinformation vulnerability over others? For example, it may be the case that having a conspiratorial worldview makes individuals more likely to believe online misinformation that touches on conspiratorial themes. Alternatively, true believers (i.e., those whose worldview is steeped in conspiratorial beliefs) might engage more with misinformation content to promote the “truth” to others. By adding a direct measure of conspiratorial belief into the current analysis, we can begin to address these questions.

Furthermore, including a measure of receptivity toward conspiratorial narratives might reveal additional reasoning processes influencing misinformation vulnerability. For example, it has been suggested that individuals who are particularly receptive to conspiratorial beliefs present a monological worldview that promotes an acceptance of conspiratorial narratives, sometimes resulting in individuals simultaneously endorsing theories that are mutually incompatible (Goertzel, 1994; Wood et al., 2012). These findings suggest that individuals prone to conspiratorial ideation don’t

necessarily need to *believe* a conspiracy theory in order to endorse it, and instead tend to endorse any narrative that reinforces their view that “something” nefarious is going on. Therefore, we may find that a tendency to hold conspiratorial beliefs is uniquely associated with increased engagement toward misinformation that contains conspiratorial themes and captures reasoning processes involved in engagement (beyond perceived accuracy of the stimuli and cognitive processes that result in inattentiveness).

When measuring individual differences in conspiracy theory receptivity there are several established measures to choose from, with most focusing on belief in “classic” socio-political conspiracy theories of the late 20th and early 21st century (i.e., those relating to the Kennedy assassination, the US Moon landings being fabricated, world governments hiding the existence of extra-terrestrials, 9/11 as a false-flag incident, etc.; Swami et al., 2017). It was decided that the most appropriate measure of conspiratorial beliefs would be the Generic Conspiratorial Belief Scale (GCBS; Brotherton et al., 2013). In contrast to other conspiracy belief measures, the GCBS explores “generic” conspiracy beliefs instead of those relating to existing conspiracy theories (i.e., it detects the presence of a generalised conspiratorial worldview instead of belief in specific conspiracies). This measure seems to be an appropriate choice when exploring receptivity to the varied, and often novel, content of online misinformation.

6.1.5 Research questions, hypotheses, and exploratory analyses.

The current study sought to address the following research questions:

1. Can the MSS-B predict misinformation vulnerability? And if so, does it provide additional clarity in the analysis of the schizotypy-misinformation relationship?
2. Can an NFCC bias, previously associated with schizotypal cognition, account for the observed relationship between schizotypy and misinformation vulnerability?
3. Can generic conspiratorial beliefs, previously associated with conspiratorial cognition, account for the observed relationship between schizotypy and misinformation vulnerability?

To address these research questions a series of formal hypotheses were formed. In congruence with the findings of Studies 1 and 2, it was predicted that the expression of positive schizotypal personality traits would be associated with higher scores on measures of misinformation engagement and belief. Therefore, hypothesis 1 was:

H1a: Scores on the MSS-B positive schizotypy subscale will be significant predictors of, and positively correlated with, measures of misinformation stimuli engagement.

H1b: Scores on the MSS-B positive schizotypy subscale will be significant predictors of, and positively correlated with, measures of misinformation stimuli belief.

It was also predicted that a NFCC bias, as measured by the NFCS-15, would be associated with increased engagement and belief in relation to false news headlines. Therefore hypothesis 2 was:

H2a: Scores on the NFCS-15 will be significant predictors of, and positively correlated with, measures of misinformation stimuli engagement.

H2b: Scores on the NFCS-15 will be significant predictors of, and positively correlated with, measures of misinformation stimuli belief.

Finally, it was also predicted that the endorsement of conspiratorial beliefs, as measured by the GCBS, would be associated with increased engagement and belief in relation to false news headlines. Therefore hypothesis 3 was:

H3a: Scores on the GCBS will be significant predictors of, and positively correlated with, measures of misinformation stimuli engagement.

H3b: Scores on the GCBS will be significant predictors of, and positively correlated with, measures of misinformation stimuli belief.

In addition to the above research questions and formal hypotheses, several exploratory questions would also be addressed. These include: 1) Do the findings of the current study mirror the previous findings by displaying a significant role of positive schizotypal traits in the prediction of misinformation vulnerability? 2) Is the schizotypy-misinformation relationship once again shown to be stronger for misinformation engagement compared to misinformation belief? 3) How do predictors of engagement and belief differ for accurate vs misinformation stimuli?, and 4) How does the MSS-B compare to the SPQ-BRU as a predictor of misinformation vulnerability?

6.2. Method

The online study was conducted using Qualtrics and participants were acquired from the Prolific research panel. Hypotheses and primary analyses were preregistered using AsPredicted (see Appendix O). All statistical analysis was conducted using SPSS 28 for Windows.

6.2.1 Materials and stimuli

Reliability was assessed (where appropriate) for each measure included in the primary analysis. Alpha values presented below were all derived from the current dataset.

6.2.1.1 *The Multidimensional Schizotypy Scale – Brief (MSS-B; Gross et al., 2018b).*

The MSS-B is brief self-report measure of schizotypal personality traits, adapted from the full length Multidimensional Schizotypy Scale (MSS; Kwapil et al., 2018a) for use among the general public. The MSS-B utilises 38 of the original 77 MSS items while maintaining much of the effectiveness of the full-length measure (Gross et al., 2018a; Kemp et al., 2020).

Each of the 38-items in the MSS-B were measured using a yes/no response, with questions belonging to one of following three sub-scales: positive schizotypy ($\alpha = .80$), negative schizotypy ($\alpha = .82$), and disorganised schizotypy ($\alpha = .90$).

6.2.1.2 *Brief Need for Closure Scale (NFCS-15; Roets & Van Hiel, 2011).*

The NFCS-15 is a brief 15-item scale adapted from the original 41-item Need for Closure Scale (NFCS; Webster & Kruglanski, 1994). The NFCS-15 was designed to measure individual differences associated with a need for cognitive closure. Such traits include a reduced tolerance of uncertainty, craving for order and structure, and a pressing desire for answers to outstanding questions (with *any* answer potentially being endorsed, regardless of accuracy or likelihood, in an attempt to achieve cognitive closure).

Each item on the scale is answered using a 5-point Likert scale, with scores calculated as a single factor ($\alpha = .88$).

6.2.1.3 *Generic Conspiracy Beliefs Scale (GCBS; Brotherton et al., 2013).*

The GCBS is a 15-item questionnaire designed to assess the degree to which individuals endorse generic conspiratorial beliefs (e.g., that secretive groups influence world events, suppress technologies that might threaten industry, manipulate the public via mind control, and engage in covering up contact with extra-terrestrials).

Each item on the scale is answered using a 5-point Likert scale, with scores calculated as a single factor ($\alpha = .96$).

6.2.1.4 Online Misinformation Engagement/Belief Task.

The misinformation task involved the exact same protocol as Study 1 (see Section 4.2.1.4), with the only differences being the specific selection of headline stimuli (see Appendix P for a copy of the stimuli and Appendix B for more details on the selection process).

Cronbach's Alpha was calculated using all 4 engagement scales for each individual question, with all 6 questions exhibiting satisfactory reliability ($\alpha > .88$). The individual engagement scales were then summed together into a single composite engagement score for each headline. Cronbach's Alpha was then calculated using these newly calculated engagement scores for all false headlines ($\alpha = .85$), all true headlines ($\alpha = .83$). Subsequently, the variables that would be used in the final analyses were calculated by averaging each participant's collective engagement score for false headlines (resulting in the variable *engagement with false headlines*), as well as the average engagement score for true headlines (resulting in the *engagement with true headlines* variable; see Table 6.2 for details on the reliability analysis for these variables).

6.2.1.5 Political orientation.

Political orientation was measured using an 11-point scale (ranging from "strongly Democrat" to "strongly Republican").

6.2.1.6 Political news sharing.

The extent to which participants shared political news on social media platforms (*Political news sharing*) was measured using a 6-point scale (ranging from "not at all" to "very frequently").

6.2.1.7 Demographics.

The following demographic variables were collected: *Age*, *Gender*, *Country of residence*, and *Education level* (see Table 6.1 for a breakdown of participant characteristics).

6.2.2 Procedure

The procedure was very similar to that applied in Studies 1 and 2. Upon recruitment, participants were directed to the Qualtrics online testing platform where they were presented a set of instructions informing them of the upcoming tasks, as well requesting their informed consent. After providing consent participants were asked to answer questions relating to their demographic information, political orientation, and how often they share political news online. Participants were then presented with the Online Misinformation Engagement/Belief Task. Upon completion the

participants were presented the positive schizotypy subscale from the MSS-B, followed by the NFCS-15, and lastly the GCBS. This process took an average of approximately 12 minutes for participants to complete.

Upon completing these tasks, participants were asked to reconfirm their consent to use their data for the purposes of research. Participants were then presented with a debriefing information page further explaining the purpose of the study and providing additional information resources. During the debrief it was made clear to participants which of the presented stimuli were known to be misleading and a link to the UK government's SHARE checklist was made available.

6.2.3 Participants

6.2.3.2 Participant recruitment.

This study aimed to recruit RW Trump-voters using a similar approach to that used in Studies 1 and 2. As mentioned previously, the decision to recruit only RW participants was due to research that has highlighted vulnerability to misinformation among political conservatives (e.g. Calvillo et al., 2020) and the prominent role of misinformation in the Trump presidency (see Kellner, 2023), leading to a hypothesis that Trump-supporting conservatives may represent a sub-group that is particularly receptive to political misinformation. Additionally, the results of Study 2 seemed to indicate that misinformation vulnerability among RW individuals displayed a stronger relationship with positive schizotypal traits compared to LW participants, further supporting the notion of increased vulnerability to political misinformation among RW individuals. Therefore, focus was restricted to RW participants to further explore the schizotypy-misinformation connection.

6.2.3.1 Power analysis.

An a priori power analysis was conducted using G*power 3.1.9 on the basis of providing adequate power ($\alpha = 0.05$, power = 80%) for a series of multiple regression analyses. With a maximum of 11 predictor variables per regression model and an expected R^2 value of above 0.08, a minimum sample size of 221 participants was required. This number was increased by an additional 10% to account for potential attrition and exclusions, plus an additional 17 participants that were recruited for pilot testing. Therefore, the total sample consisted of 260 participants.

6.2.3.3 Inclusion criteria.

A sample of 260 participants was collected using the Prolific research panel. Each participant was paid £1.50 GBP for their involvement in the study.

The inclusion criteria (facilitated by Prolific's audience filters) consisted of the following: 1) Age over 20, 2) US residents, 3) English as a first language, 4) US political spectrum: Conservative,

Moderate, Other, N/A, 5) US political affiliation: Republican, Independent, Other, None, 6) US presidential election 2020: Donald Trump, 7) Having not taken part in the previous rounds of testing in Study 1 & Study 2. These criteria were largely similar to those used in studies 1 & 2, with the exception of a change to the lower age limit (from 18 to 20). This was done simply to restrict the selection of participants to those who would have been of legal voting age for the 2020 presidential election, as voting choice in the 2020 elections was a key selection criterion.

Participants were recruited and tested in 3 sessions over the course of a week in June 2022. The “balance sample” function provided by Prolific was used to acquire an equal mix of Men and Women.

6.2.3.4 Exclusion of problematic responses.

At the end of each data collection session the acquired datasets were screened problematic responses and excluded from further analysis based on the following criteria: 1) participants declined consent for the use of collected data, 2) participants demonstrated zero variance in their responses to the included measures of schizotypy, 3) participants reported their age to below 20, 4) answering “no” to the question “Do you live in the United States?”, 5) demonstrating an implausibly fast completion time (more than 2SD below mean completion time), 6) responding to a hidden question that would only be observable to automated bots. Participants were also assessed using fraud metrics provided by the Qualtrics (RelevantID, Google’s invisible reCAPTCHA; Qualtrics, 2022), with suspicious responses being excluded from analysis.

As with the previous studies, Gender was explored as a binary variable, thereby restricting the analysis to those who identify as either Men or Women. Therefore, any recruited participants who report a gender other than male or female in the demographic section of the survey would be excluded from the analysis.

Of the 260 participants that were recruited, two participants were flagged for exclusion from the analysis. One was flagged due to a suspicious RelevantID fraud score and the other was flagged based on a suspicious invisible reCAPTCHA score.

6.2.3.5 Summary of final sample.

The final sample had a $n = 258$ and was 50% female, with a mean age of 43.14 ($SD = 13.29$; see Table 6.1 for a breakdown of participant characteristics). This sample size exceeds the minimum sample requirements outlined in the power analysis, and therefore provides adequate statistical power for the proposed analysis.

Table 6.1 - Participant demographics, political orientation and news sharing characteristics (n = 258)

Demographic variables		
	n	%
Gender		
Female	129	50
Male	129	50
Age		
20-30	51	19.8
31-40	71	27.5
41-50	64	24.8
51-60	44	17.1
61-70	32	12.4
70+	3	1.2
Highest educational level		
Less than High School	1	0.4
High School / Secondary School	43	16.7
Some post-school College or University	58	22.5
College or University undergraduate degree	119	46.1
Master's Degree	29	11.2
Doctoral Degree	4	1.6
Professional Degree (JD, MD)	4	1.6
Political orientation		
(1=Strongly Democrat and 11=Strongly Republican).		
1-3	0	0
4-6	28	11
7-9	142	55
10-11	88	34
Frequency of political news sharing on social media		
Not at all	53	20.5
Very rarely	65	25.3
Rarely	39	15.1
Occasionally	77	29.8
Very frequently	24	9.3

6.3. Results

6.3.1 Data screening and descriptive statistics.

Data was screened for missing values, reliability, skewness, and kurtosis (see Table 6.2). There were no missing values in the dataset, however significant skewness (skewness statistic > 1) was observed all MSS-B variables (*positive schizotypy*, *negative schizotypy*, and *disorganised schizotypy*), as well as *engagement with false headlines*. Kurtosis was also shown to be significant (± 3 in SPSS output; Field, 2013) for all MSS-B measures. However, these violations of skewness and kurtosis were thought to not pose any significant problems in the regression analyses due to the sufficiently large size of the sample relative to the number of predictor variables (Schmidt & Finan, 2018).

See Appendix Q for histograms of belief and engagement measures, *political orientation*, *news sharing*, demographic features, *MSS-B subscales*, *NFCS-15*, and *GCBS* scores.

6.3.2 Sample characteristics.

The sample was highly educated, with roughly 60% of participants possessing a college degree or higher (a frequency above the US average of 47.4%; OECD, 2021). The mean participant age was 43 years ($SD=13.29$), and the overall distribution of participant ages was shown to be normally distributed.

In response to the question “*how much do you tend to share political information you come across on social media?*” 21% of participants indicated that they never share political information encountered on social media. This proportion of non-sharers was lower than both Study 1 (29%) and Study 2 (25%), implying that the sample was particularly willing to contribute to the spread of political information on social media (thereby signalling a high level of online political engagement). In terms of political orientation, no participant scored below a 5 on a scale of 1-11 (with 1 indicating “strongly Democrat” and 11 indicating “strongly Republican”) and 23% of participants scored an 11 (e.g. maximum endorsement of Republican identity). These results indicate that we were successful in recruiting a sample comprising a range of RW/Republican participants.

As observed previously in Study 1 and 2, the participants were shown to exhibit high rates of engagement toward headline stimuli, with 63% of participants indicating an intention to engage with at least one misinformation headline (and 85% of participants intending to engage with at least one accurate headline). These engagement rates are again above previously reported norms of 10-40% (Chadwick & Vaccari, 2019; Guess et al., 2019), implying an increased tendency to engage with online political content among the current sample.

Similarly, the distribution of belief scores for accurate and misinformation headlines mirrored the results from Study 1 & 2, with a majority of participants indicating some degree of belief in misinformation headlines (74% of participants in the current sample indicated some degree of belief in at least one misinformation headlines). As with previous findings however, belief in accurate headlines was much more common (98% of participants indicated belief in at least one accurate headline) and participants were generally more confident in their belief judgements for accurate headlines compared to misinformation headlines.

Table 6.2 - Descriptive statistics for predictor and outcome variables used in the regression analysis.

Variables			Skewness		Kurtosis		Cronbach's Alpha (α)
	<i>M</i>	<i>SD</i>	Statistic	Std. Error	Statistic	Std. error	
Age (years)	43.14	13.286	0.24	0.15	-0.90	0.30	-
Gender (-1 = Women, 1 = Man)	0.00	1.00	0.00	0.15	-2.02	0.30	-
Education level	3.62	1.05	0.26	0.15	0.62	0.30	-
Frequency of political news sharing on social media	2.82	1.31	0.03	0.15	-1.28	0.30	-
Political orientation *	8.74	1.70	-0.18	0.15	-0.99	0.30	-
Positive schizotypy - MSS-B**	0.09	0.15	2.31	0.15	5.76	0.30	.80
Disorganised schizotypy - MSS-B*	0.07	0.17	3.31	0.15	11.68	0.30	.90
Negative schizotypy - MSS-B**	0.16	0.20	1.81	0.15	3.31	0.30	.82
NFCS-15	3.49	0.68	-0.68	0.15	1.06	0.30	.88
GCBS	2.90	1.07	-0.13	0.15	-0.85	0.30	.96
Engagement with false headlines	1.89	1.19	1.44	0.15	1.34	0.30	-
Engagement with accurate headlines	2.56	1.31	0.62	0.15	-0.51	0.30	-
Belief in false headlines	1.76	0.68	0.86	0.15	0.42	0.30	-
Belief in accurate headlines	2.84	0.61	-0.54	0.15	0.51	0.30	-

*11-point scale, ranging from 1 = strongly Democrat, to 11 = strongly Republican.

**Scores range from 0-1

6.3.3 Regression analysis

The preregistered analysis was conducted using 2 different multiple regression analyses. The first (Model 6.1) sought to predict engagement with false headlines, while the second (Model 6.2) sought to predict belief in false headlines. The predictor variables used in these regression models consisted of demographic variables (*age, gender, education level*), *political news sharing, political orientation*, MSS-B subscales (*Positive schizotypy, Disorganised schizotypy, Negative schizotypy*), *NFCS-15* scores, and *GCBS* scores.

In addition to these predictor variables, Model 6.1 also included *belief in false headlines*, while Model 6.2 included *engagement with false headlines*. These variables were included in the regression models to account for the “plausibility” account of content engagement, whereby individuals preferentially engage with online material they find to be credible. By accounting for this relationship, the regression analysis can also potentially identify factors that go beyond this simple driver of engagement behaviour (e.g., factors relating to the inattention model and other reasoning biases that promote misinformation vulnerability)

Following the preregistered analyses, further exploratory analysis was conducted in the form of 2 additional regression models (Model 6.3 and 6.4). These additional regression models were identical to Models 6.1 and 6.2 except all belief/engagement measures were replaced with their equivalent measure for accurate headlines (*engagement with false headlines* would be replaced with *engagement with accurate headlines*, etc.).

6.3.3.1 Bivariate correlations

Prior to the regression analysis, bivariate correlations were produced for all outcome measures and predictor variables included in the current study (see **Table 6.3**). As with previous analyses, due to the large number of comparisons and the increased likelihood of type I errors the primary criterion for significance was effect size (as opposed to *p* values). Effect size guidelines for individual differences research were utilised to flag significant correlations, with small, medium, and large effect sizes defined as *r* values $\geq .15$, $.25$, and $.35$ respectively (see Gignac & Szodorai, 2016).

The correlation matrix was screened for large correlations between predictor variables and outcome variables, where the predictor was hypothesised to have a relationship with the outcome variable (e.g., MSS-B traits, NFCS-15 scores, GCBS scores, and belief/engagement measures). Large correlations between predictor and outcome variables were noted between the outcome variable *engagement with false headlines* and the predictors *political news sharing* and *belief in false headlines*. The outcome variable *belief in false headlines* also displayed large correlations with *GCBS*

score and *engagement with false headlines*. Large correlations were also reported between the outcome variable *engagement with accurate headlines* and the *political news sharing* predictor, as well as the outcome variable *belief in accurate headlines* and *engagement with accurate headlines*.

The correlation matrix was also assessed for signs of multicollinearity (e.g. a correlation between predictors $>.70$; Daoud, 2017). The only predictor variables that indicated signs of multicollinearity were *engagement with false headlines* and *engagement with accurate headlines* ($r(256) = .74$). However, as these variables were never utilised in the same regression model there should be no issues concerning multicollinearity.

Table 6.3 – Pearson’s correlation matrix for all predictor and outcome variables

Variables	Correlation (Pearson’s <i>r</i>)												
	Variables												
	1	2	3	4	5	6	7	8	9	10	11	12	13
(1) Age	1.00												
(2) Gender (-1 = Women, 1 = Man)	-0.17**	1.00											
(3) Education level	0.05	0.07	1.00										
(4) Frequency of political news sharing on social media	0.03	0.11	-0.05	1.00									
(5) Political orientation	0.19**	-0.09	0.08	0.18**	1.00								
(6) Positive schizotypy - MSS-B	-0.07	0.04	-0.03	0.18**	-0.01	1.00							
(7) Disorganized schizotypy - MSS-B	-0.22**	0.02	-0.19**	0.05	-0.06	0.33**	1.00						
(8) Negative schizotypy - MSS-B	-0.16*	0.19**	-0.13*	-0.02	-0.10	0.19**	0.30**	1.00					
(9) NFCS-15	-0.03	-0.11	-0.12*	-0.17**	0.05	-0.01	0.13*	0.19**	1.00				
(10) GCBS	-0.08	0.03	-0.21**	0.13*	0.09	0.35**	0.11	0.12	0.08	1.00			
(11) Engagement with false headlines	0.09	0.10	-0.05	0.45**	0.25**	0.33**	0.04	0.03	-0.08	0.31**	1.00		
(12) Engagement with accurate headlines	0.11	0.09	-0.07	0.54**	0.30**	0.27**	0.10	0.01	-0.10	0.15*	0.74**	1.00	
(13) Belief in false headlines	0.10	-0.01	-0.04	0.18**	0.15*	0.19**	0.06	-0.11	-0.12*	0.38**	0.57**	0.36**	1.00
(14) Belief in accurate headlines	0.10	0.05	0.02	0.20**	0.23**	0.11	0.10	-0.12	0.01	0.14*	0.28**	0.43**	0.36**

Small effect size ($r > .15$) is highlighted in green. **Medium** effect size ($r > .25$) is highlighted in yellow. **Large** effect size ($r > .35$) is highlighted in red.

Effect size guidelines derived from Gignac & Szodorai (2016).

* $p < .05$. ** $p < .01$. All significance tests were two-tailed.

6.3.3.2 Outcome of regression models

Four regression models were constructed using the enter method (see Table 6.4). The regression models were checked for homoscedasticity and normally distributed residuals by examining p-p plots and scatter plots of predicted values and residuals. All regression models were found to conform to the assumptions of homoscedasticity and normal distribution of residuals. The presence of multicollinearity was assessed via the variance inflation factor (VIF) values of the regression coefficients, with no VIF values > 3.

Model 6.1 sought to predict *engagement with false headlines* using the following predictor variables: *age, gender, education level, political news sharing, political orientation, positive schizotypy, disorganised schizotypy, negative schizotypy, NFCS-15 scores, GCBS scores, and belief in false headlines*. The regression model was shown to be significant ($F(11,246) = 23.42, p < .001$), with an adjusted of $R^2 = .49$. The significant predictor variables for this regression model were *political news sharing* ($\beta = .31, p < .001$), *political orientation* ($\beta = .13, p = .007$), *positive schizotypy* ($\beta = .20, p < .001$), and *belief in false headlines* ($\beta = .47, p < .001$).

Model 6.2 sought to predict *belief in false headlines* using the following predictor variables: *age, gender, education level, political news sharing, political orientation, positive schizotypy, disorganised schizotypy, negative schizotypy, NFCS-15 scores, GCBS scores, and engagement with false headlines*. The regression model was shown to be significant ($F(11,246) = 16.48, p < .001$), with an adjusted of $R^2 = .40$. The significant predictor variables for this regression model were *political news sharing* ($\beta = -.11, p = .047$), *NFCS-15 scores* ($\beta = -.10, p = .042$), *GCBS scores* ($\beta = .28, p < .001$), *negative schizotypy* ($\beta = -.14, p = .008$), *disorganised schizotypy* ($\beta = .11, p = .042$), and *engagement with false headlines* ($\beta = .55, p < .001$).

Model 6.3 sought to predict *engagement with accurate headlines* using the following predictor variables: *age, gender, education level, political news sharing, political orientation, positive schizotypy, disorganised schizotypy, negative schizotypy, NFCS-15 scores, GCBS scores, and belief in accurate headlines*. The regression model was shown to be significant ($F(11,246) = 19.28, p < .001$), with an adjusted of $R^2 = .44$. The significant predictor variables for this regression model were *political news sharing* ($\beta = .41, p < .001$), *political orientation* ($\beta = .17, p < .001$), *positive schizotypy* ($\beta = .17, p < .001$), and *belief in accurate headlines* ($\beta = .30, p < .001$).

Model 6.4 sought to predict *belief in accurate headlines* using the following predictor variables: *age, gender, education level, political news sharing, political orientation, positive schizotypy, disorganised schizotypy, negative schizotypy, NFCS-15 scores, GCBS scores, and engagement with accurate headlines*. The regression model was shown to be significant ($F(11,246) = 7.13, p < .001$),

with an adjusted of $R^2 = .21$. The significant predictor variables for this regression model were *negative schizotypy* ($\beta = -.16, p = .008$), *disorganised schizotypy* ($\beta = .13, p = .047$), and *engagement with accurate headlines* ($\beta = .42, p < .001$).

Table 6.4 - Summary of regression analysis outcomes for Model 6.1, Model 6.2, Model 6.3, and Model 6.4.

Variables	Model 6.1 (DV = Engagement with false headlines)			Model 6.2 (DV = Belief in false headlines)			Model 6.3 (DV = Engagement with accurate headlines)			Model 6.4 (DV = Belief in accurate headlines)		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Age	0.00	0.00	0.03	0.00	0.00	0.07	0.01	0.00	0.06	0.00	0.00	0.05
Gender †	0.09	0.06	0.08	-0.02	0.03	-0.04	0.06	0.06	0.04	0.04	0.04	0.07
Education level	-0.03	0.05	-0.03	0.02	0.03	0.03	-0.09	0.06	-0.07	0.04	0.03	0.07
Frequency of political news sharing on social media	0.28	0.04	0.31***	-0.06	0.03	-0.11*	0.40	0.05	0.41***	-0.02	0.03	-0.05
Political orientation ‡	0.09	0.03	0.13**	-0.01	0.02	-0.01	0.13	0.04	0.17***	0.03	0.02	0.08
BNFCS	0.05	0.08	0.03	-0.10	0.05	-0.10*	-0.10	0.10	-0.05	0.06	0.05	0.06
GCBS	0.01	0.06	0.00	0.18	0.03	0.28***	-0.03	0.06	-0.03	0.06	0.03	0.10
MSS-B – Negative schizotypy	0.43	0.30	0.07	-0.49	0.18	-0.14**	0.29	0.35	0.04	-0.50	0.19	-0.16**
MSS-B – Positive schizotypy	1.54	0.40	0.20***	-0.31	0.25	-0.07	1.47	0.46	0.17***	-0.15	0.26	-0.04
MSS-B – Disorganised schizotypy	-0.60	0.35	-0.09	0.44	0.22	0.11*	0.01	0.40	0.00	0.44	0.22	0.13*
Belief in false headlines	0.82	0.09	0.47***	-	-	-	-	-	-	-	-	-
Belief in accurate headlines	-	-	-	-	-	-	0.64	0.11	0.30***	-	-	-
Engagement with false headlines	-	-	-	0.32	0.03	0.55***	-	-	-	-	-	-
Engagement with accurate headlines	-	-	-	-	-	-	-	-	-	0.19	0.03	0.42***
Adjusted R²	.49			.44			.40			.21		
F	23.42***			16.48***			19.28***			7.13***		

Significant predictor variables reported in bold. * $p < .05$. ** $p < .01$. *** $p < .001$.

†woman-man. ‡ 1 = strongly Democrat, 11 = strongly Republican.

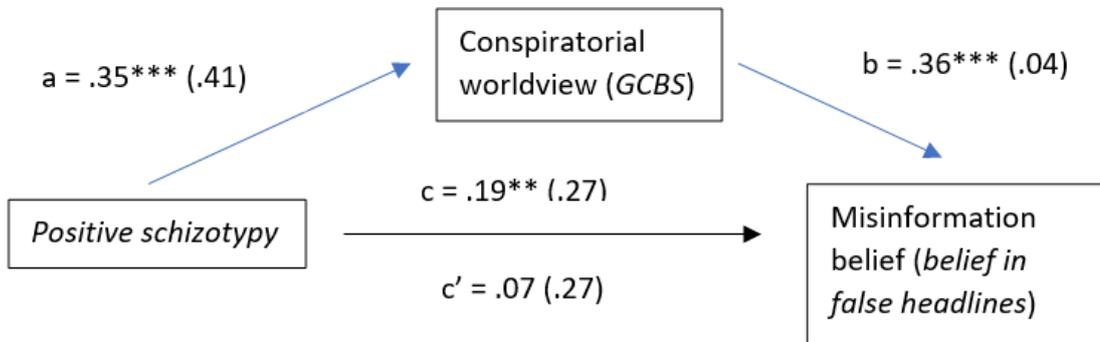
6.3.4 Mediation analysis

The results on the main regression analyses indicated that positive schizotypy did not significantly predict belief in false headlines, while disorganised and negative schizotypal traits did act as significant predictors. This result was surprising considering that *positive schizotypy* was the only MSS-B sub-scale to display a correlation of meaningful effect size with *belief in false headlines*. However, *positive schizotypy* was also shown to strongly correlate with *GCBS* scores, which itself acted as a significant predictor of *belief in false headlines*. It was therefore hypothesised that *positive schizotypy* would likely act as a predictor of *belief in false headlines*, but this relationship would be fully mediated via conspiratorial ideation (represented by *GCBS* scores).

To explore this proposed relationship a mediation analysis was conducted using the SPSS PROCESS Macro (model number 4; Hayes, 2013). The analysis sought to explore the mediating role of *GCBS* scores in the relationship between *positive schizotypy* and *belief in false headlines*.

The results of the analysis (see Appendix R and Figure 6.1) demonstrated a significant total effect of *positive schizotypy* on *belief in false headlines* (Effect = .85 $p = .002$), as well as a non-significant direct effect (Effect = .29, $p = .286$). The indirect effect of *positive schizotypy* on *belief in false headlines* was tested using non-parametric bootstrapping (5000 samples) and was found to be significant (Effect = .56, 95% C.I. (0.30, 0.91)). Collectively these results suggest that the significant predictive relationship between *positive schizotypy* and *belief in false headlines* was fully mediated by conspiratorial beliefs as captured by the *GCBS*.

Figure 6.1. - Path diagram for mediation analysis displaying standardised regression weights and standard errors in brackets for paths *a*, *b*, *c*, and *c'*.



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

6.4. Discussion

6.4.1 Summary of research goals and findings

The current study sought to identify significant predictors of online misinformation vulnerability based on measures of schizotypal personality traits, NFCC, and generic conspiracy beliefs. The participants recruited for the study consisted solely of “US conservatives” (operationalised as US residents that had previously voted for Donald Trump in the 2020 presidential election). Participants completed a scenario-based judgement task where they were presented a series of news headlines in “social media format” and asked to report both 1) the extent to which they believed in the accuracy of the content, and 2) whether they would consider engaging with the content (e.g., giving it a “like”, sharing, commenting). Participants also completed a series of self-report measures assessing schizotypal personality traits, traits associated with the NFCC cognitive bias, and generic conspiratorial beliefs.

It was hypothesised that positive schizotypal traits, NFCC bias, and generic conspiracy beliefs would positively predict misinformation vulnerability measures (i.e., *belief in misinformation* and *engagement with misinformation*).

The results of the study indicated that positive schizotypy traits positively predicted engagement with misinformation stimuli but failed to significantly predict belief in misinformation stimuli when assessed alongside other explanatory variables. NFCC bias was shown to be a non-significant predictor of misinformation engagement, but a significant predictor of misinformation belief (although the direction of this relationship was the opposite to that of the hypothesis, with higher levels of NFCC bias being associated with lower levels of belief in misinformation stimuli). The analysis also found that generic conspiracy beliefs were a non-significant predictor of misinformation engagement but did act as a significant positive predictor of misinformation belief. It was also demonstrated that generic conspiracy beliefs fully mediated the relationship between positive schizotypy and misinformation belief.

The study would also investigate several exploratory questions relating to 1) replication of prior findings, 2) the relative importance of schizotypy in predicting engagement vs belief, 3) differences between predictors of belief and engagement for misinformation vs accurate stimuli, and 4) how the MSS-B compares as a predictor of misinformation vulnerability compared to the SPQ-BRU in Study 1 & 2. The interpretation of both primary and exploratory analyses is expanded upon below.

6.4.2 Schizotypy and misinformation vulnerability

It was hypothesised that positive schizotypy would act as a positive predictor of misinformation engagement (H1a) and misinformation belief (H1b) due to its association with an increased reliance on intuitive/heuristic reasoning processes.

The results of the current study indicate that positive schizotypy acted as a significance predictor of misinformation engagement (supporting H1a), even when controlling for relationships with other significant explanatory variables (e.g., political orientation, online news sharing habits). The fact that positive schizotypy significantly contributed to the prediction of misinformation engagement once direct measures of belief were accounted for suggests that positive schizotypy influences engagement through mechanisms that do not draw upon specific beliefs (e.g., heuristics and reasoning biases). Positive traits were also the only schizotypal characteristics shown to significantly predict misinformation engagement, suggesting that individual differences associated with elevated positive schizotypy might play a particularly important role in facilitating engagement with online misinformation. This is congruent with previous research suggesting that positive schizotypy might play a prominent role in promoting the sharing of online misinformation (Buchanan & Kempley, 2021), as well as the endorsement of socio-political conspiracy theories (Dyrendal et al., 2021). There is also evidence to suggest that positive schizotypy is associated with changes to emotional regulation that can manifest as strong emotional reactions and impulsive reasoning (Kemp et al., 2018), which may contribute to the proposed heuristic-reasoning account of inattentive misinformation engagement.

In contrast, positive schizotypy did not significantly predict misinformation belief (failing to support H1b), whereas both negative and disorganised schizotypy traits did. Disorganised schizotypy was associated with greater levels of misinformation belief, potentially reflecting associated deficits of executive functioning and attentional capacity that would result in an increased tendency to engage in heuristic-reasoning (Kerns & Becker, 2008; O'Leary et al., 2000; Robinson & Unsworth, 2017). Negative schizotypy was associated with lower levels of belief in misinformation stimuli, potentially reflecting its association with emotional blunting (potentially making the emotive arguments and subject matter used in misinformation less impactful) and reduced inter-personal trust (it is possible this lack of trust might also extend to scepticism toward online content). Alternatively, it might be that negative traits predict reduced belief in misinformation the previously reported conceptual overlap between social-cognitive elements of negative schizotypy and traits associated with ASD (Chisholm et al., 2015; Zhou et al., 2019). Social-communication ASD traits have previously been associated with a reduced tendency to engage in heuristic reasoning (Brosnan et al., 2016) along with a predisposition

to engage in an analytical reasoning style (Lewton et al., 2019), both of which could serve to interrupt misinformation vulnerability facilitated via inattention. In Study 1 and 2 it was also shown that social-communication ASD traits negatively correlated with belief in misinformation stimuli (although the magnitude of these correlations were generally small), further supporting the view of social and communication deficits associated with ASD traits being associated with a degree of resistance against misinformation. However, recent evidence has also suggested that the analytical ASD reasoning style might promote belief in conspiracy theories (Georgiou et al., 2021a), and therefore this interpretation should be approached with caution (especially since we did not include a direct measure of ASD traits to clarify the situation).

The significance of negative and disorganised traits and lack of significance for positive traits when predicting misinformation belief was unexpected given that neither the negative nor disorganised schizotypy traits displayed any significant zero-order correlations with misinformation belief (while positive schizotypy did). To explore these findings an additional mediation analysis was conducted demonstrating that, while positive schizotypy exhibited a significant positive relationship with misinformation belief, this relationship was fully mediated by its positive association with generic conspiracy beliefs (see section 6.4.4 for further discussion). Therefore, it might be fairer to say that positive schizotypy *can* act as a predictor of misinformation belief, however a direct measure of an individual's conspiratorial worldview provides superior predictive properties.

In summary, positive schizotypy was shown to significantly predict misinformation engagement, but not misinformation belief due to its relationship being fully mediated by generic conspiratorial beliefs. Furthermore, disorganised and negative schizotypy traits were shown to significantly contribute to the prediction of misinformation belief (with disorganised traits being associated with greater levels of belief, and negative traits being associated with lower levels of belief).

6.4.3 Need for cognitive closure and misinformation vulnerability

It was hypothesised that stronger expressions of the NFCC would act as a positive predictor of misinformation engagement (H2a) and misinformation belief (H2b). The rationale behind these hypotheses was based upon NFCC and its association with a cognitive preference for clear, unambiguous answers, often leading individuals to “seize” on available explanations to reduce feelings of uncertainty (Kruglanski & Webster, 2018). It was suggested that this type of cognitive style may be relevant in misinformation contexts, as misinformation often presents simplistic answers to complex issues (Pereira et al., 2020).

The results of the current study indicate that NFCC was not a significant predictor of misinformation engagement (failing to support H2a), implying that the NFCC traits and associated differences in cognition did not appear to be associated with greater levels of engagement behaviour. Upon reflection this lack of predictive significance might be explained by cognitive biases associated with NFCC being more influential on the formation of beliefs, as opposed to the heuristic and attentional processes thought to influence erroneous engagement with misinformation.

In contrast, NFCC was shown to significantly predict misinformation belief, however contrary to expectations this was a negative relationship whereby greater NFCC was associated with lower levels of belief in misinformation stimuli (thereby failing to support H2b). Contrary to previous research (e.g., Colbert & Peters, 2002), NFCC failed to demonstrate a significant relationship with positive schizotypy.

Interestingly, NFCC was shown to positively correlate with negative schizotypy, which was also shown to be associated with lower levels of misinformation belief in the current study. It was previously suggested that the significance of negative schizotypy as a negative predictor of misinformation belief might stem from conceptual overlap with ASD traits and an association with analytical reasoning. Existing research has demonstrated elevated NFCC among individuals with ASD traits (e.g., Fujino et al., 2019), meaning that the significance of NFCC in the current study may reflect the sceptical, detail oriented, and analytical reasoning styles associated with ASD traits.

Alternatively, the rigidity in belief formation and resistance to attitude change associated with NFCC (i.e. the tendency to “freeze” ones beliefs; Webster & Kruglanski, 1994) might simply result in a general reluctance to believe *any* new information, other than that which addresses completely unfamiliar and novel subjects (thereby making its influence on political misinformation less pronounced due to pre-existing political attitudes and ideological beliefs). However, if this was the case we might also expect NFCC to negatively predict belief in accurate headlines, which it did not (see section 6.4.6.2 for more details).

In summary, NFCC failed to significantly predict engagement with misinformation stimuli, but did act as a negative predictor of misinformation belief.

6.4.4 Generic conspiracy beliefs and misinformation vulnerability

It was hypothesised that individuals who reported higher levels of generic conspiratorial beliefs would be more likely to engage with misinformation stimuli (H3a) and belief misinformation stimuli (H2b). The rationale behind this prediction was simply that much online misinformation contains

conspiratorial themes and therefore individuals who find these types of narratives to be more compelling or believable might be more likely to endorse or believe the content.

The results of the current study demonstrate that generic conspiratorial beliefs did not significantly predict misinformation engagement, despite displaying a significant zero-order correlation (thereby partially supporting H3a). These findings suggest that the sizeable positive correlation between generic conspiratorial beliefs and misinformation engagement can be better understood via associations with other covariates included in the regression model, such as positive schizotypy and belief in misinformation stimuli. This reinforces the notion that engagement toward misinformation stimuli is robustly associated with greater perceived accuracy of the presented stimuli, and the increased expression of schizotypal traits and cognition. These findings also match previous research that has suggested a disconnect between conspiratorial beliefs and a willingness to signal such beliefs to others (Oliver & Wood, 2014).

In contrast, it was shown that generic conspiratorial beliefs did act as a significant positive predictor of belief in misinformation stimuli (supporting H3b). This result appears relatively straightforward, given that a generalised conspiratorial worldview would understandably influence the perceived accuracy of misinformation when the stimuli appeal to conspiratorial themes and narratives. It is noteworthy that the measure remains significant after accounting for stimuli engagement measures, as this suggests that some individuals believe misinformation content due to their receptivity to generic conspiratorial narratives, but this endorsement is not reflected in their online engagement behaviour (somewhat mirroring the previously reported gap between the relatively low frequency of those who publicly endorse conspiracy theories and the substantially larger demographic of “silent believers” who quietly possess conspiratorial beliefs; Oliver & Wood, 2014). Therefore, these results suggest that engagement measures generally do a good job at predicting the perceived accuracy of misinformation stimuli, however they do not fully capture the strength of underlying beliefs (perhaps due to the influence of social desirability bias and a reluctance to publicly endorse information that might be seen as controversial or divisive).

It was also shown that generic conspiratorial beliefs fully mediated the relationship between positive schizotypy and misinformation belief. This suggests that positive schizotypy promotes misinformation belief due to its association with conspiratorial beliefs (e.g., Barron et al., 2018; March & Springer, 2019) and that other aspects of positive schizotypal cognition might play a lesser role in facilitating misinformation belief compared to misinformation engagement (where positive schizotypy was shown to be a significant predictor, but generic conspiracy beliefs were not).

In summary, generic conspiracy beliefs were shown to significantly predict misinformation belief, but not misinformation engagement. Furthermore, generic conspiracy beliefs were shown to significantly predict misinformation belief, but not misinformation engagement. Generic conspiracy beliefs appear to be a potential candidate to account for previously reported associations between positive schizotypy and belief in online misinformation.

6.4.5 Other significant predictors of misinformation vulnerability

As was demonstrated in Study 1 & 2, the strongest predictors of misinformation vulnerability were the variables that accounted for the plausibility model of engagement (whereby participants are more likely to engage with content they think is accurate). Accuracy judgements were found to predict engagement with misinformation stimuli significantly and positively, while engagement intentions were found to significantly and positively predict belief in misinformation stimuli. Therefore, it was demonstrated that individuals tend to engage more with online misinformation content they believe to be accurate.

Frequency of online news sharing was also shown to be a positive predictor of misinformation engagement and a negative predictor of misinformation belief. These results were congruent with those of Study 1 & 2, which also demonstrated a trend whereby individuals who tended to share online news were more likely to engage with misinformation stimuli, but less likely to believe in it. As suggested previously, habitually sharing online news would understandably be associated with an increased likelihood of misinformation engagement if individuals shared most news stories they encountered online. Additionally, habitual news sharing may indicate a high level of political engagement and expertise, with sharing behaviour serving to promote political discourse among social networks (e.g., sharing misinformation might be done in an effort to fact-check and debunk). The negative relationship between news sharing and misinformation belief might also be interpreted as a function of political engagement and expertise, with politically engaged individuals being less likely to believe political misinformation due to their higher degree of domain knowledge (congruent with previous findings of researchers such as Brashier et al., 2021 and Vegetti & Mancosu, 2020).

Finally, political orientation was shown to significantly predict misinformation engagement, but not misinformation belief. These findings suggest that individuals will tend to engage with political misinformation when it is congruent with their political identity, and that this relationship is significant beyond associations with positive schizotypy, news sharing habits, and the perceived accuracy of the stimuli. This suggests that political congruence might influence engagement with political misinformation via processes that are distinct from schizotypal reasoning biases and strength of beliefs (e.g., confirmation bias or negative partisanship). The fact that political orientation did not

significantly predict belief in misinformation stimuli implies that partisanship bias might play a bigger role in shaping misinformation engagement behaviour (perhaps by promoting impulsive reactions based on group identity) while influencing the formation of beliefs to a lesser extent.

6.4.6 Exploratory findings

The current study also sought to address several exploratory research questions, the findings of which are presented below.

6.4.6.1 *Replication of previous findings*

The first was to see if the current study would replicate the findings of Study 1 and 2, by demonstrating a significant relationship between schizotypal personality traits and measures of misinformation vulnerability. Despite the use of different research methodology, the current study supported the findings of the previous work by demonstrating a significant relationship between misinformation vulnerability and schizotypal traits (particularly positive traits). It was also shown that, as with Study 1 and 2, the variables of interest were better at predicting misinformation engagement compared to misinformation belief. This may be due to the study's focus on the utilisation of predictor variables thought to contribute to the promotion of inattentive reasoning errors (e.g. schizotypy traits, NFCC) as these variables will likely have less relevance when predicting crystallised beliefs.

6.4.6.2 *Contrasting misinformation and accurate information*

Another exploratory goal of the current project was to contrast the significant predictors of engagement and belief for misinformation stimuli with those for accurate stimuli. With regard to engagement, the significant predictors for misinformation stimuli and accurate stimuli were identical (i.e., significant predictors consisted of news sharing frequency, political orientation, positive schizotypy, and corresponding belief measures). These results suggest that the same factors are associated with engagement behaviour regardless of the content being factual or not (i.e., news sharing habits, appeals to heuristic reasoning, group identity, and underlying beliefs play a role in promoting engagement of all kinds). However, the regression model predicting engagement with accurate stimuli accounted for a lower amount of explained variance compared to the model predicting misinformation engagement, suggesting a stronger association between these factors and misinformation. These findings could be interpreted as support for the notion that information accuracy plays a relatively small role in influencing how individuals approach engagement with online content and that instead of being processed differently misinformation hijacks the systems that are normally used to promote engagement. It might also suggest that efforts to reduce misinformation engagement could result in reduced online engagement in general.

By comparison, when contrasting predictors of belief for misinformation vs accurate stimuli several differences were noted. As with engagement, the regression models predicting belief in misinformation stimuli were shown to account for a larger proportion of explained variance relative to the models predicting belief in accurate stimuli (suggesting the variables of interest were particularly relevant for misinformation vulnerability). It was also demonstrated that, while belief in misinformation was significantly predicted by news sharing frequency, NFCC, and generic conspiracy beliefs, these variables failed to significantly predict belief in accurate stimuli. Belief in both misinformation and accurate information was shown to be predicted by negative schizotypy, disorganised schizotypy, and corresponding engagement measures. These findings suggest that belief in misinformation may be influenced by processes that do not tend to apply to accurate information (e.g., receptivity to conspiratorial narratives, reasoning biases, scepticism associated with domain expertise).

6.4.6.3 Contrasting the MSS-B and the SPQ-BRU

The study also sought to compare the MSS-B to the previously utilised schizotypy measure used in the current project (the SPQ-BRU). It was shown that the MSS-B appeared to function similarly to the SPQ-BRU in previous studies, demonstrating significant predictive relationships with misinformation vulnerability measures in a similar pattern (e.g., it mirrored the SPQ-BRU by identifying the prominence of positive schizotypal traits). However, when comparing the differences between the two measures several can be noted. For example, the MSS-B displayed a lower degree of inter-correlation between sub-scales (e.g., the largest correlation between MSS-B subscales was $r = .33$, while the SPQ-BRU demonstrated $r = .45$ in Study 1 and $r = .40$ in Study 2). This clearer distinction between the three domains of schizotypal traits contributed to a clearer interpretation of data and allows for results to be directly contextualised within wider research utilising the prominent and well-established 3-factor model of schizotypy. Additionally, as the MSS-B uses a yes/no response paradigm instead of the Likert scale associated with the SPQ-BRU, the distribution of schizotypal traits was less varied. This potentially suggests that some nuance could be lost in recording the spectrum of schizotypal traits. The difference in scoring might also result in the MSS-B registering the presence of schizotypal traits that are pronounced enough to meet the threshold for “full endorsement” (i.e., responding “yes”), meaning that the measure would be sensitive to those with elevated schizotypy but insensitive to variations in less schizotypal individuals.

As the research focus during the current project has largely shifted to exploring the role of positive schizotypy in relation to misinformation vulnerability it was decided to compare the two measures in terms of their positive schizotypy subscales (known as cognitive-perceptual schizotypy in

the SPQ-BRU; see Appendix S). When comparing the performance of the positive sub-scales for the MSS-B and the SPQ-BRU in equivalent regression models across the past 3 studies it could be argued that the MSS-B appears to perform better. For example, when comparing zero-order correlations the MSS-B positive schizotypy subscale demonstrated a stronger relationship with misinformation engagement and belief compared to the SPQ-BRU cognitive-perceptual subscale. When comparing standardised beta values across regression models predicting *engagement with false headlines*, the MSS-B positive subscale contributed to the regression model more than CP schizotypy in study 2, but slightly less than CP schizotypy in study 1. However, as the adjusted R^2 was significantly higher in study 3 compared to study 1 a direct comparison of beta values would be inappropriate, therefore semi-partial correlations were explored (a measure that accounts for the “unique” relationship between variables after having controlled for relationships with all other explanatory variables). Examining semi-partial correlations revealed that the MSS-B positive sub-scale displayed a stronger relationship with misinformation engagement scores compared to the SPQ-BRU measure used in Study 1 and 2. This was not shown to be the case for misinformation belief, however as the regression model in Study 3 included the GCBS variable that was shown to fully mediate the predictive significance of the MSS-B positive subscale, its semi-partial correlation value would be significantly suppressed and therefore such comparisons would not be appropriate.

6.4.7 Methodological limitations

The methodological issues associated with the current study were largely the same as Study 1 and 2. This includes the correlational design of study limiting the opportunity to empirically establish causal relationships between the variables of interest. Another concern is the generalisability of the study's results given the non-representative characteristics of the participant sample (i.e., the sample was highly educated, politically active, unusually prone to engagement behaviour, restricted to binary gender categorisation, and restricted to RW/conservatives). Instead, it is possible that the findings of the current study specifically reflect factors associated with misinformation vulnerability among this social demographic, and therefore the findings should be interpreted with caution.

Another factor effecting the generalisability of the study is that the scenario-based measure of misinformation vulnerability utilised a relatively small number of news stimuli. As online news content (both accurate and inaccurate) is highly idiosyncratic, it may be the case that the significant relationships reported in the current study are not generalisable to other stimuli. Furthermore, all stimuli in the current study consisted of political headlines, therefore the results may be unique to online content displaying political misinformation and should not be assumed to account for vulnerability to other types of misinformation (e.g., health misinformation, climate-change misinformation, anti-science misinformation).

6.4.8 Conclusion

In summary, the results of the current study lend further support to the previously reported association between positive schizotypy and misinformation vulnerability. It was shown that positive traits play a particularly significant role in predicting misinformation engagement and that the relationship between positive schizotypy and misinformation belief may be mediated via the expression of generic conspiratorial beliefs.

In addition to these findings the study also provided evidence to suggest that: 1) NFCC was a poor predictor of misinformation engagement but acted as a negative predictor of misinformation belief, 2) generic conspiracy beliefs failed to significantly predict misinformation engagement while significantly predicting misinformation belief, 3) when comparing predictors of belief and engagement for misinformation stimuli vs accurate stimuli it was shown that predictors of belief differed while predictors of engagement stayed the same, and 4) the MSS-B displayed advantages over the SPQ-BRU supporting its suitability in the current research.

Schizotypy has now been identified as a significant predictor of misinformation vulnerability across three empirical studies utilising different methodologies, thereby lending support to the

validity of the observation based on replication. The next stage of research will aim to move beyond the task of establishing the existence of this relationship and instead focus on the potential implications of this vulnerability in relation to anti-misinformation intervention strategies.

Chapter 7: Exploring the Potential Moderating Effects of Positive Schizotypy on Cognitive Interventions for Right-Wing Misinformation Vulnerability (Study 4)

7.1 Introduction

7.1.1 Background

Studies 1-3 established evidence to suggest that a significant relationship exists between schizotypy traits and measures of vulnerability to online political misinformation. Across these three studies, positive schizotypy was the most commonly identified schizotypal trait to significantly predict misinformation vulnerability, particularly with regard to RW misinformation engagement. The relationship between elevated positive schizotypy and increased misinformation vulnerability was further supported by the results of an exploratory cluster analysis (see Appendix T for more details).

In an attempt to better understand the nature of the positive schizotypy-misinformation relationship, Studies 1-3 also incorporated an exploration of schizotypy-related cognitive traits and reasoning biases. The results of these studies failed to identify any underlying correlates of schizotypy that fully accounted for its association with increased misinformation vulnerability, suggesting that the relationship is likely a multifaceted and complex one. However, Study 3 found that the significant predictive relationship between positive schizotypy and misinformation belief was fully mediated by the expression of a conspiratorial worldview (a frequently reported correlate of positive schizotypy; Denovan et al., 2020; Georgiou et al., 2019). Interestingly, a conspiratorial worldview was shown to act as a nonsignificant predictor of misinformation engagement, suggesting that the relationship between schizotypy and misinformation belief is mediated by different underlying processes to those that facilitate its relationship with misinformation engagement.

Building upon these previous findings, the aim of the current study was to shift focus from solely exploring the role of schizotypal reasoning biases to exploring the potential impact of schizotypy on the efficacy of intervention techniques designed to reduce engagement and belief in online misinformation.

7.1.2 Misinformation interventions and schizotypy.

Interventions designed to reduce vulnerability to online misinformation come in many different forms (see van der Linden, 2022). Some have adopted a media literacy approach (Guess et al., 2020b), while others have gamified the education process and found engaging ways to “inoculate” the public by providing insights into the manipulative aims and methods of disinformation agents (Roozenbeek et al., 2020). Perhaps the most common approach has been to provide fact-checking labels and warning flags for users, informing them of potentially misleading information (e.g., Gaozhao, 2021; Ng et al., 2021; Walter & Murphy, 2018).

Each category of intervention employs different tactics to protect users; however, most seek to stimulate analytical reasoning (i.e., System 2) in order to suppress inaccurate reasoning founded on appeals to intuition, mental heuristics, and biases (i.e. System 1). Therefore, given that those with elevated schizotypy appear to be more vulnerable to online misinformation (Buchanan & Kempley, 2021; Georgiou, et al., 2021), while also being resistant to the utilisation of System 2 (Broyd et al., 2019) and reluctant to modify existing beliefs (Granger et al., 2016), such interventions may prove ineffective at protecting this at-risk demographic. Alternatively, it may be the case that interventions explicitly targeting System 1 reasoning may be particularly effective at reducing vulnerability among those with elevated positive schizotypy, as they are thought to be particularly attentive to this form of reasoning.

To explore these ideas, the current study will draw upon existing work in the field of misinformation interventions by Moravec et al. (2020).

7.1.3 Summary of Moravec et al. (2020) experimental interventions.

In their study, Moravec and colleagues explored the efficacy of several experimental content warning flags when applied to stimuli simulating online news content. These content flags were adapted from those trialled by Facebook between 2017-2018 and sought to reduce belief and engagement toward misinformation news stimuli by drawing attention to their disputed factuality using strategies based on the Dual Processing Model of Reasoning. A variety of content warning flags were developed that were designed to specifically capture the attention of either System 1 reasoning (i.e., intuition and familiarity) or System 2 reasoning (i.e., analytical reasoning).

Each warning flag consisted of an image accompanied by text that was presented beneath the simulated social media content (see Appendix U for examples). The System 1 flag was designed to activate intuitive reasoning by using a highly recognisable symbol as the warning image, one intuitively

associated with an inhibitory response (a stop sign). Along with this image, there was also accompanying text stating, "Disputed by 3rd party fact-checkers" (a statement thought to be vague enough that it wouldn't prompt System 2 activation). In contrast, the System 2 flag presented a less recognisable warning symbol, thought to have a reduced intuitive appeal to System 1 compared to the highly recognisable stop sign. The accompanying text for the System 2 flag stated, "Declared fake by 3rd party fact-checkers" (a statement thought to be definitive enough to activate and register with System 2 cognition). In a third combined intervention, both the System 1 activating warning image and the System 2 activating text were presented simultaneously.

Prior to testing the efficacy of their interventions, Moravec and colleagues conducted a preliminary test to determine whether their individual warning flags functioned as intended (i.e., primarily targeting either System 1 or System 2 cognition). Participants were split into two experimental groups: The first was exposed to both the System 1 and System 2 warning flags (separately) for one second each, while the second group was exposed to each of the warning flags for five seconds. Participants were then asked to rate each flag based on how effectively they indicated the presence of fake news. It was suggested that participants in the short exposure condition would only be capable of processing information using the quick and reflexive System 1, while those who were exposed to the warning flags for longer periods of time had enough time to activate the comparatively slow and effortful System 2. Similar approaches to discerning System 1 and System 2 processing via manipulation of exposure time have been successfully employed by other researchers exploring the validity of Dual Process reasoning models (e.g., Evans & Stanovich, 2013; Kahneman, 2011; Pennycook et al., 2015).

Moravec et al. hypothesised that the meaning of the image-based System 1 flag would be instantaneously understood by participants and that additional time for processing by System 2 would have little additional effect. In contrast, it was hypothesised that text-based System 2 intervention would have little impact when processed quickly by System 1, but when enough time was available for participants to engage their System 2 faculties the warning message would become more impactful. The results of the preliminary test were generally congruent with these predictions, with participants finding the System 1 intervention equally convincing in both the one and five second exposure conditions, while the System 2 intervention was significantly more effective in the five second exposure condition. The results of the preliminary test therefore indicated that the System 1 and System 2 intervention flags did indeed appear to act primarily through contrasting reasoning systems, with the System 1 flag being processed quickly and intuitively while the System 2 flag required more effortful processing for its meaning to become salient.

Moravec and colleagues main experiment compared the efficacy of the different warning flag interventions at reducing both belief and engagement toward misinformation stimuli. Participants were either exposed to the System 1 targeted flag, the System 2 targeted flag, or a combination of both at the same time. The results of the experiment indicated that all warning flags were effective at reducing misinformation belief and engagement compared to the control condition (i.e., no warning flags). It was also demonstrated that targeting different reasoning systems resulted in varying degrees of efficacy (with the combined System 1 and System 2 approach proving to be the most effective, followed by System 2 flag, and then the System 1 flag).

By replicating the interventions designed by Moravec et al. while also exploring the moderating effects of schizotypal traits on their efficacy, we can begin to address the following questions:

- 1) Are content flags effective at reducing misinformation vulnerability among those with elevated schizotypy?
- 2) Does positive schizotypy cause differential effects toward interventions that target System 1 vs those that target System 2?
- 3) Are the results of Moravec et al. (2020) replicated?

7.1.4 Adaptation of research design.

The design of the study will be similar to that used in Study 3, combined with an adaptation of the experimental procedure outlined in Moravec et al. (2020).

In contrast to Study 3, the present study focuses solely on positive schizotypy traits instead of all three schizotypy domains. This decision was influenced by the reoccurrence of positive schizotypal traits as significant predictors of misinformation vulnerability across studies 1-3, compared to the weaker and inconsistent pattern demonstrated among other schizotypal traits. Additionally, by limiting the use of the MSS-B to the positive subscale, data collection sessions were shortened, thus reducing recruitment costs and better managing the limited funds available for the project.

The study would also retain the use of the GCBS measure from Study 3 to further explore the role of conspiratorial beliefs. This choice was made primarily due to previous findings suggesting that GCBS scores fully mediated the predictive relationship between positive schizotypy and belief in misinformation stimuli. The current study would seek to replicate these findings in an exploratory regression analysis, as well as utilise conspiratorial beliefs as a covariate in the proposed analyses exploring the moderating effect of positive schizotypy on different intervention types.

In comparison to Study 3, the number of misinformation stimuli presented to participants in the Misinformation Engagement and Belief Task would be increased from three headlines to six, while accurate stimuli were no longer presented. This change was made due to the specific focus of the experimental interventions on misinformation (i.e., it was not necessary to investigate the power of these interventions to reduce belief and engagement toward accurate headlines) and the desire to optimise the number of variables included in the analysis (again, due to practical concerns over participant load, recruitment cost, and attempts to maximise the statistical power of the analyses). Increasing the number of misinformation stimuli would also have the beneficial effect of "diluting" the disproportionate influence of any one misinformation headline on the aggregated engagement and belief scores.

The Misinformation Engagement and Belief Task would also be modified to accommodate the experimental interventions derived from Moravec et al. (2020). The procedure remains largely the same, with participants presented with misinformation stimuli and being asked to rate engagement, then stimuli being presented again for rating belief accuracy. However, the presented stimuli would now slightly differ between participants depending on their assigned experimental condition. Misinformation stimuli would be presented as either 1) Unflagged (control condition), 2) Accompanied by a System 1 targeted flag, 3) Accompanied by a System 2 targeted flag, or 4) Accompanied by a combined System 1 & 2 targeted flag.

In contrast to the original research by Moravec et al., the current study would omit the use of the unedited 2017 Facebook content warning flag from which the experimental intervention flags were adapted (this flag was not explicitly designed to target specific reasoning systems; therefore its inclusion was deemed unnecessary). Furthermore, the current study would utilise a single phase of experimental testing (Moravec and colleagues utilised two testing phases in the original study, with the first phase consisting of a mix of control stimuli and experimental stimuli, followed by a brief awareness training message, and then another testing phase where only the experimental intervention stimuli were presented).

In the original study, exposure to the brief awareness training message significantly increased the efficacy of the System 2 and combined intervention conditions (although, as anticipated by the author, the System 1 intervention was unaffected by the awareness training as written arguments tend to specifically influence System 2 reasoning). Therefore, it was decided that an awareness training message would be presented to participants at the beginning of the single experimental testing phase to fully maximise the potential efficacy of the experimental intervention flags. It was hoped that by

doing so the intervention effects would be maximally expressed, therefore any moderating effects of positive schizotypy could then be interpreted as occurring in the presence of an otherwise effective intervention technique.

Finally, the misinformation stimuli used in the Misinformation Engagement and Belief Task would be sourced from the same library of materials used in studies 1-3 (see Pennycook et al., 2021a), as opposed to the misinformation stimuli utilised in the original Moravec et al. experiments (adapted from Kim and Dennis, 2019). Although the stimuli used in both studies share many similarities (both were political in nature, designed to appeal to partisan bias, and appeared as social media posts), it is worth noting that the misinformation stimuli used in the original Moravec study were more homogenous in terms of subject matter (i.e., all stimuli related to political debate around abortion rights).

With these changes to the preexisting research design established, the current study would seek to explore the efficacy of the different intervention flags at reducing misinformation belief/engagement, as well as the potential moderating effects of positive schizotypy.

7.1.5 Hypotheses

It was predicted that all intervention techniques (System 1 intervention, System 2 intervention, and the combined intervention) would reduce belief and engagement with online misinformation, as previously demonstrated by Moravec et al. (2020). Therefore:

H1 - All intervention techniques will reduce misinformation engagement (H1a) and belief (H1b) compared to the control condition.

H2 - The combined System 1 and System 2 intervention will be more effective than the separate System 1 and System 2 interventions at reducing misinformation engagement (H2a) and belief (H2b).

It was also hypothesised that the efficacy of the intervention techniques would be moderated by individual differences in positive schizotypy, as measured by the MSS-B (Gross et al., 2018). It was hypothesised that increased levels of positive schizotypy would be associated with a System 1 processing bias, resulting in reduced efficacy for the intervention targeting System 2 processing and an increased efficacy for the intervention targeting System 1 processing. Therefore:

H3 – Increased levels of Positive schizotypy will be associated with reduced efficacy of the System 2 intervention for misinformation engagement (H3a) and belief (H3b).

H4 – Increased levels of Positive schizotypy will be associated with increased efficacy of the System 1 intervention for misinformation engagement (H4a) and belief (H4b).

Exploratory analyses will also be conducted using moderation analyses in order to explore the potential moderating role of Positive schizotypy on the combined System 1 and System 2 intervention approach. Additionally, for the purposes of comparison with studies 1-3, two hierarchical regression analyses will be conducted (one predicting misinformation engagement, the other predicting misinformation belief), incorporating all covariates and predictor variables included in the moderation analyses.

7.2 Method

The study was conducted entirely online. Qualtrics was used to present questions and experimental stimuli, while Prolific was used to recruit participants. Hypotheses and primary analyses were preregistered on AsPredicted (Aspredicted.org; see Appendix V), while statistical analyses were performed using SPSS 28 and Jamovi 2.1.3 on a Windows 10 machine.

7.2.1 Participants

7.2.1.1 *Power analysis.*

An a priori power analysis was conducted in G*power 3.1.9.4 based on providing adequate power ($\alpha = 0.05$, power = 80%) for a 2 x 2 ANCOVA (as well as a series of follow-up moderation and multiple regression analyses). With a total of 4 experimental groups and one covariate, along with an anticipated effect size over $f = .15$, a minimum sample size of 352 participants is required (88 per experimental condition). An additional 10% would be collected to account for participant attrition, plus an additional 15 participants would also be recruited for pilot testing. Therefore, a total sample of 405 participants were recruited for the study.

7.2.1.2 *Target demographic of sample.*

The study aimed to solely recruit US participants who identified as RW/conservative/Trump supporters/Republicans. As with Studies 1 and 3, this approach was utilised due to reports of increased vulnerability to misinformation among political conservatives (e.g., Allcott & Gentzkow, 2017) and the prominence of misinformation in Donald Trump's political career (Evanega et al., 2020; Kessler et al, 2021; The Guardian, 2020). Therefore, as supporters of Trump and his brand of post-truth politics appeared to be particularly receptive to political misinformation, it was thought that this group would serve as a useful sub-population to study in the investigation of misinformation vulnerability.

7.2.1.3 *Participant inclusion criteria.*

A sample of 405 participants was collected via the Prolific research panel. Each participant was paid £1.00 GBP for their involvement in the study.

Inclusion criteria were applied using the following Prolific filters: Age (minimum: 20, maximum: 100), Nationality (United States), First language (English), Political spectrum (Conservative, Moderate, Other, N/A), U.S political affiliation (Republican, Independent, Other, None), 2020 U.S presidential

election (Donald Trump), Exclude participants who took part in previous studies (Study1, Study 2, Study 3). A balanced sample of men and women was recruited by using the "balanced sample" filter.

Participants were recruited and tested over the course of several data collection sessions in the month of February 2023. This was done in part to ensure that a roughly equal number of participants were recruited for each intervention group and that these groups were balanced in terms of gender (see Appendix W for distribution of gender across experimental groups).

7.2.1.4 Exclusion of problematic responses

At the end of each data collection session, the acquired datasets were screened for problematic responses and excluded from further analysis based on the following preregistered criteria: 1) Participants declining consent for the use of collected data, 2) Participants reporting their age to below 20 (this would suggest they were too young to vote in 2020 and therefore could not meet the inclusion criteria), 3) Answering "no" to the question "Do you live in the United States?", 4) Demonstrating an implausibly fast completion time (more than 2SD below mean completion time), and 5) Responding to a hidden question that would only be observable to automated bots.

In contrast to the originally preregistered exclusion criteria, it was decided not to disqualify people on the basis of zero variance in the MSS-B measure. This change was made due to the realisation that since all questions in the positive schizotypy sub-scale measured a single construct, low variance may simply reflect uniformity in a participant's response (i.e., being consistent in reporting high or low levels of positive schizotypy). Furthermore, the MSS-B scale contained no reverse-coded questions, making a "straight-lining" response within the realm of acceptability.

An alternative approach was adopted to screen response quality in the form of attention checks. A single attention check was inserted into both the MSS-B positive schizotypy subscale and the GCBS (see Appendix X for a copy of the scale questions and embedded attention check items). Any participants who failed to correctly answer either of the attention check items were removed from the final analysis.

Participants were also assessed using fraud metrics provided by Qualtrics (RelevantID, Google's invisible reCAPTCHA; Qualtrics, 2022), with suspicious responses being excluded from analysis. Participants were excluded from the analysis if: 1) RelevantID fraud score was greater than or equal to 30, 2) RelevantID duplicate score was greater than or equal to 75, 3) invisible reCAPTCHA score was below 0.5.

Of the 405 participants that were recruited, 10 participants were flagged for exclusion from the analysis: 6 failed attention checks, and 4 were excluded based on fraud metrics.

7.2.1.5 Summary of final sample

The final sample had a $n = 395$ and was 51% female, with a mean age of 42.99 ($SD = 13.74$; see Table 7.1 for a breakdown of participant characteristics). The final sample size exceeded the minimum sample requirements outlined in the power analysis and provided adequate statistical power for the proposed analysis.

7.2.2 Materials and stimuli

Reliability was assessed (where appropriate) for each measure included in the primary analysis. Alpha values presented below were all derived from the current dataset.

7.2.1.1 The positive schizotypy sub-scale of the Multidimensional Schizotypy Scale – Brief (MSS-B; Gross et al., 2018a; 2018b).

The MSS-B is a brief measure of schizotypal personality traits, designed for use among the general public and adapted from the full-length Multidimensional Schizotypy Scale (MSS; Kwapil et al., 2018a). The full MSS-B is comprised of 38 questions, however, only the 13-item positive schizotypy sub-scale was utilised ($\alpha = .83$). Each question was measured using a yes/no response.

7.2.1.2 Generic Conspiracy Beliefs Scale (GCBS; Brotherton et al., 2013).

The GCBS is a 15-item questionnaire designed to measure the endorsement of generic conspiratorial beliefs (e.g., that secretive groups influence world events, suppress technologies that might threaten industry, manipulate the public via mind control, and engage in covering up contact with extraterrestrials). Each item on the scale is answered using a 5-point Likert scale, with scores calculated as a single factor ($\alpha = .94$).

7.2.1.3 Misinformation Engagement and Belief Task.

The misinformation task involved participants being presented with a series of 6 news headlines in "social media format" (i.e. looking as though it had been encountered on a social media platform) then being asked to report on: 1) Whether the participant would consider "engaging" with the article (e.g. giving a "like", posting an emoji, sharing, or commenting) and 2) How truthful they believe the article headline to be (i.e., to what extent they believe the headline). All headline stimuli were derived from a pretested library of real-world social media content, with all 6 of the presented headlines being examples of political misinformation (see Appendix X). The order of the stimuli was presented randomly to participants.

Stimuli were selected from a larger collection of political misinformation based on their appeal to right-wing/republican supporters, as well as having the stimuli be roughly comparable with each other in the strength of their partisan appeal (see Appendix B for more details).

Prior to presenting the stimuli, all participants were presented with a brief awareness training message designed to bring attention to the meaning and significance of content warning flags that would be presented to those in the experimental conditions. The awareness training message (adapted from Moravec et al., 2020) was as follows:

"Before you begin:

You may have noticed that certain news stories on social media are sometimes flagged by the platform and labelled as disputed or "fake".

Social media companies such as Facebook are now working with third party fact-checkers (e.g., ABC news, Politifact, FactCheck, Snopes and the Associated Press) to assess the reliability of different news articles and sources. Users may report a story as fake, or Facebook's internal monitoring system may detect suspicious articles. Such articles would then be verified by fact-checking organisations, and at least two of them have to agree before the label is applied."

Participants were then shown the full stimuli set (along with content warnings in the experimental groups) and asked to report their engagement intentions. Afterwards, the participants were shown the same set of stimuli again, but this time, they were asked to report on their belief judgements.

Engagement measures were presented as 6-point Likert scales, which asked for participants to report the likelihood of engaging with the presented headlines by either 1) "liking", 2) commenting, 3) sharing, or 4) reacting by posting an emoji. Cronbach's Alpha was calculated using all four engagement scales for each individual stimulus across experimental groups (resulting in $\alpha > .87$ in all cases). The four engagement scales were then averaged together into a single engagement score for each headline, and Cronbach's Alpha was calculated using these new composite engagement scores for all headlines across all groups ($\alpha > .89$ in all analyses). Finally, a new variable was computed by averaging each participant's collective engagement score (*engagement with false headlines*).

Belief in the accuracy of the presented stimuli was measured using a single self-report item per headline paired with the following question: "*To the best of your knowledge, is the claim in the above headline accurate?*". Participants responded using a 4-point Likert scale, with responses being shown

to have an acceptable degree of internal reliability across all stimuli ($\alpha > .78$). Belief judgements for all six stimuli were then averaged to create a new variable (*belief in false headlines*).

7.2.1.4 Political orientation.

Political orientation was measured using an 11-point scale (ranging from "strongly Democrat" to "strongly Republican").

7.2.1.5 Political news sharing.

The extent to which participants tended to share political news on social media platforms (*Political news sharing*) was measured using a 6-point scale (ranging from "not at all" to "very frequently").

7.2.1.6 Demographics.

The following demographic variables were also collected: *Age*, *Gender*, *Country of residence*, and *Education level* (see Table 7.1 for a breakdown of participant characteristics).

7.2.3 Procedure

Participants were directed to the Qualtrics online testing platform, where they were presented with a set of instructions informing them of the upcoming tasks and requesting their informed consent. After providing consent, participants were asked to answer questions relating to their demographic information (age, gender, education, political orientation, and how often they share political news online). Participants were then presented with the modified Online Misinformation Engagement/Belief Task. Upon completion, participants were presented with the MSS-B positive schizotypy scale, followed by the GCBS (with question order randomised for both). The whole process took an average of approximately 10 minutes for participants to complete.

Upon completing the tasks, participants were asked to reconfirm their consent to use their data for research purposes. Participants were then presented with a debriefing information page that elaborated on the purpose of the study. During the debrief, it was made clear to participants that all the presented stimuli were known to be false, and a link to the UK government's SHARE misinformation checklist was made available (sharechecklist.gov.uk).

7.2.4 Design

The present study employed a multifaceted analytical approach to addressing the research questions and hypotheses.

First, a pair of 2x2 ANCOVA would be utilised to explore intervention effects on misinformation vulnerability measures, with both analyses using the same independent variables (System 1 targeted intervention stimulus: present vs absent; System 2 targeted intervention stimulus: present vs absent) and a single covariate (positive schizotypy as measured by the MSS-B). Next, a series of six moderation analyses were performed to explore the moderating effect of positive schizotypy on the relationship between 1) All three interventions and misinformation engagement scores, and 2) All three interventions and misinformation belief scores. Lastly, hierarchical regression analysis was used for exploratory and replication purposes. In the following sections, the rationale behind these choices in design will be discussed, along with any other key details relating to the utilised methodology.

7.2.4.1 2x2 ANCOVA.

The study utilised two 2 x 2 between-subjects factorial ANCOVA, using *MSS-B positive schizotypy* scores as a covariate alongside the two independent variables: 1) System 1 targeted intervention stimulus: present vs absent, and 2) System 2 targeted intervention stimulus: present vs absent. The first analysis would utilise *Engagement with false headlines* as the dependent variable, while the second would use *Belief in false headlines*.

Upon recruitment, participants would be randomly assigned to one of four experimental groups: Group 1 (control group, both types of intervention absent), Group 2 (System 1 intervention present, System 2 absent), Group 3 (System 1 intervention absent, System 2 present), and Group 4 (Both System 1 and System 2 interventions present). The combination of assigned intervention stimuli for each group would dictate the type of imagery presented to participants in the *Misinformation Engagement and Belief Task*. The approach to constructing the intervention stimuli was adapted from Moravec et al. (2020). In all intervention types, a warning image accompanied by text was placed below the misinformation news headline indicating that the information is not trustworthy and factually disputed (see Figure 7.1 for a comparison of System 1, System 2, and combined interventions relative to the control condition).

The purpose of the analysis was to explore the main and interaction effects of the different intervention stimuli in terms of their effect in reducing engagement and/or belief in misinformation stimuli. Positive schizotypy was included as a covariate in the analysis to control for any potential

moderating effects of positive schizotypy when assessing intervention efficacy. In doing so, it would then be possible to establish the efficacy of the interventions among the collected sample without the risk of any potentially confounding effects associated with positive schizotypy (thereby allowing for the potential replication of the significant findings from Moravec and colleagues that demonstrated these experimental interventions to be effective).

7.2.4.2 Moderation analysis.

A series of moderation analyses would be performed (using the PROCESS 4.1 macro for SPSS) to explore the moderating role of positive schizotypy in the relationship between each of the intervention conditions and the outcome variables of *engagement with false headlines* and *belief in false headlines*, while also controlling other relevant covariates. Dummy variables would be created for each intervention type, and separate moderation analyses would be performed using each intervention type as the independent variable. In total, six moderation analyses were conducted: three with *engagement with false headlines* as the dependent variable and three with *Belief in false headlines* as the dependent variable. The results of this analysis would address the research questions and hypotheses surrounding the potential for positive schizotypy to either help or hinder the various experimental interventions.

7.2.4.3 Exploratory hierarchical regression.

Two exploratory hierarchical regression analyses were performed to explore potential predictors of the outcome variables (*engagement with false headlines* and *belief in false headlines*) while also facilitating comparison with the findings of Study 3 and other previous work. The predictor variables included in these regression models consisted of all dummy variables representing intervention type, alongside positive schizotypy and all covariates utilised in the moderation analyses. While these analyses did not directly address any of the formally posed hypotheses, they facilitated valuable insights in relation to several exploratory research questions.

Table 7.1 - Participant demographics, political orientation and news sharing characteristics (n = 395).

Demographic variables		
	n	%
Gender		
Female	203	51.4
Male	192	48.6
Age		
20-30	98	24.8
31-40	106	26.8
41-50	81	20.5
51-60	43	10.9
61-70	23	5.8
70+	10	2.5
Highest educational level		
Less than High School	3	0.8
High School / Secondary School	77	19.5
Some post-school College or University	108	27.3
College or University undergraduate degree	160	40.5
Master's Degree	37	9.4
Doctoral Degree	3	0.8
Professional Degree (JD, MD)	7	1.8
Political orientation (1=Strongly Democrat and 11=Strongly Republican).		
1-2	1	0.3
3-4	1	0.3
5-6	47	12.0
7-8	115	29.1
9-10	151	38.2
11	80	20.3
Frequency of political news sharing on social media		
Not at all	87	22.0
Very rarely	106	26.8
Rarely	59	14.9
Occasionally	124	31.4
Very frequently	19	4.8

Figure 7.1 – Example of differences in stimuli across experimental conditions.

A) Control condition (no warning flags)



B) System 1 targeted intervention



C) System 2 targeted intervention



D) Combined System 1 & System 2 targeted intervention



7.3. Results

7.3.1 Data screening and descriptive statistics.

Data were screened for missing values, reliability, skewness, and kurtosis (see Table 7.2). There were no missing values in the dataset. Among the variables utilised in the main analysis significant skewness (skewness statistic > 1) was observed for *MSS-B positive schizotypy*, as well as *engagement with false headlines*. Kurtosis was also shown to be significant (± 3 in SPSS output; Field, 2013) for *MSS-B positive schizotypy* scores. These violations of skewness and kurtosis were thought to not pose a significant problem in the proposed analyses due to the sufficiently large size of the sample (Schmidt & Finan, 2018). See Appendix Z for frequency distributions.

7.3.2 Sample characteristics.

The sample was well educated, with roughly 53% of participants possessing a college degree or higher (compared to the US average of 47.4%; OECD, 2022). The mean participant age was 43 years old ($SD=13.74$), higher than previously reported averages among social media users (ranging from 27-40 years depending on the platform; DataReportal, 2022).

In response to the question, "*how much do you tend to share political information you come across on social media?*" 22% of participants indicated that they never share political information (lower than a previously reported average of 40% among US social media users, suggesting the current sample exhibits a level of political engagement above the norm; Pew Research Center, 2021b). In terms of political orientation, only 2% of participants scored below the mid-point on a scale of 1-11 (with 1 indicating "strongly Democrat" and 11 indicating "strongly Republican") while 20% of participants scored an 11 (e.g. maximum endorsement of Republican identity).

Across the sample, it was demonstrated that roughly 26% of participants reported no intention to engage with any of the misinformation headlines, while 74% indicated that they would engage with at least one of the headlines to some degree (although it should be noted that engagement rates differed across intervention groups, see Appendix AA). These engagement rates are once again above previously reported norms of 10-40% (Chadwick & Vaccari, 2019; Guess et al., 2019), reflecting a degree of engagement behaviour above the norm among the current sample. It was also shown that 12% of participants indicated no belief in any of the presented misinformation headlines, while 88% of participants indicated some degree of belief in at least one of the headlines (again, these belief scores varied across intervention groups; see Appendix AA).

Table 7.2 - Descriptive statistics for all variables used in the analysis.

Variables			Skewness		Kurtosis		Cronbach's Alpha (α)
	<i>M</i>	<i>SD</i>	Statistic	Std. Error	Statistic	Std. error	
Age (years)	42.99	13.74	0.35	0.12	-0.76	0.24	-
Gender (-1 = Women, 1 = Man)	-0.03	1.00	0.06	0.12	-2.01	0.24	-
Education level (1-7)	3.48	1.06	0.43	0.12	0.78	0.24	-
Frequency of political news sharing on social media (1-5)	2.70	1.25	0.05	0.12	-1.31	0.24	-
Political orientation (1-11) *	8.77	1.75	-0.51	0.12	-0.15	0.24	-
MSS-B positive schizotypy scale (0-1)	0.12	0.18	1.84	0.12	3.32	0.24	.83
GCBS**	3.03	0.96	-0.43	0.12	-0.55	0.24	.94
Engagement with false headlines †	1.95	1.12	1.34	0.12	1.11	0.24	-
Belief in false headlines ‡	1.94	0.67	0.47	0.12	-0.43	0.24	-

*1 = strongly Democrat, 11 = strongly Republican.

**Measured using a 5-point Likert scale

†Measured using a 6-point Likert scale.

‡Measured using a 4-point Likert scale.

7.3.3 Bivariate correlations

Bivariate correlations were produced for all variables utilised in the proposed analysis, as well as engagement and belief scores separated by experimental condition and dummy variables contrasting experimental conditions with the control condition (see Table 7.3). Once again, effect size guidelines for individual differences research were utilised (see Gignac & Szodorai, 2016) with small, medium, and large effect sizes defined as r values $\geq .15$, $.25$, and $.35$ respectively.

Table 7.3 – Pearson's correlation matrix for all variables included in main analyses, as well as engagement and belief scores for individual experimental conditions and dummy variables contrasting interventions with control group.

Variables	Correlation (Pearson's <i>r</i>)																		
	Variables																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Age	--																		
Gender (-1 = F, 1 = M)	-.15**	--																	
Education level	-.03	.11*	--																
Frequency of political news sharing on social media	-.03	.07	-.03	--															
Political orientation	.22**	-.05	.04	.13**	--														
Positive schizotypy - MSS-B	-.22**	.11*	-.15**	.19**	-.12*	--													
GCBS	-.12*	.11*	-.21**	.24**	.03	.49**	--												
Engagement with false headlines (Across all conditions)	-.06	.06	-.04	.51**	.17**	.35**	.38**	--											
Engagement with false headlines (Control)	-.07	.06	-.07	.64**	.26**	.32**	.35**	-	--										
Engagement with false headlines (S1 intervention)	.01	.14	-.05	.57**	.31**	.21*	.27**	-	-	--									
Engagement with false headlines (S2 intervention)	-.11	.03	.16	.31**	.10	.33**	.42**	-	-	-	--								
Engagement with false headlines (Combined intervention)	-.06	.06	-.13	.57**	-.00	.55**	.55**	-	-	-	-	--							
Belief in false headlines (Across all conditions)	.00	-.03	-.14**	.26**	.19**	.27**	.42**	.61**	.56**	.46**	.68**	.60**	--						
Belief in false headlines (Control)	.15	-.03	-.25*	.32**	.20	.18	.41**	.56**	.56**	-	-	-	-	--					
Belief in false headlines (S1 intervention)	.06	-.01	-.19	.18	.34**	.21*	.48**	.46**	-	.46**	-	-	-	-	--				
Belief in false headlines (S2 intervention)	-.13	-.02	-.04	.21*	.11	.31**	.36**	.68**	-	-	.68**	-	-	-	-	--			
Belief in false headlines (Combined intervention)	-.09	-.06	-.05	.34**	.12	.34**	.48**	.60**	-	-	-	.60**	-	-	-	-	--		
Control intervention (0) vs S1 intervention (1)	.02	.00	-.00	-.05	.02	-.02	.03	-.07	-	-	-	-	-.13*	-	-	-	-	--	
Control intervention (0) vs S2 intervention (1)	-.08	-.01	.10	.02	-.04	-.01	-.02	-.19**	-	-	-	-	-.21**	-	-	-	-	.00	--
Control intervention (0) vs Combined intervention (1)	-.07	-.01	.05	-.02	.01	.00	.01	-.06	-	-	-	-	-.12*	-	-	-	-	.58**	.58**

Small effect size ($r > .15$) highlighted in green. **Medium** effect size ($r > .25$) highlighted in yellow. **Large** effect size ($r > .35$) highlighted in red.

Effect size guidelines derived from Gignac & Szodorai, 2016.

* $p < .05$. ** $p < .01$. All significance tests were two-tailed.

7.3.4 2 x 2 ANCOVAs

To explore significant differences between rates of misinformation belief and engagement across experimental conditions, while controlling for the potential influence of positive schizotypy, two factorial ANCOVA models were calculated (see Table 7.4). The purpose of the analysis was to first establish whether any significant effects were associated with the intervention types while controlling for positive schizotypy, after which moderation analysis would be used to explore potential moderating effects of positive schizotypy.

7.3.4.1 Assumption checks

Prior to performing the preregistered analyses, a series of checks were performed to ensure that the underlying assumptions of the ANCOVA method were met for each proposed model (i.e., assumptions of homogeneity of variance, homogeneity of regression slopes, normality, and linearity between the covariate and dependent variables, no significant correlations between covariate and independent variables; Khammar et al., 2020). For Model 7.1, it was demonstrated that both the assumptions of normality and homogeneity of variance were violated. For Model 7.2 it was demonstrated that the assumption of normality was also violated.

While it has been suggested that such violations often have little impact on ANCOVA analyses when utilising a sufficiently large sample and avoiding sharply unequal group sizes (Maxwell et al., 2017), these violations would be addressed by comparing the results of the proposed ANCOVA models with those of more robust methods that account for violations of normality and homoscedasticity. Furthermore, a non-parametric correlation matrix was produced for comparison with the previously reported Pearson's correlation matrix (see Appendix BB). The pattern of correlations was largely unaffected beyond slightly more conservative correlation values, with all significant correlations reported in the parametric analysis found to be significant in the non-parametric analysis.

7.3.4.2 ANCOVA results

The preregistered analysis was conducted using two factorial ANCOVA models, with each model utilising a different misinformation vulnerability measure as the dependent variable (see Table 7.4).

Model 7.1 compared the effect of intervention type on *Engagement with false headlines* across the four experimental groups. The model had a 2 x 2 design, with the independent variables consisting of a pair of binary variables indicating 1) the presence of the System 1 targeted intervention stimuli,

and 2) the presence of the System 2 targeted intervention stimuli. The covariate included in the analysis consisted of mean scores on the *MSS-B positive schizotypy* scale.

Model 7.2 was identical to Model 7.1, except that the dependent variable was *Belief in false headlines*.

Model 7.1 demonstrated that there was a significant interaction between the effect of the System 1 intervention and the System 2 intervention ($F(1,394) = 11.29, p = .001, \text{Partial } \eta^2 = .03$). Simple main effects analysis demonstrated that the System 2 intervention alone had a statistically significant effect on engagement with false headlines ($p < .001$), while the System 1 intervention alone was nonsignificant ($p = .086$). By comparing adjusted group means and their 95% confidence intervals (see Appendix CC and Figure 7.2) it appears that all interventions significantly differed from the control condition, resulting in lower misinformation engagement scores. It was demonstrated that System 2 intervention resulted in the greatest reduction in misinformation engagement relative to the control condition (1.67 vs 2.41), followed by the combined intervention (1.83 vs 2.41) and the System 1 intervention (1.90 vs 2.41). However, when contrasting the effect of interventions directly the engagement scores did not significantly differ across groups (as indicated by overlapping confidence intervals).

Model 7.2 also demonstrated a significant interaction between interventions ($F(1,394) = 6.58, p = .011, \text{Partial } \eta^2 = .02$), as well as significant main effects for both the System 1 intervention ($p = .008$) and the System 2 intervention ($p < .001$) at reducing misinformation belief scores. When comparing adjusted group means and 95% confidence intervals, it was again demonstrated that all interventions were associated with significantly lower misinformation belief scores than the control condition (Appendix CC and Figure 7.2). Both the System 2 and combined intervention groups were associated with the same degree of reduction in misinformation belief compared to the control condition (1.80 vs 2.25), while the System 1 intervention was associated with a lesser degree of belief reduction (1.92 vs 2.25). However, as with Model 7.1, the adjusted intervention group means did not significantly differ from each other (based on overlapping confidence intervals), indicating that the relative strength of these interventions should not be inferred by their differences in means alone.

An alternative method of ranking the efficacy of the interventions is comparing effect sizes (reported in Table 7.4). For Model 7.1, the intervention with the largest effect size was the System 2 intervention ($\text{Partial } \eta^2 = .04$), followed by the combined intervention ($\text{Partial } \eta^2 = .03$), and then the System 1 intervention ($\text{Partial } \eta^2 = .01$). For Model 7.2 the largest effect size was observed for the System 2 intervention ($\text{Partial } \eta^2 = .05$), followed by the combined and System 1 intervention (both

displayed a Partial $\eta^2 = .02$). Based purely on effect size, it is suggested that the System 2 intervention was most effective at reducing both misinformation engagement and misinformation belief.

In both ANCOVA models the main effect of positive schizotypy (the covariate) was significant and displayed a considerably larger F value and effect size compared to any of the intervention variables (Model 7.1: ($F(1,394) = 75.95, p < .001, \text{Partial } \eta^2 = .16$), Model 7.2: ($F(1,394) = 40.37, p < .001, \text{Partial } \eta^2 = .09$). These effect sizes are in the medium-large range, while those of the interventions ranged from small-medium (Cohen, 1988).

Table 7.4 – 2 x 2 ANCOVA: between subject effects for Model 7.1 and Model 7.2

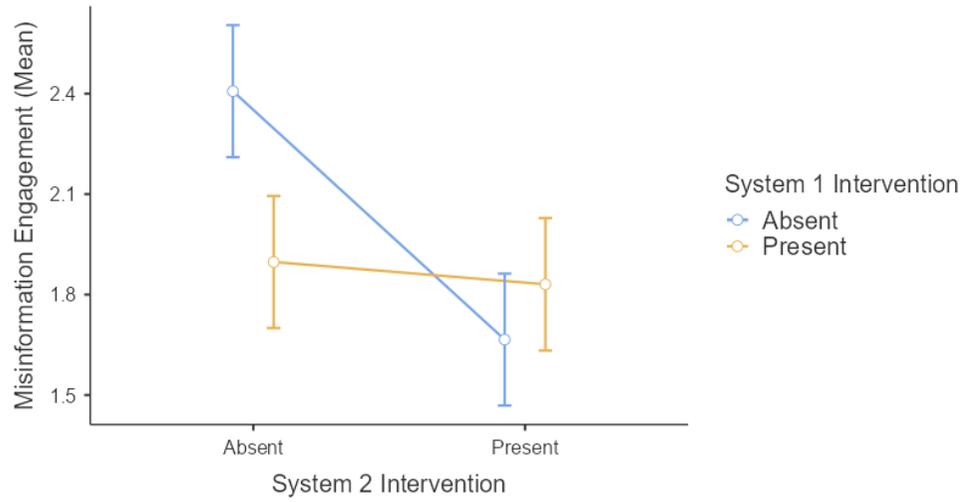
Variables	Model 7.1 (DV = Engagement with false headlines)					
	SS	df	MS	F	p	Partial η^2
Corrected model	110.91	4.00	27.73	27.90	<.000	.22
Intercept	735.98	1.00	735.98	740.60	<.000	.66
System 1	2.93	1.00	2.93	2.95	.086	.01
System 2	16.14	1.00	16.14	16.24	<.000	.04
System 1*System 2	11.22	1.00	11.22	11.29	.001	.03
MSS-B positive schizotypy	75.47	1.00	75.47	75.95	<.000	.16
Error	387.57	390.00	0.99			
Total	2001.50	395.00				
Corrected total	498.48	394.00				
Adjusted R ²	.22					
Variables	Model 7.2 (DV = Belief in false headlines)					
	SS	df	MS	F	p	Partial η^2
Corrected model	29.99	4	7.50	19.78	.000	.17
Intercept	881.28	1	881.28	2325.15	.000	.86
System 1	2.71	1	2.71	7.15	.008	.02
System 2	8.13	1	8.13	21.46	<.000	.05
System 1*System 2	2.50	1	2.50	6.58	.011	.02
MSS-B positive schizotypy	15.30	1	15.30	40.37	<.000	.09
Error	147.82	390	0.38			
Total	1668.44	395				
Corrected total	177.81	394				
Adjusted R ²	.16					

Note: Variables in **bold** were found to have a significant effect on the DV ($\alpha = .05$).

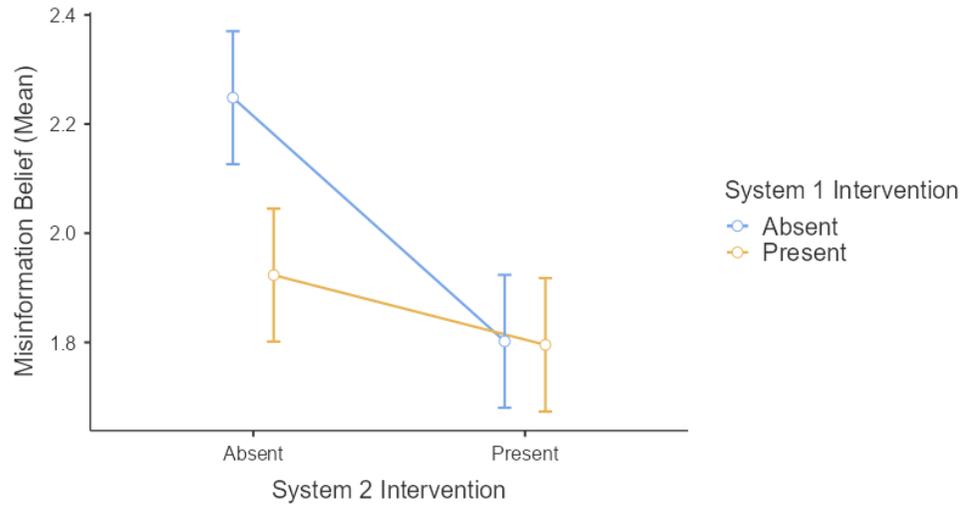
SS=sum of squares, df=degrees of freedom, MS=mean square

Figure 7.2 – Line graphs demonstrating ANCOVA interaction effects derived from estimated marginal means.

a) Model 7.1 – Engagement with false headlines



b) Model 7.2 – Belief in false headlines



7.3.4.3 Robust ANOVA

Due to the reported violations of statistical assumptions behind the ANCOVA method, it was decided to run a series of additional "robust ANOVA" analyses using the WLRS2 plug-in for Jamovi to contrast the results with the original ANCOVA models. These robust ANOVA models are designed to function effectively regardless of violations of normality or homoscedasticity (see Mair & Wilcox, 2020). While this approach does not accommodate the inclusion of a covariate and, therefore, does not provide a direct comparison to the original analysis, the use of such robust approaches to detecting the effects of intervention type will assist in clarifying the reliability of the original ANCOVA analysis.

The results of the robust ANOVA analyses supported the findings of the original ANCOVA (see Appendix DD), with significant effects detected for the System 2 and combined intervention on misinformation engagement reduction and significant effects detected for all intervention types on misinformation belief reduction. These findings suggest that the significant differences across group conditions identified in the original ANCOVA models are unlikely to be the result of bias introduced to the analysis as a result of violated statistical assumptions.

7.3.5 Moderation analysis

The next step in the preregistered analysis was to conduct a series of moderation analyses to explore the potential moderating effects of positive schizotypy on the efficacy of the different intervention conditions. The analysis was performed using the SPSS PROCESS Macro (model number 1; Hayes, 2013) and utilised dummy variables representing intervention type relative to control condition as the IVs (see Appendix EE).

The analyses also included the following covariates: GCBS scores, political news sharing habits, political orientation scores, age, gender, education, and engagement with false headlines (when the DV = belief in false headlines) or belief in false headlines (when the DV = engagement with false headlines). All analyses utilised heteroscedasticity consistent standard errors (HC3).

The results of the analyses demonstrated that positive schizotypy did not significantly moderate the effect of any of the interventions on engagement and belief measures (as indicated by a lack of statistical significance for their interaction terms), suggesting that the interventions explored in the analysis were robust to the influence of positive schizotypy. The moderation analyses also demonstrated that dummy variables representing intervention type failed to significantly predict any of the outcome variables when assessed alongside the moderator and covariates. This suggests that the combined predictive value of the moderator and covariates was greater than the treatment condition.

7.3.6 Exploratory analysis: hierarchical regression

Finally, two hierarchical regression analyses were conducted using all the dummy variables and covariates included in the moderation analyses as predictors, with the first model (Model 7.9) utilising *engagement with false headlines* as the dependent variable and the second model (Model 7.10) utilising *belief in false headlines*.

These analyses were performed primarily to compare with equivalent analyses from studies 1-3 and to explore the predictive value of different intervention types when assessed together. Particular attention was paid to replicating the results of Study 3, which had previously implied that conspiratorial beliefs (as measured by the GCBS) predicted misinformation belief but not engagement when assessed alongside all other predictors, while positive schizotypy (as measured by the MSS-B) predicted engagement but not belief. A hierarchical design was used so that the results could be examined for evidence of moderation/mediation between variables in different blocks.

The hierarchical structure of the regression was as follows: 1) Block 1 examined the predictive value of dummy variables representing different interventions; 2) Block 2 then entered the *MSS-B positive schizotypy* and *GCBS* scores to explore their predictive value in the absence of additional variables; 3) Block 3 added demographic measures (*age, gender, education*), *political news sharing* scores, and *political orientation* scores; 4) In the final block (Block 4) the plausibility-engagement relationship was accounted for by including *belief in false headlines* Model 7.9 and *engagement with false headlines* for Model 7.10.

Model 7.9 was shown to be significant at each stage of the regression ($p < .001$; see Appendix FF), with the following variables acting as significant predictors of *engagement with false headlines* at the final block: *S1 v Control* ($\beta = -.10, p = .023$), *S2 v Control* ($\beta = -.18, p < .001$), *S1+S2 v Control* ($\beta = -.10, p = .026$), *MSS-B positive schizotypy* ($\beta = .20, p < .001$), *gender* ($\beta = .08, p = .028$), *education* ($\beta = .08, p = .037$), *political news sharing* ($\beta = .30, p < .001$), *belief in false headlines* ($\beta = .42, p < .001$). By comparing Block 3 and Block 4 it was demonstrated that the inclusion of *belief in false headlines* resulted in *GCBS* scores being rendered nonsignificant, suggesting that the predictive value of the *GCBS* was better accounted for by direct measures of belief for the presented stimuli. In contrast, *MSS-B positive schizotypy* remained a significant predictor of misinformation engagement at every level of its inclusion in the regression model, suggesting that none of the other variables included in the analysis accounted for the relationship between misinformation engagement and positive schizotypy.

Model 7.10 was also significant at each stage of the regression ($p < .001$; see Appendix FF), with the following variables acting as significant predictors of *belief in false headlines* at the final block: *S1 v Control* ($\beta = -.12, p = .009$), *S2 v Control* ($\beta = -.13, p = .009$), *S1+S2 v Control* ($\beta = -.18, p < .001$), *GCBS* ($\beta = .22, p < .001$), *gender* ($\beta = -.10, p = .014$), *education* ($\beta = -.09, p = .028$), *political orientation* ($\beta = .10, p = .015$), *engagement with false headlines* ($\beta = .50, p < .001$). Comparing Block 3 and Block 4 demonstrated that the inclusion of *engagement with false headlines* resulted in *MSS-B positive schizotypy* becoming a nonsignificant predictor, suggesting that the predictive value of the schizotypy measure was better accounted for by the direct measures of stimuli engagement.

See Table 7.5 for a comparison of both hierarchical regression analyses at their final block.

Table 7.5 – Comparison of Model 7.9 and Model 7.10 at Block 4.

Variables	Model 7.9 (DV = Engagement with false headlines)			Model 7.10 (DV = Belief in false headlines)		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
S1 v Control	-0.26	0.11	-0.10*	-0.19	0.07	-0.12**
S2 v Control	-0.45	0.11	-0.17***	-0.20	0.07	-0.13**
S1+S2 v Control	-0.26	0.12	-0.10*	-0.27	0.07	-0.18***
MSS-B positive schizotypy	1.29	0.26	0.20***	0.11	0.17	0.03
GCBS	0.03	0.05	0.03	0.15	0.03	0.22***
Age	0.00	0.00	-0.04	0.00	0.00	0.03
Gender †	0.09	0.04	0.08*	-0.06	0.03	-0.10**
Education	0.08	0.04	0.07*	-0.05	0.02	-0.08*
Political news sharing	0.27	0.03	0.30***	-0.02	0.02	-0.03
Political orientation ‡	0.04	0.02	0.07	0.04	0.01	0.10**
Engagement with false headlines	-	-	-	0.29	0.03	0.49***
Belief in false headlines	0.71	0.07	0.42***	-	-	-
Adjusted R²	.53			.45		
F	41.48***			30.62***		

Significant predictor variables are reported in **bold**.

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

†Gender was coded as -1 = women, 1 = man. ‡Political orientation was scored so that 1 = strongly Democrat, 10 = strongly Republican.

7.4. Discussion

7.4.1 Summary of aims and findings.

The primary aim of the study was to use the interventions developed by Moravec et al. (2020) to explore the potential moderating effects of positive schizotypy on the efficacy of online misinformation intervention techniques designed to target specific reasoning systems (i.e. System 1 and System 2).

The participants recruited for the study consisted of an online cohort of US residents that had previously voted for Donald Trump in the 2020 presidential election and who identified with political identities other than "Democrat" or "Liberal" (i.e., Republican, Conservative, Moderate, Independent, Non-political, and Other). In the experimental phase of the study, participants were randomly assigned to experimental conditions and presented a series of misinformation stimuli accompanied by different types of content warning flag. Participants were then asked to self-report the extent to which they believed in the accuracy of the content and whether they would consider engaging with it (e.g., "like", share, comment).

It was hypothesised that all three intervention techniques (System 1 targeted, System 2 targeted, and targeting both systems simultaneously) would significantly reduce engagement and belief in misinformation stimuli. It was also hypothesised that the combined intervention technique would be demonstrated to be the most effective in reducing both engagement and belief in misinformation stimuli (in congruence with the original findings of Moravec et al. 2020). Finally, it was hypothesised that increased levels of self-reported positive schizotypy would moderate the effects of the individual System 1 and System 2 interventions, with the System 2 intervention being hindered and the System 1 intervention being enhanced.

In addition to testing the outlined hypotheses, further exploratory analysis was also performed (e.g., investigating the moderating effects of positive schizotypy on the combined intervention and exploring data through hierarchical regression analysis).

The results of the study indicated that all three intervention conditions significantly reduced both engagement and belief toward the misinformation stimuli, however the combined intervention was not demonstrated to be most effective. Furthermore, positive schizotypy was shown not to significantly moderate the efficacy of the interventions, suggesting that they were robust to the influence of schizotypal cognition. The interpretation of these findings, and those of any exploratory analyses, are expanded upon below.

7.4.2 Efficacy of intervention techniques

It was hypothesised that all intervention techniques would significantly reduce misinformation engagement (H1a) and misinformation belief (H1b) compared to the control condition. The results of the study supported both hypotheses, demonstrating that engagement with false headlines and belief in false headlines was significantly lower in the active conditions relative to the control condition. Furthermore, the significant differences in misinformation vulnerability between the control group and experimental groups were validated by both main and conservative analyses, reinforcing the findings' robustness.

Collectively, the results of the study suggest that all experimental content flags were effective at reducing misinformation vulnerability, in congruence with the original findings of Moravec et al. (2020).

7.4.3 Relative efficacy of the combined intervention.

It was hypothesised that the combined System 1 and System 2 intervention would be more effective at reducing misinformation engagement (H2a) and misinformation belief (H2b) compared to the separate System 1 and System 2 interventions. The results of the current study failed to support these hypotheses, with the efficacy of the combined intervention failing to demonstrate any significant difference in the reduction of engagement or belief measures relative to the separate interventions. Furthermore, when judging efficacy based on relative effect sizes reported in the ANCOVA models, the System 2 condition appeared to be the most effective of the experimental conditions.

Therefore, the results of the current study suggest that the combined System 1 and System 2 intervention flag was not the most effective means of reducing misinformation vulnerability, contrary to the previous findings of Moravec and colleagues. It is possible that these differences in results might be due to differences in methodology (the current study utilised different misinformation stimuli and statistical analyses) and/or participant demographics (the current study utilised a comparatively restrictive sample by recruiting right-leaning Trump voters). Whatever the reason, the deviation from previous findings simply reflects a lack of replication and did not pose any additional barriers to exploring the more pressing focus of the study: the moderating effects of positive schizotypy.

7.4.4 Interventions and the moderating effect of positive schizotypy.

It was hypothesised that positive schizotypy would moderate the efficacy of the individual System 1 and System 2 interventions, with positive schizotypy significantly enhancing the efficacy of

the System 1 intervention in reducing misinformation engagement (H3a) and misinformation belief (H3b), while significantly reducing the efficacy of the System 2 intervention in relation to engagement (H4a) and belief (H4b). The rationale behind these hypotheses was based on positive schizotypy and its association with a preference for System 1 processing (Broyd et al., 2019). Given this tendency, interventions designed to activate System 1 were expected to be potentially more salient to those with positive schizotypal traits. Similarly, it was anticipated that the System 2 intervention might be less effective for those with elevated levels of positive schizotypy, as they may fail to attend to the warning flag and/or activate their analytical faculties.

Ultimately none of the hypotheses were supported, as demonstrated by a series of moderation analyses that revealed positive schizotypy to have no significant moderation effects on the efficacy of any of the intervention conditions. It is noteworthy that all the interventions remained effective regardless of the influence of positive schizotypy, despite the comparatively larger effect size and predictive value exhibited by positive schizotypy in the analysis (suggesting that individual differences in positive traits appeared to account for more variance in misinformation vulnerability). This suggests that, despite the known association between positive schizotypy and misinformation vulnerability, the underlying cognitive processes that facilitate the reduction of misinformation vulnerability in the experimental interventions (e.g., the activation of critical reasoning) were not significantly modulated by schizotypal cognition.

In many ways these findings are not surprising, as reasoning biases have previously been demonstrated to reflect preferences in information processing, rather than deficits (i.e., individuals with a System 1 reasoning bias are fully capable of utilising System 2 reasoning, they just tend not to; Pennycook & Rand, 2019a; 2019c). As the interventions in the current study were designed to explicitly prompt critical reasoning via attentional lures the participant's normal preferences may have played less of a significant role in shaping their receptivity toward misinformation stimuli.

No hypothesis was made regarding the moderating effects of positive schizotypy on the combined System 1 and System 2 intervention, however exploratory moderation analyses demonstrated that there were no moderating effects. As with the separate intervention conditions, reasoning biases associated with positive schizotypy appeared not to interfere or assist the effect of the intervention.

7.4.5 Differential predictive function of positive schizotypy and generic conspiratorial beliefs.

One of the reasons for conducting the exploratory hierarchical regression analyses was to explore and compare the predictive utility of the *MSS-B positive schizotypy scale* and scores on the *GCBS*. In Study 3 the significant relationship between positive schizotypy and misinformation belief was fully mediated by generic conspiratorial beliefs, indicating that a conspiratorial worldview might account for the previously reported relationship between positive schizotypy and belief in misinformation. In contrast, positive schizotypy acted as a significant predictor of misinformation engagement while conspiracy beliefs did not. By using hierarchical regression analysis, it was possible to create a similar analysis to that used in Study 3 for the purposes of replication while also observing the fluctuating patterns of significance among predictor variables at different blocks to better infer how positive schizotypy and generic conspiracy beliefs relate to misinformation vulnerability measures.

The results of the hierarchical regression were partially congruent with those of Study 3; at the final block of the analyses (i.e., after including all predictor variables in the model) *MSS-B positive schizotypy* scores were shown to significantly predict misinformation engagement and *GCBS* scores were shown to significantly predict misinformation belief. However, by examining the different blocks of the regression model it was demonstrated that this contrast in predictive significance did not emerge until the final block (the stage which the plausibility-engagement relationship was accounted for by including engagement measures as a predictor of belief and belief measures as a predictor of engagement). Contrary to Study 3, the *GCBS* appeared not to fully mediate the predictive value of the *MSS-B positive schizotypy scale*, as both regression models showed these variables to act as significant predictors alongside each other until the final block of the analysis.

It was therefore demonstrated that: 1) Generic conspiracy beliefs are a useful predictor of misinformation engagement, but direct measures of belief in the misinformation stimuli are significantly better by comparison, 2) Positive schizotypy acts as a useful predictor of misinformation belief, but direct measures of engagement with the misinformation stimuli were significantly more effective, and 3) Generic conspiracy beliefs were not fully mediated by positive schizotypy in the current sample, instead both the mediated significance of generic conspiracy belief and positive schizotypy were influenced by the inclusion of direct belief and engagement measures.

These findings suggest that generic conspiracy beliefs might function as a predictor of misinformation engagement because they act as a proxy measure for the tendency to find political

misinformation plausible, while positive schizotypy acts as a predictor of misinformation belief due to serving as a proxy (or potentially driving factor) of online engagement behaviour toward political misinformation. These findings align with prior research that has suggested the association between schizotypy and misinformation vulnerability does not operate through a single mediating variable, but rather involves multifaceted interactions of cognition and belief (Georgiou et al., 2019).

The findings also suggest that positive schizotypy traits uniquely contributed to the prediction of engagement with misinformation, even after accounting for the role of other predictors. This implies that positive schizotypy is promoting misinformation engagement in ways other than generally increasing engagement toward online political content or increasing the tendency to believe misinformation/conspiracy theories. These results could be interpreted as support for the heuristic-reasoning hypothesis, with positive schizotypy traits serving as a proxy for schizotypal cognition and associated reasoning biases. Alternatively, there may be another key factor (or combination of factors) associated with positive schizotypy that has yet to be accounted for that explains the observed relationship.

Similarly, generic conspiracy beliefs were shown to uniquely contribute to the prediction of misinformation belief beyond the predictive value of partisan appeal, lower education levels, and the plausibility-engagement relationship. This overlap was anticipated, given that much political misinformation embeds conspiratorial themes (Oliver & Wood, 2014), reinforcing the idea that conspiratorial worldviews and misinformation belief share foundational cognitive and motivational processes.

7.4.6 Other notable observations

The outcome of the primary analyses indicated that the interventions, while significantly effective relative to the control condition, were not particularly powerful. The effect sizes observed for the intervention conditions were generally small, and when entering all experimental conditions as predictors in the first block of hierarchical regression models they failed to account for a large amount of explained variance (around 6% when predicting misinformation engagement and 8% when predicting misinformation belief). In all analyses the extent of misinformation vulnerability was better predicted by differences in positive schizotypy, generic conspiracy beliefs, and other covariates. While it may be unrealistic to achieve a particularly large effect size when conducting brief interventions embedded into online content, it may be the case that targeting other cognitive processes known to promote misinformation vulnerability in the design of future interventions might improve its impact (for example, including stimuli designed to combat partisan bias).

It was noted that the analyses seemed to indicate gender differences in misinformation vulnerability, with men being significantly more likely to engage with misinformation and women being significantly more likely to believe misinformation. While the observed relationships are not particularly strong, it is noteworthy that the same pattern was previously been detected in Study 2. While there are examples of studies that have reported misinformation engagement to be more common among men (e.g., Buchanan, 2020; Kim, Sin, & Yoo-Lee, 2014) and misinformation belief to be more common among women (e.g., Lai et al., 2020), these gender differences have not been consistently observed in the wider body of information research.

Additionally, the hierarchical regression analyses demonstrated that higher levels of education were associated with greater levels of engagement with misinformation stimuli, while also being associated with reduced levels of misinformation belief. These findings are in alignment with previous research that has demonstrated a negative correlation between education and misinformation belief (e.g., Melki et al., 2021; Preston et al., 2021) and a positive correlation between education and misinformation engagement (Buchanan & Kempley, 2021). This pattern of relationships might reflect a willingness among the highly educated to engage with misinformation to debunk/correct it (this could explain why they would also be less likely to believe the content). Alternatively, it might be the case that those with higher levels of education feel that their opinions are worthy of being shared with others, prompting them to share and/or comment on online materials. They might also be more sceptical/discerning in general, and therefore report lower levels confidence in misinformation stimuli even if they were to believe it.

7.4.7 Limitations

The generalisability of the study might be called into question due to the non-representative nature of its participant sample (e.g., politically active, above average education, restricted to right-leaning Trump supporters, particularly prone to engagement and belief in political misinformation compared to the norm). One of the factors that may be playing a significant role differentiating the current sample (and those used in Study 1-3) from more representative samples reported in other studies is the fact that the inclusion criteria require the participants to be actively involved in the political process (i.e., all participants voted in the 2020 presidential election). Therefore, the sample collected here and in Study 1-3 may represent politically engaged individuals, which might explain why they tend to believe and engage with partisan political material to a greater extent than would otherwise be expected.

Another methodological limitation was the relatively small number and idiosyncratic content of the misinformation stimuli. While the number of misinformation stimuli was increased compared to Studies 1-3 (from three to six) this rather small collection of misinformation stimuli obviously cannot capture the full range of characteristics of all political misinformation shared online. Therefore, it cannot be ruled out that the pattern of results obtained in the current might have been disproportionately influenced by the specific content of the misinformation stimuli and therefore cannot be generalised.

Finally, there were several instances during the analysis where violations of statistical assumptions were noted (e.g., lack of normality, heterogeneity of variance). While these violations were noted, and where appropriate addressed using robust measures and heteroskedastic resistant statistics, it may be the case that these statistical violations have influenced the findings. Such influence might stem from the introduction of inaccuracies and bias stemming from violated statistical assumptions, or due to the detrimental impact on statistical power that robust/conservative statistical measures often produce (i.e., reduced sensitivity).

7.4.8 Conclusion

In summary, the results of the present study indicated that the online misinformation intervention techniques previously reported by Moravec et al. (2020) were effective in significantly reducing both misinformation engagement and misinformation belief (both when controlling for the influence of positive schizotypy and when not). In contrast to the findings of Moravec and colleagues the combined System 1 and System 2 intervention technique was not shown to be more effective than the individual intervention approaches. Furthermore, the efficacy of all intervention conditions was shown not to be moderated by the expression of positive schizotypy, suggesting that the interventions were not hindered (or helped) by the expression of schizotypal cognition associated with positive schizotypal traits. Finally, exploratory regression analyses demonstrated that positive schizotypy and generic conspiracy beliefs significantly predicted different aspects of misinformation vulnerability, partially replicating the findings of Study 3. Despite some methodological limitations, the results of the current study further our understanding of positive schizotypy and its correlates as potential misinformation risk factors and lends support to the efficacy of misinformation intervention design based upon the dual process model of reasoning.

Chapter 8: General Discussion

This chapter will collectively discuss the results of all previous empirical chapters within the context of the PhD project's aims and research questions. First, I will summarise the research questions addressed by the project and the main findings derived from Studies 1-4. Then each of the project's research questions and corresponding research findings will be discussed in detail, followed by detailed discussion of exploratory findings that arose during the course of the project. Next, the project's methodological limitations will be discussed, followed by suggestions for future research and real-world applications based on the project's results. The chapter will then conclude with a reflection on the project's purpose and a summary of the main findings of the thesis.

8.1 Summary of project goals and research questions

The current project sought to build upon existing research exploring individual differences in personality and cognitive functioning as potential predictors of misinformation vulnerability. In other words, the aim of the project was to address the following question: *Why do some people fall for online misinformation when others do not?*

By drawing upon existing research within the fields of conspiracy theory research and human reasoning it was decided to explore non-clinical schizotypal personality traits as potential risk factors associated with vulnerability to online misinformation. This choice was made because 1) Schizotypal personality traits have previously been shown to positively correlate with a predisposition toward believing socio-political conspiracy theories, 2) Schizotypal personality traits are associated with a range of cognitive biases that promote reasoning based on intuition and heuristics, and 3) At the instigation of the project there was only a single study that had sought to explore these traits within the context of online misinformation vulnerability.

The project also explored numerous other potential contributory factors alongside schizotypal traits (e.g., ASD-traits, reasoning biases, partisanship), with the aim of clarifying the nature of the hypothesised relationship between schizotypal traits and online misinformation vulnerability.

The primary research questions explored in the project were the following:

- *RQ1 - Can schizotypal personality traits predict misinformation vulnerability?*
- *RQ2 - Can non-clinical ASD traits predict misinformation vulnerability?*
- *RQ3 - Can the relationship between personality traits and misinformation vulnerability be explained by an association with reasoning biases?*
- *RQ4 – How do predictors of misinformation belief differ from predictors of misinformation engagement?*
- *RQ5 – Do schizotypal personality traits moderate the efficacy of existing interventions designed to reduce vulnerability to online misinformation?*

8.2 Summary of project results and answers to primary research questions

The findings of the project indicate that non-clinical schizotypal personality traits (specifically positive traits) appear to be associated with heightened vulnerability to online political misinformation. A robust relationship between schizotypy and misinformation engagement was demonstrated across all four studies, in addition to a relatively weaker and less consistent relationship between schizotypy and misinformation belief.

The exploration of nonclinical ASD traits as a protective factor against online misinformation resulted in largely non-significant results. While there were trends in the data that supported the general rationale for the exploration of ASD traits (i.e., an association with analytical reasoning, reduced receptivity to inaccurate beliefs), there was also evidence contradicting the expectations of a diametric relationship between schizotypy and ASD traits (i.e., positive correlations were observed). After Studies 1-2 resulted in overwhelmingly non-significant relationships with other variables of interest it was decided to cease the exploration of ASD traits and prioritise the exploration of schizotypy traits in Studies 3-4.

Regarding the extent to which the relationship between misinformation vulnerability and personality measures can be explained by associations with analytical/heuristic reasoning bias, it was demonstrated that schizotypal personality measures positively correlated with measures of heuristic reasoning bias and generally acted as a stronger predictor of misinformation vulnerability compared to the CRT (see Studies 1-2). These results suggest that the relationship between misinformation vulnerability and schizotypal traits is not simply due to an association with heuristic reasoning (as captured by the CRT and similar measures), but also due to other factors associated with schizotypal traits that further contribute to their predictive significance.

When comparing variables that acted as significant predictors for *misinformation belief* and *misinformation engagement* across Studies 1-4 many differences were observed, however two notable patterns repeated across the studies. The first was that schizotypal traits (specifically positive traits) were shown to be stronger and more consistent predictors of misinformation engagement relative to misinformation belief. There was also evidence to suggest that the predictive relationship between positive schizotypy and misinformation belief was largely mediated by a conspiratorial worldview, while conspiratorial worldview failed to significantly predict misinformation engagement. The second pattern was that individuals who reported a greater tendency to share online political news (a characteristic shown also to correlate with positive schizotypy) were more likely to engage with misinformation stimuli, but also less likely to believe it.

Finally, Study 4 sought to explore the potential moderating effects of positive schizotypy on warning flag-based interventions designed to reduce belief and engagement with online misinformation. It was demonstrated that the interventions were robust to the expression of positive schizotypy and remained effective at reducing engagement and belief in misinformation stimuli.

In addition to the primary research questions, several exploratory questions were also investigated throughout the course of the project (see Section 8.4).

The following section of this chapter will provide a detailed discussion for each of the primary research questions and their associated findings.

8.3 Primary research questions

8.3.1 Research question 1: Can schizotypal personality traits predict misinformation vulnerability?

At the onset of the current project, it was hypothesised that schizotypal personality traits would display a positive relationship with measures of online misinformation vulnerability (mirroring the findings of previous research exploring schizotypy as a predictor of conspiratorial beliefs). More specifically, it was anticipated that positive schizotypal traits would be significantly associated with misinformation vulnerability, as positive traits have been previously demonstrated to positively correlate with belief in conspiracy theories and the endorsement of a conspiratorial worldview (Barron et al., 2014; Dagnall et al., 2015; March & Springer, 2019). A second reason that schizotypal traits were hypothesised to promote misinformation vulnerability was due to their known association with a

reasoning style reliant on the use of mental heuristics (Aldebot Sacks et al. 2012; Broyd et al., 2019), as existing research has already demonstrated that heuristic reasoning biases increase the likelihood of individuals believing and/or engaging with online misinformation (see Pennycook & Rand, 2019a). Furthermore, positive schizotypal traits are also associated with the expression of numerous other cognitive biases that might promote receptivity to unusual and inaccurate beliefs, such as a tendency to perceive agency in random events (van der Tempel & Alcock, 2015), a tendency to jump to conclusions based on little supporting evidence (Le et al., 2019), and a bias against disconfirmatory evidence contradicting existing beliefs (Buchy et al., 2007). Therefore, it was suggested that individuals with elevated schizotypal traits might be a particularly vulnerable demographic when considering the influence of online misinformation.

In line with expectations, correlations observed throughout the project confirmed that positive schizotypal traits were frequently associated with misinformation vulnerability, although this relationship appeared to be stronger for engagement measures relative to belief measures (see Section 8.2.4 for more details on the differences between predictors of belief vs engagement). It was also demonstrated that positive schizotypy was negatively correlated with performance on reasoning bias tests, confirming an association between positive schizotypy and an increased tendency to rely on heuristic reasoning strategies (see Section X2.3 for more details on the relationship between schizotypy and reasoning bias). Going beyond these zero-order correlations, regression models were also used to determine whether schizotypal traits significantly contributed to the prediction of misinformation vulnerability, or whether the relationship was better accounted for by any of the other variables included in the analyses.

When exploring schizotypy as a predictor of misinformation engagement across Studies 1-4, the pattern of results indicate that positive traits were the strongest and most consistent predictor of engagement behaviour among the schizotypal traits. Across all four studies positive schizotypy was shown to act as a positive predictor of misinformation engagement, suggestive of a robust relationship detectable across variations in methodological design and replicated in multiple participant samples (it is also worth noting that this relationship was consistent for right-wing misinformation only, as Study 2 demonstrated a non-significant predictive relationship for left-wing misinformation engagement; see Section 8.4.1). The observed significance of positive schizotypy as a predictor of misinformation engagement is consistent with the findings of Buchanan & Kempley (2021), which at the point of writing is the only published research article that has explicitly explored the schizotypy-engagement relationship.

There was limited evidence for a significant relationship between misinformation engagement and either negative or disorganised schizotypy traits. Neither Study 1 nor Study 3 found these traits to significantly correlate or contribute to the prediction of engagement (and Study 4 included only measures of positive schizotypy and therefore cannot contribute this line of investigation).

The results of Study 2 indicated that disorganised traits were positively correlated with engagement toward left-wing misinformation and negatively correlated with right-wing engagement (potentially reflecting trait differences in partisan groups). However, disorganised traits failed to significantly predict engagement with misinformation of any kind (regardless of partisan alignment) when assessed alongside other covariates in the regression analyses, suggesting the significant correlation was mediated by a third variable (e.g., positive schizotypy). On the other hand, negative traits (i.e., social anxiety) were shown to significantly predict engagement with right-wing misinformation, with higher levels of the traits being associated with increased engagement behaviour. However, as these findings were not replicated in the other studies no clear relationship can be inferred to exist between misinformation engagement and negative/disorganised traits (although this line of questioning may be worth further investigation within the context of contrasting left-wing vs right-wing misinformation vulnerability).

Regarding the potential role of schizotypal traits in promoting misinformation belief, while Study 1 failed to demonstrate any significant relationship between misinformation belief and any schizotypy traits, Studies 2-4 demonstrated positive schizotypy to be significantly correlated with misinformation belief (although these relationships were weaker than those observed for misinformation engagement). However, Studies 3-4 also demonstrated that positive schizotypal traits failed to significantly predict misinformation belief beyond their association with other mediating covariates included in the analyses (e.g., conspiratorial worldview). This pattern of results seems overall congruent with prior research that has demonstrated positive schizotypy to be associated with the endorsement of inaccurate beliefs (Dagnall et al., 2015; 2016; Denovan et al., 2018) and sociopolitical conspiracy theories (Dyrendal et al., 2021). Furthermore, these results support research that has suggested positive schizotypy to promote inaccurate beliefs via the expression of a generalised conspiratorial worldview (Anthony & Moulding, 2019; Georgiou et al., 2019; 2021).

Observed relationships between misinformation belief and disorganised or negative schizotypal traits were once again relatively weak and inconsistent. Disorganised traits were shown to predict belief in right-wing misinformation in Study 2 & 3. However, Study 2 indicated that

disorganised traits acted as a negative predictor of belief, while Study 3 showed it to be a positive predictor (it may be possible that the results from Study 2 were influenced by group differences in the distribution of schizotypal traits observed between left-wing and right-wing participants). Combined with the non-significant correlation for disorganised traits observed in Study 1, the pattern of findings are inconsistent and fail to provide much insight into any underlying relationship.

Negative traits were demonstrated to significantly predict misinformation belief only in Study 3, where they were negatively associated with belief in misinformation stimuli. Negative (but non-significant) correlations were also observed between negative schizotypy traits and belief in right-wing misinformation for Studies 1-2, suggesting a level of consistency to the observed relationship (albeit a weak one). One possible explanation for the negative association between negative schizotypy and misinformation belief might stem from conceptual overlap with ASD traits and their association with analytical reasoning (see Section 8.2.2). Alternatively, these findings might reflect the influence of depressive realism, whereby individuals who express dysphoric/depressed characteristics demonstrate enhanced probabilistic reasoning (see Moore & Fresco, 2012). Another potential explanation might stem from emotional deficits associated with elevated levels of negative schizotypy (e.g., emotional flattening, reduced empathy, alexithymia; see Aaron et al., 2015; Seghers et al., 2011; Yang et al., 2020). It may be the case that individuals who experience a relative deficit of emotional processing also rely less on their emotions when making decisions (thereby reducing the efficacy of misinformation that seeks to appeal to emotions to distract from its logical inconsistencies). Finally, the association between negative schizotypy and lower levels of belief in misinformation could also be reflecting heightened levels of suspicion and paranoia associated with negative traits (Horton et al., 2014). Therefore, individuals with elevated negative schizotypy might simply be less open to believing new information of any kind due to a general lack of trust in the intentions of other people (which would also explain why a similar negative relationship was also observed for belief in accurate stimuli across Studies 1-3). However, none of these proposed explanations clearly address why negative schizotypy would not also be associated with a reduction in misinformation engagement.

In summary, the current project provides robust evidence to suggest that positive schizotypal personality traits significantly predict misinformation engagement, and to a lesser extent misinformation belief. There was also evidence to suggest that negative and disorganised traits may also play a role in predicting misinformation vulnerability, however the nature of these potential relationships is currently unclear.

8.3.2 Research question 2: Can non-clinical ASD traits predict misinformation vulnerability?

It was originally hypothesised that the expression of non-clinical ASD traits would be associated with reduced vulnerability to online misinformation. The rationale for this hypothesis was grounded in the Diametric Model of Autism-Psychosis (see Crespi & Badcock, 2008), which suggests that numerous developmental, cognitive, and behavioural characteristics associated with ASD traits are diametrically opposed with those associated with the expression of schizotypal traits.

For example, schizotypal traits are associated with an increased utilisation of heuristic reasoning strategies, while ASD traits have been associated with a reduced utilisation of heuristic reasoning strategies in favour of more rational and cognitively taxing approaches (i.e., analytical reasoning; Lewton et al., 2019). Furthermore, schizotypal traits have been associated with the endorsement of unusual and non-empirical beliefs, while ASD traits have been associated with a tendency to reject such beliefs (e.g., Crespi et al., 2019). It was therefore suggested that ASD traits might be associated with a reduction in misinformation vulnerability (in diametric contrast to the hypothesised relationship between schizotypy and misinformation vulnerability).

Contrary to these initial expectations, ASD traits failed to significantly predict misinformation vulnerability in either Study 1 or 2 and did not appear to demonstrate any significant diametric relationship with schizotypy measures. While trends in the data were suggestive of social communication ASD traits being associated with greater analytical reasoning and reduced misinformation vulnerability, the effect sizes for these observed relationships were largely weak and non-significant. There were also similarly weak trends in the data that suggested ASD traits reflecting the tendency to notice patterns and details in day-to-day life (*attention to detail*) were positively correlated with misinformation vulnerability, contrary to the hypothesised protective influence of a detail-oriented cognitive style associated with the expression of ASD trait.

The results of Study 1 and 2 also demonstrated ASD traits to be significantly correlated with schizotypy traits, with *social communication* ASD traits being significantly correlated with all schizotypal traits but showing the strongest relationship with measures of negative schizotypy (i.e., interpersonal difficulties and social anxiety), while *attention to detail* ASD traits were significantly correlated with positive and disorganised schizotypy. This pattern of results potentially reflects previously reported rates of heightened co-occurrence (Kincaid et al., 2017), and/or conceptual

similarities between negative schizotypy and social deficits associated with ASD traits (see Zhou et al., 2019 for more discussion on this topic).

Of particular interest was the unexpected observation of *attention to detail* ASD traits positively correlating with *positive* schizotypal traits. It was anticipated that *attention to detail* would reflect the tendency to engage in detail-oriented analytical reasoning associated with ASD traits, and yet these traits were positively correlated with *positive schizotypy* which is commonly regarded as the primary schizotypal marker of heuristic reasoning and receptivity to unusual beliefs. One potential explanation is that individuals with elevated positive schizotypy may be more likely to “overfit” new information to conform with their higher order beliefs and expectations (see Andersen, 2022) and that this process of more readily seeing subjective patterns and connections may be experienced as being able to see details that others are unaware of. Therefore, when asking participants questions included in the AQ-9 such as “I tend to notice details that others do not” and “I notice patterns in things all the time”, it is possible that those who tend to perceive patterns more readily and/or overinterpret the significance of minor details due to the expression of positive schizotypy would also score highly on this measure (along with those who perceive accurate patterns and details due to their analytical and detail-oriented cognitive style associated with ASD traits). This explanation might also help to explain why *attention to detail* positively correlated with misinformation vulnerability and why performance on analytical reasoning tasks failed to significantly correlate with the traits (despite attentiveness to detail being a key requirement for successful performance in the tasks).

In summary, ASD traits displayed weak and non-significant correlations with measures of online misinformation vulnerability, in which attention to detail was associated with increased vulnerability and inter-personal traits were associated with reduced vulnerability. However, when assessed alongside schizotypy traits and other explanatory variables ASD traits failed to significantly contribute to the prediction of online misinformation vulnerability. Therefore, due to the non-significant results acquired in Studies 1 and 2, and a desire to divert available resources to facilitate a deeper exploration of the role of schizotypal traits, ASD traits were not explored any further in Studies 3 and 4.

8.3.3 Research question 3: Can the relationship between personality traits and misinformation vulnerability be explained by an association with reasoning biases?

One of the motivating factors for the investigation of schizotypy was the previously reported associations between schizotypal traits and a wide range of cognitive biases, including an increased

tendency to utilise heuristic reasoning strategies and an association with poor performance on the CRT. As CRT performance and heuristic reasoning biases have previously been associated with receptivity to misinformation (see Bago et al., 2020; Pennycook & Rand, 2019a; 2019c), it was suggested that expression of schizotypal traits might identify a demographic of individuals that could be particularly vulnerable to the tactics and argumentation of online misinformation content. Furthermore, schizotypal traits (particularly positive traits) are associated with a broad range of cognitive biases that appear to promote unusual, non-empirical, and at times conspiratorial beliefs. Therefore, it was also suggested that schizotypy measures might tap into other relevant reasoning processes (i.e., beyond those reflected in CRT performance) and therefore function as a superior predictor of misinformation vulnerability.

To explore this theory, performance-based measures of reasoning bias were included in Studies 1 & 2 alongside personality measures to directly compare their relative predictive value. Throughout both studies it was demonstrated that reasoning measures and schizotypy traits were generally found to correlate with misinformation vulnerability (supporting the idea that individuals who displayed increased vulnerability to misinformation were also more likely to express schizotypal traits and a heuristic reasoning style).

Study 1 indicated that positive schizotypal traits were a superior predictor of misinformation engagement compared to CRT performance, while CRT performance appeared to be a superior predictor of misinformation belief compared to schizotypal traits. These findings suggest that schizotypy relates to misinformation engagement and misinformation belief in different ways. When seeking to predict misinformation engagement, schizotypal traits were able to provide additional predictive value beyond their association with CRT performance. Furthermore, CRT performance failed to contribute to the prediction of misinformation engagement beyond its association with positive schizotypy, suggesting that schizotypy measures both accounted for variance explained by the CRT while also accounting for other relevant factors that the CRT did not detect. In contrast, schizotypal traits failed to uniquely contribute to the prediction of misinformation belief and only CRT performance was shown to have a significant relationship. This suggests that the wider range of reasoning biases associated with schizotypal cognition might play a lesser role in promoting misinformation belief relative to engagement, while the specific reasoning biases reflected in CRT appear to be relevant for predicting misinformation belief. Overall, Study 1 provided support for the notion that schizotypy traits might serve as better predictors of misinformation vulnerability compared to the CRT, but only when seeking to predict engagement.

Study 2 displayed a different pattern of results, with neither of the performance-based measures of reasoning (i.e., the CRT and The Beads Task) being shown to uniquely predict any of the misinformation vulnerability outcomes, while schizotypal traits (primarily positive traits) were shown to act as significant predictors in almost every analysis. For right-wing misinformation, schizotypy significantly predicted both belief and engagement. For left-wing misinformation, schizotypal traits were similarly shown to be predictors of belief only. These findings indicate that, compared to reasoning bias measures alone, schizotypal traits acted as better predictors of both engagement and belief for right-wing misinformation stimuli (contradicting the results of Study 1, which suggested that misinformation belief was better predicted by CRT performance instead of schizotypal traits). In contrast, schizotypal traits acted as better predictors of belief for left-wing misinformation compared to reasoning measures, while both schizotypal traits and reasoning measures failed to demonstrate a significant predictive relationship with left-wing misinformation engagement once all other explanatory variables were included in the regression analyses. These findings also suggest that the nature of misinformation vulnerability differs across partisan lines, and that schizotypal traits and the other variables included in the analyses appeared to be better suited to predicting vulnerability to right-wing misinformation (see Section 8.3.1 for more details on the influence of partisanship on misinformation vulnerability).

While the findings of Study 1 and 2 were not fully consistent, they also collectively provide evidence to suggest that the relationship between misinformation vulnerability and schizotypal traits was unlikely to be fully mediated by the CRT (or any other covariates that were included in the analyses). Such results could be interpreted as support for the hypothesised significance of the wider cluster of cognitive biases associated with the expression of schizotypy (including those captured by CRT performance) in predicting misinformation vulnerability. Positive schizotypal traits in particular appeared to have the closest relationship with reasoning measures and were also shown to be the most significant of the schizotypal traits in predicting misinformation vulnerability. These findings align with existing research that has implicated positive schizotypal traits as the primary marker of receptivity to unusual beliefs and schizotypal cognitive biases (e.g., an overreliance on heuristic reasoning strategies, the tendency to jump to conclusions based on little supporting evidence, a bias against evidence that contradicts existing beliefs). As the unique predictive value of schizotypal traits had been established in Studies 1 and 2, it was decided to no longer include reasoning bias measures for the purposes of direct comparison with schizotypy traits in Studies 3 and 4. Instead, positive schizotypal traits were interpreted as partially representing a proxy measure for schizotypal reasoning

biases, including those represented by performance in CRT, in addition to previously outlined biases that might play a role in promoting inaccurate beliefs.

In conclusion, the current project provides evidence to suggest that heuristic reasoning biases captured by the CRT and similar measures only partially account for the relationship between schizotypy and misinformation vulnerability. This suggests that schizotypal traits are associated with other underlying factors that also play a significant role in facilitating misinformation vulnerability (e.g., a broad range of cognitive biases thought to promote unusual beliefs and reasoning errors).

8.3.4 Research question 4: How do predictors of misinformation belief differ from predictors of misinformation engagement?

Misinformation belief and misinformation engagement represent the primary negative outcomes associated with exposure to online misinformation (i.e., the risk of being deceived and the risk of being coerced into reacting to content in a way that contributes to its spread). Researchers have suggested that these negative outcomes are facilitated by different forms of reasoning and are therefore associated with different forms of cognitive bias (see Pennycook & Rand, 2021). Indeed, when reflecting on the qualitative differences between these two outcome measures (i.e., one being a measure of online social behaviour and the other a measure of internalised beliefs) differences in underlying cognition would hardly be surprising.

One of the primary differences between engagement behaviour and belief judgements that has been highlighted in prior misinformation research is the degree to which each process draws upon analytical reasoning abilities. When deciding whether to engage with online content, individuals tend to rely on their intuitive reasoning processes (potentially reflecting aspects of “hot” social cognition and the influence of platform design choices that encourage low-effort forms of impulsive engagement). In contrast, when asked to explicitly reflect upon the accuracy of online content (i.e., whether they believe it to be true or not) individuals are more likely to activate their analytical faculties in order to reflect on previously acquired knowledge and determine the likelihood of the presented claims. As the use of analytical reasoning is thought to be crucial for detecting inaccurate and misleading claims, individuals tend to be more discerning when attributing belief to online content than they are when choosing what to engage with. Therefore it can be argued that, while heuristic reasoning is associated with both increased belief and engagement toward misinformation content, it likely plays a bigger role in promoting misinformation engagement.

Furthermore, when considering how an individual's preference for either heuristic or analytical thinking might further influence the engagement and belief process, it is important to note that reasoning biases are not synonymous with reasoning deficits (i.e., individuals who tend to reason intuitively are not necessarily incapable of reasoning analytically, they simply display a predisposition to utilise one type of reasoning over the other given the option). Therefore, since the act of focusing on belief judgements tends to activate analytical reflection, even those who prefer to use their intuitive reasoning abilities will be likely to engage their analytical faculties to address the demands of the task. This means that a heuristic reasoning bias would likely play a less significant role in predicting belief judgments than it does for engagement intentions, since choosing to engage with online content tends not to activate analytical reasoning process to the same extent as forming accuracy judgments. Therefore, reasoning biases would be expected to display a stronger predictive relationship with misinformation engagement measures compared to belief measures, as the activation of analytical reasoning when deciding to engage with content would be more dependent on an individual's cognitive predisposition rather than the demands of the task itself.

The results of the current project generally supported this outlook, with evidence across all four studies collectively suggesting that measures reflecting heuristic reasoning bias (i.e., reasoning task performance and positive schizotypy) predicted misinformation engagement more accurately than misinformation belief. The only exception to this pattern was in Study 1 where the relationship with CRT performance and misinformation belief was shown to be stronger than its relationship with misinformation engagement, and in Study 2 where positive schizotypy displayed a stronger relationship with left-wing misinformation belief compared to left-wing misinformation engagement (although these inconsistencies across studies may have been significantly influenced by differences in participant demographic features and methodology; see Section 8.5 for details).

Among the variables of interest thought to represent the expression of reasoning biases, it was positive schizotypy that demonstrated the most pronounced and consistent differential relationship between engagement and belief measures. At the onset of the project, it was anticipated that positive schizotypal traits would potentially predict both vulnerability outcomes, as positive traits are associated with both receptivity to unorthodox beliefs and a heuristic reasoning style. As previously discussed, positive schizotypal traits consistently predicted increased rates of misinformation engagement across all four studies (with the exception of left-wing stimuli in Study 2), while their relationship with misinformation belief was comparatively weaker and inconsistent. Such results seem to support the notion that heuristic reasoning biases associated with positive schizotypy were

associated with greater levels of misinformation engagement, while misinformation belief was less influenced by cognitive biases that promote heuristic reasoning.

The results of Studies 3 and 4 provided further insight into the nature of the relationship between positive schizotypy and misinformation belief and how it differentiated from misinformation engagement. In both studies it was demonstrated that the relationship between positive traits and misinformation belief was largely mediated by the expression of a conspiratorial worldview (a characteristic previously associated with the expression of positive schizotypy; see Denovan et al., 2020). A conspiratorial worldview is thought to overrepresent the occurrence of conspiratorial motives and actions in day-to-day life, which subsequently imposes an “interpretive lens” through which new information is processed and integrated into a conspiratorial account of reality (see Dagnall et al., 2015). While a conspiratorial worldview has been suggested to influence intuitive reasoning processes by serving as a source of heuristic cues (Drinkwater et al., 2012), it may also be indicative of analytical reasoning processes that have become biased due to sustained indoctrination into conspiratorial belief systems (i.e., if an individual has come to understand the world in terms of conspiracy theories then they might reflect on this knowledge in an analytical manner to make sense of new information).

As the current study found a conspiratorial worldview to be a significant predictor of misinformation belief but not engagement, it suggests that the influence of an individual’s conspiratorial worldview was greater when prompted to draw upon their analytical reasoning abilities, thereby supporting the notion that a conspiratorial worldview might function as a result of compromised analytical reasoning and a reduced capacity to identify falsehoods. Therefore, the results of the current project appear to imply that positive schizotypy was associated with both increased misinformation engagement and misinformation belief, but in different ways. While positive schizotypy appeared to be associated with misinformation engagement due to an association with reasoning biases, its relationship with misinformation belief could be better accounted for by an association with a conspiratorial worldview (which itself may represent a long-term consequence of cumulative reasoning errors).

Looking beyond schizotypy and measures of reasoning bias, political news sharing habits were also shown to display an asymmetrical relationship with each measure of misinformation vulnerability. For example, news sharing significantly predicted greater levels of misinformation engagement in Studies 1-4 and was also consistently shown to be among the most powerful of

predictor variables included in each analysis. In contrast, news sharing displayed a weaker and less consistent predictive relationship with misinformation belief, acting as a significant predictor in Studies 2 and 3 only. Furthermore, in both studies it was shown that greater levels of online news sharing were associated with lower levels of misinformation belief (a trend that was also observed in the analyses for Studies 1 and 2, but with weak effect sizes too small to be considered statistically significant). Therefore, the results of the current project suggest that individuals who habitually share online news might be more likely to engage with misinformation content, but also slightly less likely to believe it to be true.

There are several potential explanations that might explain the significance of online news sharing habits. For example, frequent online news sharing might be associated with increased political knowledge, whereby frequent sharers of political news possess a better grasp of politics and current events due to their ongoing engagement and familiarity with the news. This could foster domain expertise in politics, thereby reducing the perceived plausibility of false political claims and making it easier for participants to reject. Such an interpretation would be congruent with previous studies that have demonstrated that superior domain expertise tends to reduce belief in related misinformation claims (e.g. Vegetti & Mancosu, 2020) and would therefore potentially explain why individuals who frequently share online political content would be less likely to believe political misinformation.

In contrast, the relationship between political news sharing and increased engagement behaviour might be explained by differences in political activism. For example, it might be the case that individuals who share political news frequently do so because they are motivated to spread political information to others as a form of online political activism. If this was indeed the case, then we might expect such individuals to display a partisan preference for the type of political information they share with others, with politically congruent information being shared more frequently. As all headline stimuli in the current project was selected to appeal to the participant's political partisan bias, it may be the case that the positive association between news sharing and misinformation engagement resulted from a tendency to promote news that favourable to their own political ideology. It should also be noted that the observed relationship between frequent news sharing and increased engagement with misinformation headlines was also seen to extend to accurate news stimuli (in some cases it was actually stronger than that observed for inaccurate news stimuli). Therefore, the results of the project suggest that frequent sharers of political information were more likely to engage

with all types of politically congruent content and did not appear to show a pattern of consistent preferential bias toward inaccurate news content.

In summary, the results of current project seem to support the notion that misinformation belief and misinformation engagement draw upon different cognitive processes and therefore consistently display different patterns among certain predictor variables. For example, it appears that heuristic biases associated with the expression of positive schizotypy might contribute toward the prediction of misinformation engagement to a greater extent than they do for misinformation belief. In contrast, while misinformation belief was also partly attributed to the expression of positive schizotypal traits, the predictive power of this relationship appears primarily stem from the mediating influence of an associated correlate: a generic conspiratorial worldview. Individuals who possess this worldview find themselves primed to believe most conspiratorial narratives, as such individuals believe in the widespread influence of an unspecified “grand conspiracy” and find the notion of conspiratorial explanations to be intuitive and appealing. Furthermore, the tendency to share online political news was shown to display an asymmetrical predictive relationship with measures of misinformation belief and misinformation engagement (however, why this pattern of results was observed in relation to news sharing behaviour is not fully understood at this point).

8.3.5 Research Question 5: Do schizotypal personality traits moderate the efficacy of existing interventions designed to reduce vulnerability to online misinformation?

It was originally hypothesised that positive schizotypal traits would moderate the efficacy of interventions designed to reduce vulnerability to online misinformation. The rationale for this hypothesis was grounded in the association between positive schizotypy and a preference for intuitive (System 1) reasoning, along with a resistance to engaging in analytical (System 2) processing (Broyd et al., 2019). Given this cognitive profile, it was anticipated that interventions targeting System 2 reasoning might be less effective for individuals with elevated positive schizotypy due to their reluctance to engage in analytical thinking. Conversely, interventions targeting System 1 reasoning were expected to be more effective for this demographic, as they might align more closely with their intuitive processing tendencies.

To test these hypotheses, the current study adapted intervention techniques from Moravec et al. (2020), which included warning flags designed to activate either System 1 reasoning, System 2 reasoning, or a combination of both. Participants with varying levels of positive schizotypy were exposed to misinformation stimuli accompanied by these different intervention flags. It was

hypothesised that increased levels of positive schizotypy would be associated with reduced efficacy of the System 2 intervention in decreasing misinformation engagement and belief (H3a and H3b), and increased efficacy of the System 1 intervention in reducing misinformation engagement and belief (H4a and H4b).

Contrary to these initial expectations, the results of the study indicated that positive schizotypy did not significantly moderate the efficacy of any of the intervention conditions. Moderation analyses revealed no significant interaction between positive schizotypal traits and the effectiveness of the System 1, System 2, or combined interventions. All interventions were effective at reducing misinformation engagement and belief across participants, regardless of their levels of positive schizotypy. This suggests that, despite the established relationship between positive schizotypy and increased vulnerability to misinformation (Buchanan & Kempley, 2021; Georgiou et al., 2021a; 2021b), the interventions were equally effective for individuals with elevated positive schizotypy.

One potential explanation for these findings is that reasoning biases associated with positive schizotypy reflect processing preferences rather than fixed cognitive deficits. Prior research suggests that individuals with a preference for intuitive reasoning are still capable of engaging in analytical thinking when appropriately prompted (Pennycook & Rand, 2019a; 2019c). The interventions in the current study were explicitly designed to prompt critical reasoning through attentional cues, which may have overridden participants' usual processing preferences. As a result, the interventions successfully engaged the analytical faculties of participants across the schizotypy spectrum, leading to a uniform reduction in misinformation vulnerability.

It should also be noted that these findings of this study should be interpreted conservatively, as they are the very first to explore positive schizotypy's potential moderating effects on misinformation interventions. Furthermore, as only one kind of intervention was explored (i.e., content flagging), the reported results should not be assumed to be applicable to other forms of intervention without further investigation.

In summary, the findings of Study 4 suggest that schizotypal personality traits did not moderate the efficacy of existing online misinformation interventions, suggesting that interventions targeting both System 1 and System 2 reasoning can be effective regardless of an individual's expression of positive schizotypal traits. However, additional research will be required to establish

8.4 Exploratory research questions

8.4.1 Exploratory question 1: How does political identity contribute to misinformation vulnerability?

Political identity has previously been suggested to play a significant role in promoting misinformation vulnerability, especially with regard to political misinformation (see Pereira et al., 2021). The current project utilised politically partisan participants paired with politically congruent misinformation stimuli, with the aim of maximising receptivity toward the presented misinformation and potentially contributing to the detection of underlying contributory factors.

The project primarily explored misinformation vulnerability among right-wing participants and using right-wing news stimuli. This choice to focus on the conservative end of the political spectrum was due to existing research that suggested right-wing individuals are both exposed to greater levels of online political misinformation and tend to be more vulnerable to online misinformation. However, in Study 2 it was decided to also include left-wing participants and misinformation stimuli for the purposes of comparison (i.e., to determine if the variables associated with increased misinformation vulnerability among right-wing participants in Study 1 also played a similar role among left-wing participants). The results of Study 2 indicated that predictors of misinformation vulnerability among the political left and right were generally similar, however the reasoning variables under investigation displayed a stronger association with right-wing misinformation vulnerability (i.e., factors such as schizotypy and reasoning biases appeared to play a larger role in promoting right-wing misinformation vulnerability). It was therefore decided to return focus solely on right-wing misinformation vulnerability for the remainder of the project, with the hope that a stronger association with schizotypy and reasoning biases might provide additional clarity to the subsequent analyses.

Throughout the course of the project, measures reflecting the strength of an individual's partisan identity acted as a significant predictor of misinformation vulnerability (except for Study 1 which did not include a measure of partisanship in its analyses).

Study 2 demonstrated that political identity significantly predicted all measures of misinformation vulnerability for both left-wing and right-wing misinformation, with politically congruent misinformation being more readily believed and engaged with. Furthermore, political identity remained significant as a predictor after having accounted for the influence of other

covariates. For example, political congruence predicted right-wing engagement after having directly accounted for the perceived accuracy of the misinformation stimuli, the extent to which individuals habitually share online news content, perceptual and cognitive biases associated with positive schizotypy, and social anxiety associated with negative schizotypy. This suggests that political congruence was associated with greater misinformation engagement due to factors other than perceived accuracy of misinformation stimuli or reasoning errors arising from schizotypal cognition (potentially supporting the influence of motivated reasoning and/or the importance of partisanship as a source of heuristic cues). Study 2 also indicated that a right-leaning political identity was associated with lower performance on analytical reasoning measures, suggesting that right-wing participants displayed a greater system-1 bias while left-wing participants displayed more system-2 bias (in support of previous findings by researchers such as Deppe et al., 2015). Specifically, it was shown that right-leaning participants were less reliant on supporting evidence before making decisions (via performance on The Beads Test). CRT performance was also negatively associated with right-leaning identity; however, the effect size of the correlation was below the threshold of significance adopted for the project. It is also worth noting that since Study 2 recruited a roughly 50/50 split of right-leaning and left-leaning participants that political orientation would be expected to play a more substantial role in predicting outcomes when compared to analyses utilising politically homogenous participant samples.

Study 3 focused only right-leaning participants, where it was shown that strength of political identity significantly correlated with both misinformation belief and misinformation engagement (indicating that individuals with a stronger sense of right-wing identity were more vulnerable to congruent political misinformation). However, after taking into consideration the roll of other explanatory covariates, political identity was shown only to significantly predict misinformation engagement. As the results of the current project (and previous research) have indicated that misinformation engagement might be more influenced by intuitive reasoning biases (relative to misinformation belief), this pattern of results could be interpreted as support for the notion of political partisanship serving as a cue for heuristic reasoning strategies (e.g., guiding decision making based on ingroup bias and the desire to reinforce group ideology).

Study 4 demonstrated that right-wing political identity was positively correlated with the expression of positive schizotypy, generic conspiratorial beliefs, and all misinformation vulnerability measures. Furthermore, political identity acted as a significant predictor of misinformation belief after accounting for the influence of other covariates, but also failed to significantly predict

misinformation engagement. This pattern of results might be interpreted as support for political identity influencing analytical reasoning and core beliefs more than heuristic reasoning (contradicting the results of Study 3).

In summary, the results of the project indicate that a strong sense of political identity is associated with increased vulnerability toward politically congruent misinformation. Unfortunately, while Studies 2-4 all support the notion that political identity predicts misinformation vulnerability, the pattern of results is too inconsistent to ascertain how this relationship might function via underlying reasoning processes. It may be the case that partisanship bias promotes misinformation engagement via heuristics or motivated reasoning. Alternatively, it may be the case that partisans are more receptive to believing in politically congruent misinformation as the content tends to appeal to assimilated ideology and reasoning shaped by a biased knowledgebase resulting from group indoctrination. Perhaps the most important thing that has been learned regarding the influence of partisanship in the current project is that, despite the intuitively obvious assumption that partisanship plays a major role in promoting vulnerability to political misinformation, there are also other important factors at play. In other words, receptivity to political misinformation is not *just* due to partisanship.

8.4.2 Exploratory question 2: Do predictors of misinformation vulnerability differ from predictors of belief and engagement toward accurate news headlines?

The project sought primarily to identify predictors of misinformation belief and engagement, however belief and engagement toward accurate headlines was also explored in Studies 1-3. This was done to compare predictors of receptivity to misinformation with those that predict receptivity to accurate information, with the goals of: 1) identifying any factors that uniquely predict misinformation receptivity, and 2) identifying overlapping factors that predict receptivity to both accurate information and misinformation (See Appendix GG for a summary of relevant variables identified across Studies 1-3).

It was hoped that identifying predictor variables associated only with misinformation receptivity might contribute to the future development of screening measures used to identify at-risk demographics, as well as providing insights into any specific cognitive processes that might play a disproportionate role in promoting misinformation vulnerability, which might then be considered as targets for disruption in future interventions. Additionally, by identifying predictors associated with receptivity to both misinformation and accurate information it may be possible to gain a better understanding of how misinformation vulnerability might function as an extension of typical cognitive processing.

8.4.2.1 Unique predictors of misinformation engagement

The results of Studies 1 and 3 suggest that all variables that significantly predicted misinformation engagement also significantly predicted engagement with accurate stimuli (i.e., no variables significantly predicted misinformation engagement, but not accurate headlines engagement). In contrast, Study 2 indicated that engagement with right-wing misinformation stimuli was uniquely predicted by higher levels of negative schizotypy traits, suggesting that a heightened expression of negative schizotypy (particularly social anxiety) might influence reasoning processes in a way that specifically promotes engagement with inaccurate news headlines. Study 2 also demonstrated that engagement with left-wing misinformation stimuli was uniquely predicted by lower levels of education and higher ratings of belief in the factual accuracy of the misinformation stimuli (both of which failed to significantly predict engagement with accurate left-wing headline stimuli). These findings suggest that similar relationships exist between the predictor variables and engagement with the headline stimuli, regardless of the headline's factual accuracy.

Regarding the unique predictors of misinformation engagement identified in Study 2, while they did not demonstrate the same differential relationship in Studies 1 or 3, they might still provide

some limited additional insight into cognitive processes that promote misinformation engagement. For example, prior research has suggested that heightened anxiety is associated with an increased willingness to believe and engage with inaccurate online news content (see Freiling et al., 2023), however this same body of research also indicated that anxiety positively predicted engagement toward accurate news content (contrary to the findings of Study 2). Furthermore, if social anxiety did have the effect of promoting right-wing misinformation engagement behaviour, it is not clear why social anxiety (or any other measure of negative schizotypy) failed to act as a significant predictor of misinformation engagement at any other stage of the project.

Regarding the unique predictors of left-wing misinformation engagement, as Study 2 was the only stage of research at which left-wing participants and headline stimuli were utilised, it is impossible to comment on replication (or a lack thereof). Therefore, it is difficult to establish the validity of the obtained findings. However, research has demonstrated that lower levels of education can be associated with reduced truth discernment which might increase receptivity to misinformation (e.g., Melki et al., 2021), although why this relationship would be significant only for left-wing stimuli is unclear.

Perhaps more interestingly, belief in the accuracy of the presented headline stimuli was repeatedly demonstrated to significantly predict increased engagement at every stage of analysis in the project (for both accurate and misinformation stimuli), with the only exception being the prediction of accurate left-wing stimuli engagement. Therefore, the significance of belief predicting engagement with left-wing misinformation was not particularly unusual (indeed, it is congruent with existing research that has demonstrated a link between belief judgements and engagement behaviour, see Pennycook et al., 2021b). Instead, the lack of a significant predictive relationship between belief judgments and engagement with accurate left-wing headlines appears to stand out (i.e., for some reason, the extent of engagement with accurate left-wing new headlines was unrelated to the extent to which participants believed them to be true). Again, why these results were obtained is not obvious, but might indicate differences in the influence of belief judgments on subsequent engagement behaviour across the political divide.

8.4.2.2 Unique predictors of misinformation belief

Throughout Studies 1-3, several predictor variables were demonstrated to significantly predict belief in misinformation headline stimuli while failing to predict belief in accurate headlines. However, the findings across individual studies were largely inconsistent.

For example, Study 1 indicated that poorer CRT performance significantly predicted belief in misinformation stimuli, but not belief in accurate headlines. In contrast, Study 2 revealed a distinctly different pattern of result, with belief in right-wing misinformation being shown to be uniquely predicted by a wide variety of factors (i.e., a stronger sense of right-wing political identity, lower levels of disorganised schizotypy traits, being younger, reporting lower levels of online news sharing behaviour, being female, and expressing heightened positive schizotypy traits). Study 2 also indicated that belief in left-wing misinformation was uniquely predicted by stronger intentions to engage with the presented stimuli and younger age. Finally, Study 3 indicated that lower levels of self-reported online news sharing, reduced need for cognitive closure, and the expression of a conspiratorial worldview uniquely predicted misinformation belief.

Collectively, these results form a mixed and inconsistent account of significant predictive relationships unique to misinformation belief. While Study 1 suggests that reasoning biases reflected in the CRT performance (i.e., a predisposition towards heuristic-reasoning) might play a key role in facilitating belief toward misinformation stimuli specifically, this result was not replicated in Study 2 where CRT measures were once again included in the analysis. Study 2 demonstrated relatively little overlap in unique misinformation predictors between left and right-leaning misinformation, apart from participant age (implying that younger participants were more receptive to all misinformation stimuli regardless of political bias). However, once again these findings were not replicated in any other stage of analysis, which draws into question the wider validity of the findings.

In contrast, Study 2 and 3 both indicated that self-reported political online news sharing habits uniquely predicted belief in right-leaning misinformation stimuli, with individuals who reported sharing online news more frequently demonstrating lower levels of confidence in the factual accuracy of the misinformation stimuli (contrary to the previously reported associations between news sharing and misinformation engagement, suggesting that individuals who tended to share online political news content were both *more* vulnerable in terms of misinformation engagement and *less* vulnerable in terms of misinformation belief). However, it is worth noting that the same relationship between increased political news sharing and lower levels of belief was noted for both misinformation and accurate left-leaning headlines in Study 2, implying that this relationship may not be unique to inaccurate stimuli.

Perhaps one of the more convincing differential predictors of misinformation belief was the relative expression of a conspiratorial worldview identified in Study 3. A conspiratorial worldview is associated with the overriding belief that the “official” account of events should be considered

suspect by default and that the outcome of world events are often directly controlled by a hidden and powerful elite. Therefore, it stands to reason that individuals who possess a conspiratorial worldview might find themselves more open to believing political misinformation given that it will likely contradict the “official” (i.e., accurate) account of events while also frequently appealing to conspiratorial narratives (as was the case for much of the misinformation stimuli used in the current project). Interestingly, since belief in accurate headlines was not negatively predicted by a conspiratorial worldview, it suggests that the expression of a conspiratorial worldview might promote belief in misinformation while playing a relatively insignificant influence on receptivity to accurate information. Furthermore, conspiratorial worldview was shown to mediate the link between positive schizotypy and misinformation belief (a finding that was partially replicated in Study 4, as well as existing research by Denovan et al., 2020), which might help clarify why positive schizotypy traits were indicated to uniquely predict belief in right-leaning misinformation in Study 2.

8.4.2.3 Shared predictors of belief and engagement toward accurate and misinformation stimuli.

When considering the overall pattern of results acquired across Studies 1-3, it was demonstrated that most of the variables that significantly predicted engagement and/or belief for misinformation stimuli also significantly predicted the same outcomes for accurate stimuli. Furthermore, these shared predictor variables demonstrated greater consistency across individual analyses than the previously discussed variables identified as unique predictors of misinformation vulnerability.

For example, Study 1 demonstrated engagement with accurate and misinformation stimuli to be significantly predicted by higher ratings of belief in the presented stimuli, higher levels of self-reported online news sharing habits, and a heightened expression of positive schizotypy traits. These same variables were also shown to predict engagement with both factual and inaccurate headlines in Study 3 and for right-wing stimuli in Study 2 (left-wing engagement failed to be significantly predicted by positive schizotypy, while belief judgements were shown to be a significant predictor for misinformation stimuli only). Furthermore, the strength of a participant’s political identity was also shown to consistently be a significant predictor for accurate and misinformation engagement behaviour when included in the analyses (i.e., Studies 2 and 3).

Therefore, it was demonstrated that engagement behaviour, regardless of stimuli accuracy, was largely associated with congruent underlying beliefs, the tendency to share online news, partisan identity, and elevated positive schizotypy. Based on these findings it might be suggested that individuals engage with online content for two main reasons: 1) because they believe it to be true, and

2) because they utilise heuristic reasoning to determine whether or not to engage (e.g., positive schizotypy is associated with a heuristic-driven cognitive style, appeals to existing beliefs might reflect the influence of confirmation bias, frequent news sharing has been associated with reduced cognitive reflection, and partisanship is associated with reasoning biases that favour information complimentary to the political in-group). The fact that these predictors remain significant regardless of stimuli accuracy also supports the notion that appeals to heuristic reasoning are not unique to misinformation stimuli, and that accurate stimuli were likely processed similarly (i.e., with a relative lack of weight applied to information accuracy relative to heuristic appeal). However, it is also worth noting that the accurate stimuli in the current study was selected to appeal to the participant's partisan identity to a similar extent as the misinformation stimuli. Therefore, the similar predictive relationships between the two stimuli groups might stem from the fact that they both pander to political bias and heuristic reasoning (i.e., shared predictor variables might simply reflect those involved in promoting receptivity to politically appealing news content).

Regarding shared predictors of belief, the most consistent predictor variable was engagement intentions (established as significant in Studies 1 and 3, in addition to predicting belief for right-wing stimuli in Study 2). These findings partly mirror those for engagement behaviour, specifically that individuals who engage with online news content also tend to rate the associated claims as more credible. Furthermore, since it has been argued that individuals often engage with online political content impulsively and without analytical reflection, engagement behaviour might be interpreted as a behavioural manifestation reflective of heuristic appeal. Therefore, the significance of engagement as a predictor of belief may not simply indicate the tendency for individuals to endorse information they believe to be accurate. It also implies that when online content is intuitively appealing enough to prompt engagement behaviour, individuals will also tend to rate it as more accurate.

Beyond these reoccurring predictors of engagement and belief, there were also instances in which other variables indicated an overlap in their predictive utility. For example, Study 2 indicated that gender significantly predicted engagement with accurate and inaccurate right-wing headlines (with men being more prone to engage with the stimuli). At the same time, positive schizotypy traits acted as significant predictors of belief for inaccurate and accurate left-wing headlines (however the nature of this relationship was asymmetrical, with higher levels of positive schizotypy being associated with greater belief in inaccurate headlines and reduced belief in accurate headlines). Study 3 also indicated that disorganised and negative schizotypy traits acted as shared predictors of accurate and inaccurate headlines (with higher levels of belief being associated with higher levels of

disorganised schizotypy and lower levels of negative schizotypy). However, as these variables failed to demonstrate a consistent pattern of significance across individual studies their validity and generalisability must be questioned.

In summary, several key observations were noted when contrasting predictors of belief/engagement toward misinformation and accurate headline stimuli. While some analyses indicated that certain predictor variables were unique to misinformation stimuli, these results were largely inconsistent. They failed to implicate any specific demographic qualities or cognitive characteristics as a significant risk factor for misinformation vulnerability alone. Instead, the overall pattern of results across the project seemed to imply that most predictors of misinformation vulnerability also predicted belief and engagement with accurate headlines (particularly for right-wing oriented stimuli). These results seem to suggest a lack of qualitative differences between accurate news headlines and misinformation headlines, implying that no “special characteristics” differentiated inaccurate claims from those that were accurate. However, it must also be recognised that both accurate and inaccurate headline stimuli were politically biased in favour of the participant’s political orientation, which might explain the significant overlap in predictive relationships. Political misinformation may simply rely on the same argumentation strategies utilised by other types of partisan media; appealing to political identity and other heuristics to generate engagement and belief from in-group members. Consequently, to compare predictors of online misinformation vulnerability with those that predict receptivity to accurate news content in the future, researchers may also wish to incorporate apolitical news stimuli in their experimental design to help rule out the influence of heuristic appeal to partisanship and create a clearer contrast of accurate and inaccurate stimuli characteristics.

8.5 Limitations

8.5.1 Generalisability of findings

Perhaps the most fundamental limitation of the current project is the extent to which the presented findings relating to misinformation vulnerability should be considered generalisable. For example, it is not clear to what extent that the findings acquired in the current project should be considered applicable to non-political misinformation. As the project utilised political stimuli exclusively throughout each stage of research it would be inappropriate to assume that the acquired findings also account for vulnerability toward non-political misinformation. Therefore, while the wider

goal of the project was to provide insight into traits and cognitive processes associated with heightened online misinformation vulnerability, it would be more accurate to say that the current project provides insight into traits and cognitive processes associated with online *political* misinformation vulnerability.

Another obvious limitation that might limit potential generalisability is the project's use of US participants and new stimuli focused on US politics. This US-centric approach to the methodology potentially limits the relevance of the project's findings to other cultures and nationalities, as it might be possible that the results of the project reflect something specific to the use of misinformation within contemporary US politics. For example, it may be the case that the results have been impacted by the significant degree of political polarisation that currently exists in the US political landscape (i.e., might a less polarised populous present different associations with political misinformation vulnerability?). Alternatively, the results of the current project might reflect the increasing utilisation of misinformation in mainstream US-politics (particularly among the political right, see Baron & Jost, 2019; Garrett & Bond, 2021). Given the apparent growing politicisation of facts within US political discourse, partisan individuals might feel the expectation to endorse non-truths espoused by political leaders as an act of loyalty or display of group membership. Therefore, it may be the case that the influence of partisanship in promoting receptivity to misinformation in the current study was inflated due to the normalisation of misinformation in contemporary US political discourse. For this reason, one must be cautious when considering the potential applicability of the current findings to residents of other nations (although it is also worth noting that the growing use of misinformation in contemporary politics is certainly not unique to the US, see Pérez Escolar et al., 2023).

Furthermore, it would be inappropriate to assume that the findings of the current project are equally applicable to the US residents who fall outside of the very specific demographic that was utilised throughout the research (e.g., participants who were politically active, above average in education, largely restricted to right-leaning Trump voters, and particularly prone to online engagement and belief in political misinformation compared to previously reported norms). Given the non-representative demographic qualities of the recruited participants it might be more appropriate to assume that the project's findings would be more applicable to highly partisan actors as opposed to the general US public.

Finally, it is worth pointing out the current project did not include any measures of ethnicity, socio-economic status, or measures of gender beyond those that adhere to binary measurement.

These characteristics were not recorded both due to practical considerations (i.e., reducing participant load and streamlining the number of predictor variables included in each regression analysis) and because these characteristics were not anticipated to contribute to the exploration of the research project's overall aims. However, the inclusion of these variables would have provided a more comprehensive overview of the participant characteristics and may have also contributed to a more robust set of control variables in the early stages of each regression analyses.

8.5.2 Variation in methodology

Certain methodological inconsistencies between each stage of research limit the extent to which the results of each study can be directly compared with one another. Such inconsistencies between individual studies arose due to the somewhat ad hoc approach that was applied throughout the project, whereby the design of each study was informed by the results (and shortcomings) of the previous study. While this approach allowed for flexibility and the adaptation of the project to explore emergent findings, a more rigid and predetermined methodology would have benefitted the final act of synthesis and interpretation (as well as any efforts to pool participant data across individual studies for the purpose of secondary analysis).

One example of such methodological inconsistency relates to participant inclusion criteria. Study 1 differed in terms of criteria used to recruit right-wing participants compared to latter studies. In Study 1 participants were recruited only if they 1) Voted for Donald Trump in the 2020 election, 2) Identified as a Republican, Independent, or Other, and 3) Specifically identified as Conservative on the US political spectrum. In Studies 2-4 changes were made to the third of these criteria (i.e., the requirement to identify as a Conservative), whereby participants were also included in the participant pool if they identified as Moderate, Other, or N/A. The reasoning behind this change in recruitment methodology was that based on two considerations. First, arguably the greatest divide between the political left and right in contemporary US politics is not characterised by those who endorse classical conservatism versus those who endorse progressive policies, but rather between those who endorse the Trump brand of post-truth populism and those who seek to defend the status quo (i.e., liberal democracy and the legitimacy of empirical truth in political discourse). Therefore, given the desire to explore receptivity to online political misinformation in the current project the most significant selection variable was reevaluated to be an individual's 2020 presidential election voting

record. This position was adopted not only due to the potential influence of partisan identity contributing toward heuristic reasoning biases, but also because Trump voters supported him despite the widespread use of misinformation throughout his presidency and political campaigning (see Kellner, 2023; Kessler et al., 2021), thereby indicating a certain degree of tolerance or receptivity to false claims within this demographic. Second, by accepting a wider range of political self-identifiers in the screening process of Trump voters the participant pool might begin to represent the wider variety of supporters who fail to self-categorise within the binary choice of Liberal and Conservative. For example, this might include individuals who consider themselves strictly as Libertarians, Centrists, or perhaps apolitical freethinkers, as well as the more fringe and special interest groups that for whom Trump's brand of populism has appeal (e.g., the Alt-right). Therefore, while the change in participant recruitment practises may have been justified, it had the unfortunate consequence of making it harder to confidently compare the results of Study 1 directly to those of Studies 2-4.

Similarly, Studies 1 & 2 utilised a different measure of schizotypal traits compared to Studies 3 & 4, with the SPQ-BRU being used for the former and the MSS-B for the latter. Again, this change in methodology was justified (i.e., the SPQ-BRU was initially used due to the ubiquity of similar measures in the existing conspiracy theory literature, while the MSS-B was later adopted due to proposed advantages in psychometric design and conceptual clarity). However, as schizotypy was measured differently in the earlier half of the project compared to the latter half, direct comparison of the results becomes slightly harder to interpret.

Perhaps the biggest variation in methodology that stifles direct comparisons of results was the choice to include both Trump and Biden voters in Study 2. While this choice was made to explore whether the observed correlation between positive schizotypy traits and misinformation vulnerability was expressed across both sides of the political divide, the methodology also creates problems when trying to compare results with other studies (e.g., differences between the two political sub-groups may have obfuscated the outcomes of regression models and potentially inflated the predictive significance of partisanship).

However, while the lack of uniformity across Studies 1-4 may be a limiting factor when directly comparing results, the fact that the main findings of the project (i.e., schizotypy predicts online misinformation vulnerability) stayed relatively consistent throughout each stage of research lends support to its wider validity. Despite changes in participant recruitment, schizotypy measures, and

numerous other design elements throughout the project, the significance of schizotypy as a predictor of misinformation vulnerability appeared to be robust and replicable.

8.5.3 Lack of causal inference

Studies 1-3 were correlational in design, and therefore could not be used to infer causal relationships (i.e. while a relationship between schizotypy traits and misinformation vulnerability measures could be established, it was not possible to claim that schizotypy traits caused misinformation vulnerability). Furthermore, while Study 4 utilised an experimental design it did not experimentally control for the expression of schizotypy traits, and therefore once again the question of the potential causal role of schizotypy traits in promoting misinformation vulnerability went unaddressed. Therefore, while the results of the current project might be interpreted as a potential indicator of online misinformation vulnerability being promoted in part due to the influence of schizotypal traits and associated cognitive biases, this causal role has yet to be established.

8.5.4 Size and idiosyncrasy of misinformation stimuli sample.

Throughout the project it was evident that, due to practical restrictions (e.g., participant load, limited funding, availability of pretested stimuli), it would not be possible to utilise a particularly large number of misinformation stimuli during misinformation vulnerability testing. Therefore, as the sample of misinformation stimuli was rather small it calls into question the ecological validity of the findings and increases the likelihood that measures of belief and engagement may have been disproportionately influenced by the specific selection of misinformation stimuli (although efforts were made to balance the stimuli in terms of partisan appeal). Furthermore, even if a larger range of misinformation stimuli had been utilised, it is worth recognising that since online misinformation lacks uniformity in its presentation and content the challenge of constructing a truly representative sample of stimuli reflective of the vast range of online misinformation in an experimental setting might be insurmountable.

8.6 Extensions to research

To build upon the current findings, future researchers might consider designing investigative studies that focus on mitigating some of the previously identified methodological limitations and addressing the outstanding questions that have arisen from the project. A brief discussion of some of these considerations is outlined below.

8.6.1 Addressing methodological limitations.

In terms of addressing the methodological shortcomings of the current project in future research, several obvious candidates exist. The first is establishing the extent of positive schizotypy's causal relationship with online misinformation vulnerability. This would require an experimental methodological design; however, it is difficult to envision how one might implement any true experimental approach to addressing this research question (i.e., even if it were possible to induce schizotypy experimentally, it would likely be considered unethical). Therefore, using a quasi-experimental approach would likely be the most sensible way to investigate potential signs of causality between positive schizotypy and misinformation (i.e., pre-screening participants into groups with high/low levels of the trait and then comparing performance on misinformation tasks). While quasi-experiments provide a weaker basis for establishing causality compared to true experiments, given the ethical and practical limitations, this approach would be a sensible next step in establishing causality indicators in the schizotypy-misinformation relationship.

Next, to improve the generalisability of the findings, future researchers should seek to increase the representativeness of their participant samples when exploring the link between schizotypy and misinformation vulnerability. This includes recruiting participants who are more representative of the wider US population in terms of personal characteristics (e.g., education level) and political engagement (i.e., also including non-voters and non-partisans). Furthermore, by using cross-cultural data or recruiting participants from outside the US, the generalisability of the findings to those beyond the US political ecosystem would be bolstered. Future researchers may also seek to include measures of ethnicity, socio-economic status, and non-binary gender to better account for the demographic characteristics of participants in the pursuit of representativeness. Similarly, future researchers may also wish to draw upon a much larger body of misinformation stimuli when acquiring vulnerability measures to better understand the appeal of online misinformation in general (as opposed to reactions toward a specific set of misinformation stimuli).

Finally, future researchers should seek to explore the potential role of schizotypal traits in promoting vulnerability toward non-political forms of online misinformation (e.g., content relating to science, health, economics, education, history, and other topics).

8.6.2 Outstanding questions

Regarding questions that have arisen during the current project one key question stands out: If misinformation vulnerability is indeed amplified by positive schizotypy and the reasoning biases associated with the expression of this trait (as suggested by the heuristic reasoning hypothesis outlined in the current project), is it possible to identify all of the specific cognitive biases that facilitate this relationship? By conducting research that includes a more exhaustive range of measures relating to known cognitive biases associated with positive schizotypy and exploring their relationship with online misinformation vulnerability it may be possible to gain better appreciation of which specific schizotypal biases mediate the relationship. In the current project it was demonstrated that measures of cognitive reflection (i.e., the presence of a heuristic reasoning bias) and to a lesser extent a jumping-to-conclusions bias might partly account for the association between positive schizotypy and misinformation vulnerability, however these bias measures were not able to fully account for the significant relationship between positive schizotypy and misinformation vulnerability. However, there are many other potential candidates among established schizotypal biases that might further account for the underlying mechanisms behind the observed relationship and therefore warrant closer inspection (e.g., a bias against disconfirmatory evidence, heightened agency detection, hypervigilance to deception, emotional dysregulation, source memory biases, knowledge corruption, and self-certainty biases). If it were possible to fully account for all the cognitive processes that mediate the relationship between positive schizotypy and online misinformation vulnerability, then it might be possible to provide specific targets for disruption in future interventions and better inform our understanding of exactly how schizotypal cognition promotes unusual and inaccurate forms of reasoning and belief.

Another question that arises from the current work relates to the exploration of negative and disorganised schizotypy traits, with the aim of further clarifying their significance regarding misinformation vulnerability. While the findings regarding positive schizotypy were largely consistent at each stage of research, throughout the project there were mixed results regarding the strength and direction of the relationship between misinformation vulnerability measures and both negative and disorganised schizotypal traits. This somewhat confusing pattern of results may have arisen due to the fact that, while schizotypy is a multifactorial construct, the expression of schizotypal traits tends to intercorrelate which can obscure the ways in which each individual trait relates to a specific outcome of interest. One potential way of addressing this issue is to shift focus from the role of individual schizotypal traits in relation to misinformation vulnerability to the role of multidimensional

schizotypy profiles (i.e., the relative expression of positive, negative, and disorganised traits within an individual). Analytical methods such as cluster analysis should be considered as this approach might provide key insights into the importance of schizotypal profiles. See [10] for the results of a small exploratory cluster analysis that utilised data from Studies 1-3 (i.e., those studies that utilised more than a single schizotypy trait measure), the results of which appear to indicate that a schizotypal profile characterised by high levels positive schizotypy (relative to negative schizotypy) was generally associated with the greatest receptivity to misinformation stimuli, while individuals with a schizotypal profile characterised by high levels of negative schizotypy (relative to positive schizotypy) displayed greater levels of discernment and rejection of misinformation stimuli.

Finally, as the current project utilised scenario-based methods to acquire measures of online misinformation engagement and belief there remain questions regarding the potential ecological validity of the findings (i.e., did the findings of the project sufficiently reflect how individuals react to online misinformation in their real-life online activity?). Future researchers might address this concern by combining the self-report methodology utilised in the current project with the collection and analysis of real social media activity (e.g., records of engagement behaviour toward true and inaccurate news content). Alternatively, researchers employing scenario-based methods in the future might consider the use of more convincing and immersive simulations of social media activity (e.g., a realistic simulation of a participant's social media platform of choice embedded with misinformation stimuli).

8.7 Real-world implications

8.7.1 Insights on the extent of the online misinformation problem.

While fears over the detrimental impact of a seemingly growing influence of online misinformation in political and social discourse are of great concern to many, empirical research must be utilised to monitor the true extent of this problem. As discussed in previously, the current project did not utilise participant samples considered typical or fully representative of the broader US population. Therefore, it would not be appropriate to estimate the extent of online misinformation vulnerability among the public based on the project's findings. However, when considering the impact of online political misinformation on democratic processes, it is arguably more important to understand how misinformation might influence those who are more likely to vote in elections. Research has established that among the key US demographics most likely to vote are individuals

who are: 1) highly educated, 2) politically polarised, and 3) politically (see Rentsch et al., 2019). This demographic profile consisting of highly educated, politically polarised and politically active individuals appear to closely resemble the characteristics of participant samples acquired throughout the project. Therefore, it may be the case that the findings of the current project could provide insight into the extent of misinformation vulnerability among those more likely to vote in elections.

Findings across each stage of the project indicated that participants were particularly vulnerable to politically congruent online misinformation compared to previously reported norms. Previous research has indicated that somewhere between 10-40% of online users demonstrate engagement behaviour toward misinformation content (see Chadwick & Vaccari, 2019; Guess et al., 2019). In contrast, the current project indicated substantially higher engagement rates toward misinformation content (e.g., 70% of participants engaged with at least one misinformation headline in Study 1, 79% in Study 2, 63% in Study 3, and 74% in Study 4). While these engagement rates may have been amplified by efforts made to maximise receptivity to the presented misinformation content, it is still concerning that most participants indicated a desire to engage with the presented misinformation stimuli. Similarly alarming levels of belief in misinformation stimuli were also noted (e.g., 85% of participants believed in the factuality of at least one misinformation headline in Study 1, 96% in Study 2, 74% in Study 3, and 88% in Study 4). While both measures of belief and engagement with misinformation stimuli appear to be relatively high across Studies 1-4, it is also worth noting that only a small minority of participants were strong proponents of the content (i.e., indicating the maximum level of confidence in misinformation stimuli factuality and/or indicating the maximum level of enthusiasm behind misinformation engagement). Among those who sought to engage and/or believe misinformation stimuli it was generally demonstrated that participants displayed low confidence in the content but failed to dismiss or ignore it entirely. This pattern of results might reflect uncertainty and confusion regarding the reliability of news headlines encountered in the post-truth media landscape (i.e., individuals may avoid wholly dismissing dubious claims since it has become harder to distinguish truth from fiction). Therefore, while the rates of engagement and belief in the current project might first appear to imply that politically congruent online misinformation is highly enticing and convincing, it may alternatively indicate that these claims were not perceived as particularly credible, however the participants had a hard time conclusively ruling them out and ignoring them.

Overall, the findings of the current project indicate that misinformation vulnerability could be substantially greater among politically engaged “likely-voters” compared to the broader public, raising

concerns over the damaging influence of online misinformation on the democratic process. While it is unclear the extent to which exposure to such misinformation content might influence voting choices, the results of the current project highlight the need to better understand the extent of misinformation vulnerability among those who wield the most significant democratic influence in society.

8.7.2 Identification of vulnerable demographics.

The project's results further reinforce the notion that individual differences can be used to predict online misinformation vulnerability. Furthermore, the results of the current project appear to indicate that schizotypal personality traits may act as a superior predictor of misinformation vulnerability compared to commonly utilised predictive measures of misinformation vulnerability (e.g., performance on the CRT). Therefore, the results of the current project may improve future efforts to profile those vulnerable to online misinformation. Personality measures such as schizotypy also benefit from emerging techniques that can be used to utilise real-world social media activity to develop behavioural and lexical indicators of underlying traits (e.g., see Panicheva et al., 2016; Preotiu-Pietro et al., 2016) and therefore hold the potential to aid in the identification of vulnerable individuals without the need for self-report or cognitive performance measures. Furthermore, as it has been suggested that a small minority of online users spread most of the misinformation on social media, the ability to target such users with interventions designed to suppress the extent of their engagement could substantially contribute to reduced spread of misinformation content across social networks.

8.7.3 Informing interventions.

Interventions designed to reduce receptivity toward online misinformation often rely on the triggering of analytical reasoning abilities to overcome heuristic reasoning errors that are thought to promote misinformation belief and engagement. The results of the current project demonstrated that, despite previous reports of schizotypal traits being associated with both a reluctance to engage in analytical reasoning and a tendency to resist updating beliefs, misinformation intervention techniques based on content flagging and the activation of analytical reasoning abilities remained effective regardless of the expression of positive schizotypy. This lends credibility to the robust nature of these types of interventions and further emphasises the notion that individuals with elevated

schizotypy may be more predisposed to heuristic reasoning errors but remain fully capable of employing analytical reasoning when prompted to do so.

Additionally, as we better understand the demographic and cognitive features of those most vulnerable to online misinformation, it may be possible to inform psychoeducational materials to raise awareness of the significance of these risk factors among the public. In doing so, individuals can become more aware of the relevant traits and reasoning biases that they (and those around them) possess, allowing individuals to develop a better understanding of how these risk factors can be exploited by misinformation content to promote receptivity. Such psychoeducational approaches have previously been shown to be effective, especially when executed in a gamified manner (see Basol et al., 2020; Roozenbeek et al., 2020).

8.8 Conclusion

In conclusion, the current research project sought to build upon our understanding of online misinformation vulnerability by exploring the potential role of schizotypy traits and several other variables of interest drawn from contemporary misinformation and conspiracy theory research.

The project's findings suggest that positive schizotypal personality traits were significant predictors of online misinformation engagement (and to a lesser extent misinformation belief). The significant relationship between positive schizotypy and misinformation vulnerability was also shown to go beyond the trait's known association with poor performance on measures of cognitive reflection, suggesting that the wide range of underlying differences in cognition associated with the expression of positive schizotypy might play a key role in promoting inaccurate beliefs and engagement with inaccurate online content. Furthermore, while positive schizotypy was identified as a potential risk factor for misinformation vulnerability, the current project also demonstrated that existing online misinformation intervention techniques remained effective and robust to the presence of positive schizotypal traits. Overall, the project has established that positive schizotypy should be explored further within the context of online misinformation vulnerability.

Other key findings include ASD traits being shown to be a weak and non-significant predictor of online misinformation vulnerability, thereby failing to support the theorised protective effects that were hypothesised at the project's outset. The current project also seems to support the notion that misinformation belief and misinformation engagement draw upon different cognitive processes, with

misinformation engagement displaying a stronger relationship with heuristic reasoning biases and misinformation belief demonstrating a stronger relationship with preexisting conspiratorial worldview. It was also demonstrated that individuals who reported a stronger and more polarised sense of political identity were more receptive to online political misinformation when the content's message was complimentary to their political in-group.

Furthermore, exploratory findings imply that there may be significant differences in the underlying nature of misinformation vulnerability when comparing left and right-leaning political news stimuli, with vulnerability to right-leaning misinformation demonstrating a stronger association with the expression of schizotypal traits. Exploratory analysis also indicated that many of the predictors of online political misinformation vulnerability also significantly predict receptivity to politically congruent online content that is accurate, indicating that misinformation vulnerability may function largely as an extension of the same reasoning processes that promote engagement and belief in other types of partisan news coverage.

While the project had its fair share of methodological limitations, it is among the first to establish a significant relationship between individual differences in the expression of schizotypy and misinformation vulnerability. Having demonstrated this relationship it is hoped that future research will seek to clarify the nature of the schizotypy-misinformation relationship, perhaps by exploring the potential causative influence of specific cognitive biases associated with positive schizotypy. Finally, it is hoped that the work started here will one day contribute toward identifying and protecting vulnerable demographics from the negative influence of deceptive online misinformation.

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Appendix A - A copy of the preregistration document (Study 1).

As Predicted: "Cognition and Fake news: The role of schizotypy and ASD traits" (#58785)

Created: 02/19/2021 06:13 AM (PT)

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1) Have any data been collected for this study already?

No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?

It is predicted that the expression of schizotypal personality traits (specifically cognitive perceptual traits) will be associated with increased scores on measures of social media engagement and belief in relation to fake news headlines. Therefore hypothesis 1 is:

H1a: Scores on the SPQ-BRU cognitive-perceptual schizotypy scale will be significant predictors of, and positively associated with, the compound measure of fake news engagement.

H1b: Scores on the SPQ-BRU cognitive-perceptual schizotypy scale will be significant predictors of, and positively associated with, the compound measure of fake news belief.

It is also predicted that increased levels of non-clinical Autism Spectrum Disorder (ASD) personality traits will be associated with reduced social media engagement and belief in relation to fake news headlines. Therefore hypothesis 2 is:

H2a: Scores on all AQ-9 sub-scales will be significant predictors of, and negatively associated with, the compound measure of fake news engagement.

H2b: Scores on all AQ-9 sub-scales will be significant predictors of, and negatively associated with, the compound measure of fake news belief.

It is also predicted that better performance on measures of cognitive reflection will be associated with reduced social media engagement and belief in relation to fake news headlines. Therefore hypothesis 3 is:

H3a: Scores on the CRT/CRT2 composite measure will be significant predictors of, and negatively associated with, the compound measure of fake news engagement.

H3b: Scores on the CRT/CRT2 composite measure will be significant predictors of, and negatively associated with, the compound measure of fake news belief.

3) Describe the key dependent variable(s) specifying how they will be measured.

The key outcome variable for all hypotheses addressing the assessment of social media engagement in relation to fake news headlines (H1a, H2a, H3a) will be a fake news engagement score indicating the self-reported likelihood of the participant either "liking", responding with an emoji, sharing, or commenting on the presented fake news article if it were to be encountered on a social media platform. This score will be calculated for each participant by combining the scores of all the engagement measures (comment, sharing, etc.).

The key outcome variable for all hypotheses addressing the assessment of belief in relation to fake news

headlines (H1b, H2b, H3b) will be a fake news belief score, indicating the extent to which participants believe in the accuracy of a presented fake news article. This score will be calculated by averaging individual belief scores from each fake news stimuli presented.

In addition to the fake news stimuli, a selection of true headlines will also be included and responses to those will be used in exploratory analysis. All news stimuli utilised in the study are derived from a public library of true and fake news articles collected and pre-tested by Pennycook et al. (2020). Stimuli were selected based on their partisan appeal to right-wing individuals.

Cognitive reflection will be measured using a combined score derived from the first three questions of the Cognitive Reflection Test (CRT; Frederick, 2005) and the complete set of questions from the Cognitive Reflection Test 2 (CRT2; Thomson & Oppenheimer, 2016).

Schizotypy domains (cognitive-perceptual schizotypy, inter-personal schizotypy, disorganised schizotypy and schizotypy-related social anxiety) will be measured using the Schizotypal Personality Questionnaire – Brief Revised Updated (SPQ-BRU; Davidson et al., 2016). ASD domains (social communication and attention to detail) will be measured using the Autism Quotient-9 (AQ-9; Jia et al., 2019)

Political partisanship will be measured by using an 11-point scale (ranging from “strongly Democrat” to “strongly Republican”). Frequency of social media use will be measured using a 5-point scale. Demographic information (age, sex and education level) will be collected via self-report.

(See section 8 for references)

4) How many and which conditions will participants be assigned to?

All participants will be exposed to all measures and stimuli. Naturally occurring individual differences are the main variables of interest and therefore cannot be manipulated by the researcher in order to assign participants to specific groups.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.

All proposed hypotheses will be tested using a series of multiple regression analyses.

The first regression model will explore the predictive value of the four schizotypy domains assessed by the SPQ-BRU, the two ASD trait domains assessed by the AQ-9, cognitive reflection measures as assessed by the CRT/CRT2, and composite fake news engagement scores on the outcome measure of fake news belief scores. The second regression model will also utilise the same four SPQ-BRU domains, as well as the two AQ-9 domains and CRT/CRT2 scores, however the outcome variable will be changed to fake news engagement scores. Measures of fake news belief will also be included as a predictor variable in this analysis.

Both regression models will include control predictor variables, consisting of demographic variables (age, sex, education level) and frequency of social media use.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Upon collection data will be screened and problematic responses will be deleted prior to analysis. Criteria for exclusion will be: 1) declining consent for the use of collected data, 2) zero variance in the item responses to measures of schizotypy and ASD, 3) reporting an age below 18, 4) implausibly fast completion time (more than 2SD below mean completion time).

If the number of valid participant data sets falls below 211, due to participant exclusion and/or attrition, further recruitment will take place in order to meet the predefined power threshold.

Participants who report gender as other than Male or Female will be excluded (only) from analyses involving gender.

Participants who say they have seen the CRT/CRT2 questions before will not be excluded from the primary analysis, however exploratory analysis investigating the impact of previous exposure will be conducted.

The frequency and distribution of missing data will be subjected to analysis to determine how missing values are to be dealt with (e.g., If missing values are shown to be missing completely at random then a pairwise

deletion approach will be utilised).

7) How many observations will be collected or what will determine sample size?

No need to justify decision, but be precise about exactly how the number will be determined.

Sample size has been determined via an a priori power analysis conducted in G*power 3.1 on the basis of providing adequate power ($\alpha = 0.05$, power = 80%) for the purposes of a multiple regression analysis. With a total of 12 predictor variables per regression model and an expected R² value of above 0.08 a sample size of 211 participants is required. In order to account for participant attrition a total sample of 250 will be sought.

8) Anything else you would like to pre-register?

(e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

The main regression analyses will be repeated using belief and engagement scores calculated for the true headlines instead of the fake stimuli in order to investigate the possibility of any significant effects being related to online news sharing in general, as opposed to fake news specifically.

Additional exploratory analyses will also be conducted using the collected data.

Key references:

Davidson, C. A., Hoffman, L., & Spaulding, W. D. (2016). Schizotypal personality questionnaire – brief revised (updated): An update of norms, factor structure, and item content in a large non-clinical young adult sample. *Psychiatry Research*, 238, 345–355. <https://doi.org/10.1016/j.psychres.2016.01.053>

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Jia, R., Steelman, Z. R., & Jia, H. H. (2019). Psychometric Assessments of Three Self-Report Autism Scales (AQ, RBQ-2A, and SQ) for General Adult Populations. *Journal of Autism and Developmental Disorders*, 49(5), 1949–1965. <https://doi.org/10.1007/s10803-019-03880-x>

Pennycook, G., Binnendyk, J., Newton, C., & Rand, D. G. (2020). A practical guide to doing behavioural research on fake news and misinformation [Preprint]. PsyArXiv. <https://doi.org/10.31234/osf.io/g69ha>

Thomson, K. S., & Oppenheimer, D. M. (2016). Investigating an alternate form of the cognitive reflection test. *Judgment and Decision Making*, 11(1), 15.

Appendix B – News stimuli selection

The news headline stimuli utilised in the current project were all acquired from a repository made available to the public by Pennycook et al. (2021) as supplementary material for their article *A Practical Guide to Doing Behavioral Research on Fake News and Misinformation*.

Pennycook et al. (2021) created this small library of news headlines to demonstrate best practice in online misinformation research. All stimuli underwent pretesting which allowed the researchers to establish measures of various characteristics (e.g., level of perceived importance, how angry the headline made participants feel, how informative the content was, etc.). Pretesting was conducted using two participant groups, one comprising entirely of individuals who identified as Democrats and another with individuals who identified as Republicans. This resulted in three sets of scores for each pretest measure: one for Democrats, one for Republicans, and one that represented a combination of Democrats and Republicans.

See <https://osf.io/xyq4t/> for all available headline image stimuli and spreadsheets outlining pretest results.

The pretest variable of interest in the current study was the measure indicating perceived partisan bias, which was used to try and balance the degree of partisan appeal for the selected stimuli. The partisan bias scores reflected averaged responses to the following question:

Assuming the above headline is entirely accurate, how favorable would it be to Democrats versus Republicans?

1. More favorable for Democrats
2. Moderately more favorable for Democrats
3. Slightly more favorable for Democrats
4. Slightly more favorable for Republicans
5. Moderately more favorable for Republicans
6. More favorable for Republicans

Table B1 – Stimuli selection for Study 1

Image name	Headline text	Partisanship		True or false	Partisanship (Average)		Notes
		Score	Baseline		Score	Baseline	
IM_898HgRT4tBGTX6d	Nancy Pelosi's Son Arrested For Murder	4.76	1.25	False	4.71	1.21	Stimuli balanced using bias scores reported by Republicans in the pre-test conducted by Pennycook et al., 2021. Partisan scores ranged from 1-6, with lower scores indicating a bias in favour of the Democratic party and high scores indicating bias in favour of the Republican party. Baseline values indicate the distance from the scale mid-point. The final selection of stimuli demonstrated a slightly stronger partisan appeal for misinformation stimuli.
IM_eQyeMxo1IOF9ReR	Hillary Clinton Accepted \$30,000 Donation From NXIVM Child Sex Cult	4.68	1.18				
IM_73ddRBIQEY0WD6R	Kenya: Authorities Release Barack Obama's "Real" Birth Certificate	4.69	1.19				
IM_3Pi5qUywkJqQTMp	Plant a trillion trees: Republicans offer fossil-friendly climate fix	4.59	1.09	True	4.60	1.10	
IM_cZ6Okm1JPl1K72t	USPS flashback: Obama administration removed thousands of mailboxes	4.55	1.05				
IM_2lQ1KoBZNizEl93	Justice Dept. Says Facts Did Not Justify Continued Wiretap of Trump Aide	4.68	1.18				

Table B2 - Stimuli selection for Study 2 (Right-wing stimuli)

Image name	Headline text	Partisanship		True or false	Partisanship (Average)		Notes
		Score	Baseline		Score	Baseline	
IM_898HgRT4tBGTX6d	Nancy Pelosi's Son Arrested For Murder	4.44	0.94	False	4.47	0.97	<p>Stimuli balanced using combined bias scores reported by Republicans and Democrats in the pre-test conducted by Pennycook et al., 2021.</p> <p>Priority was placed on balancing the relative appeal of right and left stimuli (via baseline scores), with subsequent efforts made to balance the appeal of accurate and inaccurate stimuli.</p> <p>Partisan scores ranged from 1-6, with lower scores indicating a bias in favour of the Democratic party and high scores indicating bias in favour of the Republican party.</p> <p>Baseline values indicate the distance from the scale mid-point.</p> <p>The final selection of stimuli demonstrated a slightly stronger partisan appeal for right-wing misinformation stimuli.</p>
IM_eeAlG5VLuETCUwl	Denzel Washington: With Trump We Avoided War With Russia And Orwellian Police State	4.32	0.82				
IM_3xvQbALID8sbi29	Donald Trump Sent His Own Plane To Transport 200 Stranded Marines	4.61	1.11				
IM_3Pi5qUywkJqQTMp	Plant a trillion trees: Republicans offer fossil-friendly climate fix	4.21	0.71	True	4.36	0.86	
IM_bqMdXiQWc61adQF	Trump gets endorsement of NYC police union, warns 'no one will be safe in Biden's America'	4.50	1.00				
IM_5vteoDH6Ox5OHR	Trump welcomes 'The Walking Marine' to White House	4.36	0.86				

Table B3 - Stimuli selection for Study 2 (Left-wing stimuli)

Image name	Headline text	Partisanship		True or false	Partisanship (Average)		Notes
		Score	Baseline		Score	Baseline	
IM_8pNwl18l9OeC0SN	Hispanic Woman Claims, “Donald Trump Paid Me For Sex In Cancun, This Is Our Love Child”	2.44	1.07	False	2.56	0.94	Stimuli balanced using combined bias scores reported by Republicans and Democrats in the pre-test conducted by Pennycook et al., 2021. Priority was placed on balancing the relative appeal of right and left stimuli (via baseline scores), with subsequent efforts made to balance the appeal of accurate and inaccurate stimuli.
IM_5BUdFZ2HkZbkgbr	Trump Wants To Deport American Indians To India	2.60	0.90				
IM_1LjD8OsVbPKWLGt	W.H. Staffers Defect, Releasing Private Tape Recording That Has Trump Silent	2.64	0.86				
IM_1RmpYsX9rcJl4oJ	District Of Columbia Sues Inaugural Committee For 'Grossly Overpaying' At Trump Hotel	2.64	0.87	True	2.66	0.84	Partisan scores ranged from 1-6, with lower scores indicating a bias in favour of the Democratic party and high scores indicating bias in favour of the Republican party. Baseline values indicate the distance from the scale mid-point. The final selection of stimuli demonstrated a slightly stronger partisan appeal for left-wing misinformation stimuli.
IM_0Opb8BgZsY5zxxX	Republican anxiety grows as Democratic Senate challengers oust incumbents	2.80	0.70				
IM_9H1xuZMzzjKxZu5	Top Democrats say postmaster general acknowledged new policies that workers say are delaying mail	2.55	0.95				

Table B4 - Stimuli selection for Study 3

Image name	Headline text	Partisanship		True or false	Partisanship (Average)		Notes
		Score	Baseline		Score	Baseline	
IM_6YihYsFw0n4Wtkp	Trump Reveals Which Democratic President Was Also KKK Member, Liberals In Meltdown Mode	4.22	0.72	False	4.23	0.73	<p>Stimuli were once again balanced using combined bias scores reported by Republicans and Democrats in the pre-test conducted by Pennycook et al., 2021.</p> <p>Partisan scores ranged from 1-6, with lower scores indicating a bias in favour of the Democratic party and high scores indicating bias in favour of the Republican party.</p> <p>Baseline values indicate the distance from the scale mid-point.</p> <p>The final selection of stimuli was well balanced in terms of partisan appeal.</p>
IM_23GephLMVDNPxrf	BREAKING: Bill Clinton Love Child Danney Williams Found Dead—Cause Of Death Is...Suspicious	3.96	0.46				
IM_73ddRBIQEY0WD6R	Kenya: Authorities Release Barack Obama's "Real" Birth Certificate	4.50	1.00				
IM_2lQ1KoBZNizEl93	Justice Dept. Says Facts Did Not Justify Continued Wiretap of Trump Aide	3.96	0.46	True	4.22	0.72	
IM_3Pi5qUywkJqQTMp	Plant a trillion trees: Republicans offer fossil-friendly climate fix	4.21	0.71				
IM_bqMdXiQWc61adQF	Trump gets endorsement of NYC police union, warns 'no one will be safe in Biden's America'	4.50	1.00				

Table B5 - Stimuli selection for Study 4

Image name	Headline text	Partisanship		True or false	Partisanship (Average)		Notes
		Score	Baseline		Score	Baseline	
IM_0dmHKpvhWo0eQ2p	CORONER'S REPORT: Woman Found On Clinton Estate Was Dead 15 Years, Suffered Torture And Malnutrition	4.37	0.87	False	4.45	0.95	<p>No need to balance partisan appeal of stimuli as only false headlines were used. Instead, the 6 headlines demonstrating the highest combined partisan scores were selected.</p> <p>Partisan scores ranged from 1-6, with lower scores indicating a bias in favour of the Democratic party and high scores indicating bias in favour of the Republican party.</p> <p>Baseline values indicate the distance from the scale mid-point.</p>
IM_73ddRBIQEY0WD6R	Kenya: Authorities Release Barack Obama's "Real" Birth Certificate	4.50	1.00				
IM_eeAlG5VLuETCUwl	Denzel Washington: With Trump We Avoided War With Russia And Orwellian Police State	4.32	0.82				
IM_898HgRT4tBGTX6d	Nancy Pelosi's Son Arrested For Murder	4.44	0.94				
IM_eQyeMxo1IOF9ReR	Hillary Clinton Accepted \$30,000 Donation From NXIVM Child Sex Cult	4.43	0.93				
IM_3xvQbALID8sbi29	Donald Trump Sent His Own Plane To Transport 200 Stranded Marines	4.61	1.11				

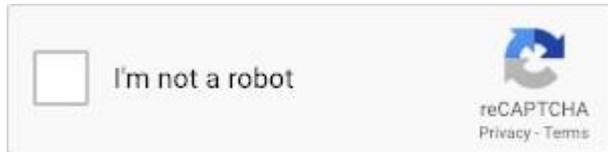
Table B6 - Comparison of average partisan scores for stimuli selection across Studies 1-4

Stage of research	Orientation of stimuli bias	Average Partisanship (Inaccurate)		Average Partisanship (Accurate)		Notes
		Score	Baseline	Score	Baseline	
Study 1	Right-wing	4.71	1.21	4.60	1.10	Partisan scores ranged from 1-6, with lower scores indicating a bias in favour of the Democratic party and high scores indicating bias in favour of the Republican party. Baseline values indicate the distance from the scale mid-point.
Study 2	Right-wing	4.47	0.97	4.36	0.86	
Study 2	Left-wing	2.56	0.94	2.66	0.84	
Study 3	Right-wing	4.23	0.73	4.22	0.72	
Study 4	Right-wing	4.45	0.95			

Appendix C - Full list of questionnaire measures, including PIS and debrief (Study 1).

Captcha verification (survey will not load until after the reCAPTCHA was solved)

Before you proceed with the survey, please complete the captcha below.



PIS and Consent

Individual differences and interactions with news on social media platforms.

Thank you for your interest in this research project. Before you decide whether to participate in the study it is important for you to understand why the research is being conducted and what you will be expected to do. Please read the information below carefully before making your decision.

You are being invited to take part in a research study that will investigate the relationship between personality traits, thinking styles, and interactions with news on social media platforms. This research is being conducted as part of the University of Westminster's doctoral research programme.

You have been selected to take part in this research project based on characteristics selected for by the pre-screening filters provided by the Prolific research platform which indicate you have met the participant inclusion criteria (outlined below).

Please take a moment to ensure that you meet the inclusion criteria:

- 1) Participants must be US residents.
- 2) Participants must be over the age of 18.

If you do not meet all the inclusion criteria outlined above, please do not continue further as your data will not be able to be used in the project.

If you choose to take part in the study, you will first be asked to answer several questions relating to your demographic information.

Next, you will complete two tasks:

Task 1: you will be presented with a series of news headlines and asked to report on your personal response to the content of the headline and how you would interact with the headline if encountered on a social media platform (All the examples of news headlines presented as part of this research were drawn from social media. They were not created by the University and we do not endorse their content.)

Task 2: you will be presented with a series of problem-solving questions designed to assess thinking style. Upon completing these tasks, you will be presented with two brief personality questionnaires.

Completing these tasks and questionnaires will take roughly 15 minutes. Upon completion you will be presented with additional information about the research.

Please note:

- Your participation is entirely voluntary.
- Individualised feedback on your test results will not be provided.
- You have the right to withdraw at any time without giving a reason. Data already submitted will not be included in any analysis.
- You do not have to answer specific questions if you do not wish to.
- No risks or benefits to you as an individual are anticipated as a result of participation.

No personal identifying information (names, email address, etc.) will be collected. No individuals will be identifiable from any collated data, written report of the research, or any publications arising from it.

If after completing the study you change your mind and wish for your data to be withdrawn, this can be done by submitting a request alongside your individual participant code (you will receive one at the end of the study) within 14 days of completion.

After 14 days your responses will be completely anonymised and from then on data will not be able to be withdrawn.

Data will be stored indefinitely on computer systems controlled by the University of Westminster. Data may be re-used in future research (at the University of Westminster or elsewhere) and may be made openly available to other researchers.

The project is being conducted at the University of Westminster in the UK. It has been approved by the School of Social Sciences Psychology Ethics Committee (project code ETH2021-0861). It is not supported

by external funding. The researcher running this project is Mr James Kempley (w1525877@my.westminster.ac.uk) who should be the first point of contact if you have any queries. The project is being supervised by Professor Tom Buchanan

(t.buchanan@westminster.ac.uk). If you have any complaints, you may contact the Head of School Professor Dibyesh Anand (D.Anand@westminster.ac.uk).

CONSENT:

If you have read the information provided above and agree to give your consent to participate in the study, please tick “I wish to take part in the study” and then click the “ → ” icon.

Consent

I wish to take part in the study.

I do not wish to take part in the study.

Prolific - No Consent (participants respond with “I do not wish to take part in the study”)

As you do not wish to participate in this study, please return your submission on Prolific by selecting the 'Stop without completing' button.

Demographics

Demographics - Questions about you

Please enter your Prolific ID

What is your age in years?

Do you live in the United States?

Yes No

What is your gender?

- Male
 Female
 Non-binary / third gender
 Prefer not to say

What is the highest level of education you have completed?

- Less than High School
 High School / Secondary School
 Some post-school College or University
 College or University undergraduate degree
 Master's Degree
 Doctoral Degree
 Professional Degree (JD, MD)

How often do you visit or use social media? (e.g. Facebook, Twitter, TikTok, Reddit, Instagram, Discord, or any others).

- Several times a day About once a day A few times a week Every few weeks Less often
 Not at all

How much do you tend to share political information you come across on social media?

- Not at all Very rarely Rarely Occasionally Very frequently
-

Please use the scale below to describe your political orientation.

Strongly Democrat

Strongly Republican



Prolific - Failed inclusion criteria (above the age of 18 and/or non-US resident)

You are ineligible for this study, as you have provided information which is inconsistent with your Prolific prescreening responses.

Please return your submission on Prolific by selecting the 'Stop without completing' button.

Prolific - Failed Captcha (flagged as a bot by Google's invisible reCAPTCHA)

Due to the detection of bot activity you have been excluded from the survey.

Please return your submission on Prolific by selecting the 'Stop without completing' button.

Social Media Task A (Instructions for Engagement measure)

Social Media News Task

You will now be presented with a series of actual news headlines. There are 6 in total.

We are interested in how you think you might interact with these headlines if you had encountered them on social media.

For each news headline you will be asked to rate the likelihood that you would **“Like”** the post, React by posting an **emoji**, **Share** it, or make a **Comment**.

You will also be asked to indicate if you have ever previously seen the headline.

Click the " → " icon to begin.

Social Media Task B-1



THELASTLINEOFDEFENSE.ORG

Nancy Pelosi's Son Arrested For Murder

If you were to see the above article on social media, how likely would you be to:

	Extremely unlikely	Moderately unlikely	Slightly unlikely	Slightly likely	Moderately likely	Extremely likely
"Like" it?	<input type="radio"/>					
React by posting an emoji?	<input type="radio"/>					
Share it?	<input type="radio"/>					
Comment on it?	<input type="radio"/>					

Are you familiar with the above headline (have you seen or heard about it before)?

Yes

	Extremely unlikely	Moderately unlikely	Slightly unlikely	Slightly likely	Moderately likely	Extremely likely
--	--------------------	---------------------	-------------------	-----------------	-------------------	------------------

React by posting an emoji?

<input type="radio"/>						
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Share it?

<input type="radio"/>						
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Comment on it?

<input type="radio"/>						
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Are you familiar with the above headline (have you seen or heard about it before)?

- Yes
- Unsure
- No

Social Media Task B-4



REUTERS.COM

Plant a trillion trees: Republicans offer fossil-friendly climate fix

Are you familiar with the above headline (have you seen or heard about it before)?

Yes

Unsure

No

Social Media Task C (Instructions for Belief measure)

You will now be presented the same set of headlines again.

This time we would like you to reflect on the **accuracy** of each headline and rate **how true you believe it to be**.

Click the " → " icon to begin.

Social Media Task D-1



THELASTLINEOFDEFENSE.ORG

Nancy Pelosi's Son Arrested For Murder

To the best of your knowledge, is the claim in the above headline accurate?

Not at all accurate

Not very accurate

Somewhat accurate

Very accurate



FOXNEWS.COM

USPS flashback: Obama administration removed thousands of mailboxes

To the best of your knowledge, is the claim in the above headline accurate?

Not at all accurate

Not very accurate

Somewhat accurate

Very accurate



REUTERS.COM

Plant a trillion trees: Republicans offer fossil-friendly climate fix

To the best of your knowledge, is the claim in the above headline accurate?

Not at all accurate

Not very accurate

Somewhat accurate

Very accurate



NYTIMES.COM

Justice Dept. Says Facts Did Not Justify Continued Wiretap of Trump Aide

To the best of your knowledge, is the claim in the above headline accurate?

Not at all accurate

Not very accurate

Somewhat accurate

Very accurate



YOURNEWSWIRE.COM

Hillary Clinton Accepted \$30,000 Donation From NXIVM Child Sex Cult

To the best of your knowledge, is the claim in the above headline accurate?

Not at all accurate

Not very accurate

Somewhat accurate

Very accurate



WORLDNEWSDAILYREPORT.COM

Kenya: Authorities Release Barack Obama's "Real" Birth Certificate

To the best of your knowledge, is the claim in the above headline accurate?

Not at all accurate

Not very accurate

Somewhat accurate

Very accurate

Cognitive Reflection Task 1

Problem Solving Task 1

Please write the answers to these four questions in the text boxes below. You can use any combination of words and numbers.

If you're running a race and you pass the person in second place, what place are you in?

A farmer had 15 sheep and all but 8 died. How many are left?

Emily's father has three daughters. The first two are named April and May. What is the third daughter's name?

How many cubic feet of dirt are there in a hole that is 3' deep x 3' wide x 3' long?

Have you seen any of these four questions before (for example, in another online survey)?

Yes No

Cognitive Reflection Task 2

Problem Solving Task 2

Please write the answers to these three questions in the text boxes below. You can use any combination of words and numbers.

A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost?

If it takes 5 minutes for five machines to make five widgets, how long would it take for 100 machines to make 100 widgets?

In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

Have you seen any of these three questions before (for example, in another online survey)?

Yes No

Schizotypy Measures

Personality Questionnaire 1

Please indicate how much you agree with the each of the following statements

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I sometimes feel that other people are watching me.	<input type="radio"/>				
I sometimes forget what I am trying to say.	<input type="radio"/>				

I believe in telepathy (mind-reading).	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
Other people see me as slightly eccentric (odd).	<input type="radio"/>				
I have had experiences with astrology, seeing the future, UFO's, ESP, or a sixth sense.	<input type="radio"/>				
When shopping, I get the feeling that other people are taking notice of me.	<input type="radio"/>				
I tend to keep my feelings to myself.	<input type="radio"/>				
I sometimes avoid going to places where there will be many people because I will get anxious.	<input type="radio"/>				
I sometimes get concerned that friends or co-workers are not really loyal or trustworthy.	<input type="radio"/>				
I feel that there is no one I am really close to outside of my immediate family, or people I can confide in or talk to about personal problems.	<input type="radio"/>				
Everyday things seem unusually large or small.	<input type="radio"/>				

Strongly
disagree

Disagree

Neutral

Agree

Strongly agree

I rarely laugh and smile.

I often feel that others have it
in for me.

My thoughts are sometimes so
strong that I can almost hear
them.

I often have to keep an eye out
to stop people from taking
advantage of me.

I often feel nervous when I am
in a group of unfamiliar people.

I often hear a voice speaking
my thoughts aloud.

I have felt that I was
communicating with another
person telepathically (by mind-
reading).

I get anxious when meeting
people for the first time.

When I look at a person or at
myself in a mirror, I have seen
the face change right before my
eyes.

I sometimes feel that people
are talking about me.

Strongly
disagree

Disagree

Neutral

Agree

Strongly agree

I tend to wander off the topic
when having a conversation.

People sometimes comment on
my unusual mannerisms and
habits.

I find it hard to be emotionally
close to other people.

I am an odd, unusual person

I feel very uncomfortable in
social situations involving
unfamiliar people.

I feel that I cannot get 'close' to
people.

I am not good at expressing my
true feelings by the way I talk
and look.

I believe in clairvoyance
(psychic forces, fortune
telling).

I sometimes jump quickly from
one topic to another when
speaking.

I have some eccentric (odd)
habits.

I often ramble on too much
when speaking.

Re-confirmation of consent

Finally...

Can your answers be (anonymously) logged and used for research?

You should answer NO if, for example, you have done this test before, did not answer the questions seriously, or do not want to participate in our research.

- Yes, use my responses.
- No, do not use my responses.

Debrief

Thank you for taking part in the study.

Now that you have finished, we would like to provide you with some additional information regarding the purpose and goals of the research project.

The study that you have participated in is looking into the current issue around misleading news articles (also known as “fake news”) being circulated on social media platforms. We hope that the information we are gathering will one day contribute to reducing the spread of fake news and help protect people who are particularly at risk of being misled by false online information.

PLEASE NOTE: of the 6 news headlines you were presented with during the testing phase of the study, 3 headlines have been previously classified as fake news by independent fact checking organisations.

The following headlines have been proven to be FALSE:





YOURNEWSWIRE.COM

Hillary Clinton Accepted \$30,000 Donation From NXIVM Child Sex Cult



WORLDNEWSDAILYREPORT.COM

Kenya: Authorities Release Barack Obama's "Real" Birth Certificate

The aim of the current study is to investigate how different personality traits and styles of thinking might make us more or less likely to either believe or engage with fake news when encountered on social media.

After completing the main tasks of the study, you were asked to complete two personality questionnaires. These were measures of schizotypy and non-clinical autistic traits. Despite how

their names might sound, these are normal personality characteristics that describe behavior expressed by everyone to some extent. You also completed a cognitive reflection test, which measures the tendency to jump to answers quickly rather than reflecting on them. All these characteristics have been hypothesized to influence how people engage with fake news on social media.

This study builds upon previous research which has indicated that people who are more reliant on their sense of intuition when processing information, as well as being more prone to reacting to information impulsively, are more likely to believe and engage with fake news on social media. Fake news has become increasingly common on social media platforms and represents a major challenge to society, as different social groups are targeted with misleading information which often promotes division and a skewed worldview.

Contrary to what many people might think, most of the fake news on social media is circulated by regular users (as opposed to “bots” or paid actors), and therefore understanding the psychological factors that lead to people sharing fake news will be important in combating its spread. Thanks to research involving participants such as yourself, we are learning more about how and why fake news spreads on social media, and what we can do to prevent it.

For more information on how to identify fake news, familiarise yourself with the SHARE Checklist (available at <https://sharechecklist.gov.uk>). The SHARE Checklist has been created by the UK Government to help assist the public in identifying misleading information online.

We at the University of Westminster would like to thank you once again for your participation in this study.

Your individual participation code is `{e://Field/ID%20code}`.

You can use this if you wish to get in touch about your participation.

If you wish to withdraw your data, please email the researcher running this project (available at w1525877@my.westminster.ac.uk) stating your participant code and asking to withdraw, within 14 days of participating.

The study is now complete. Please click the “ → ” icon to return to Prolific to log your participation and receive your compensation.

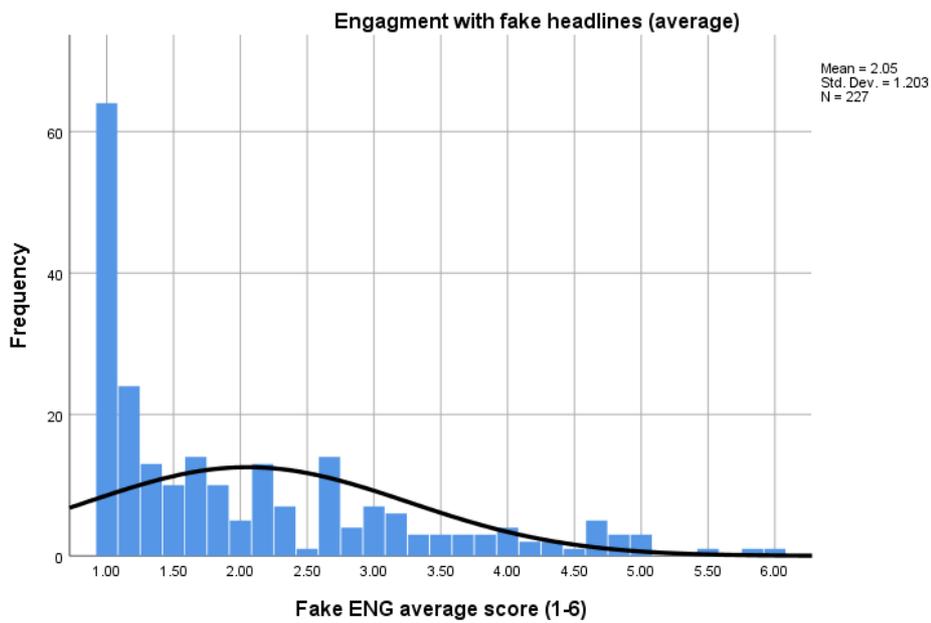
The project is being conducted at the University of Westminster in the UK. It has been approved by the School of Social Sciences Psychology Ethics Committee (project code ETH2021-0861). It is not supported by external funding. The researcher running this project is Mr James Kempley (w1525877@my.westminster.ac.uk) who should be the first point of contact if you have any queries. The project is being supervised by Professor Tom Buchanan (t.buchanan@westminster.ac.uk). If you have any complaints, you may contact the Head of School Professor Dibyesh Anand (D.Anand@westminster.ac.uk).

[Powered by Qualtrics](#)

Appendix D - Histograms of demographic and outcome variables for regression analyses (Study 1).

Figure D1 – Engagement measures

A) Average engagement with fake headlines



B) Average engagement with true headlines

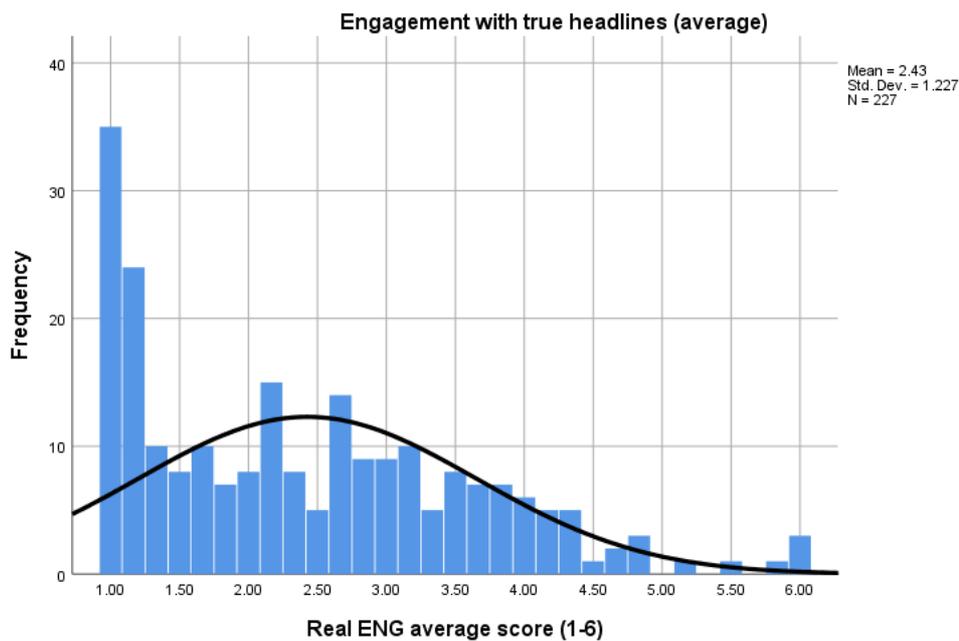
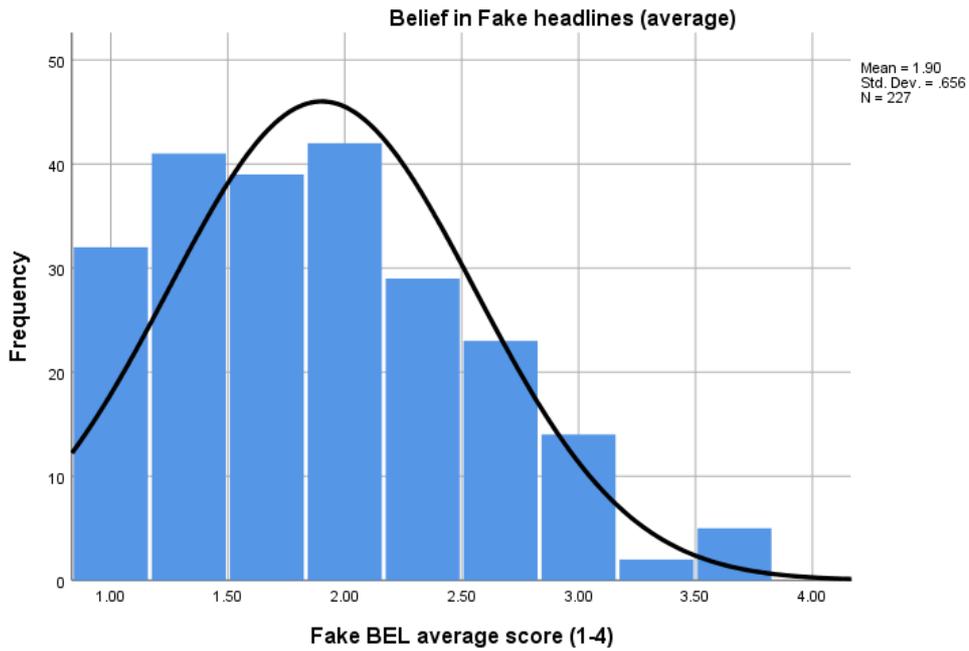


Figure D2 – Belief measures

A) Average belief in fake headlines



B) Average belief in true headlines

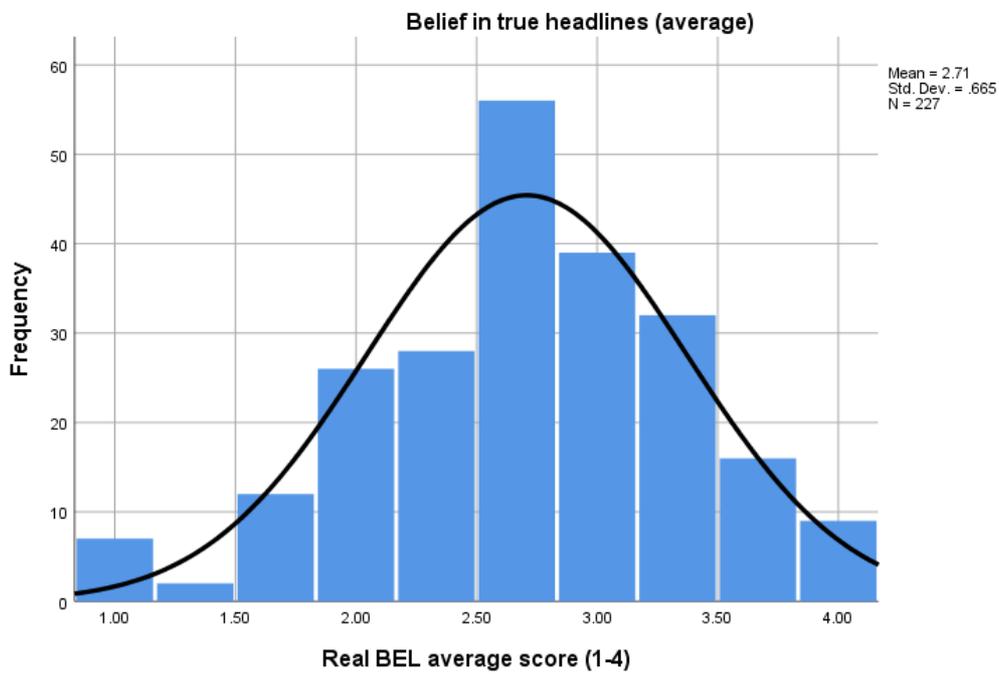
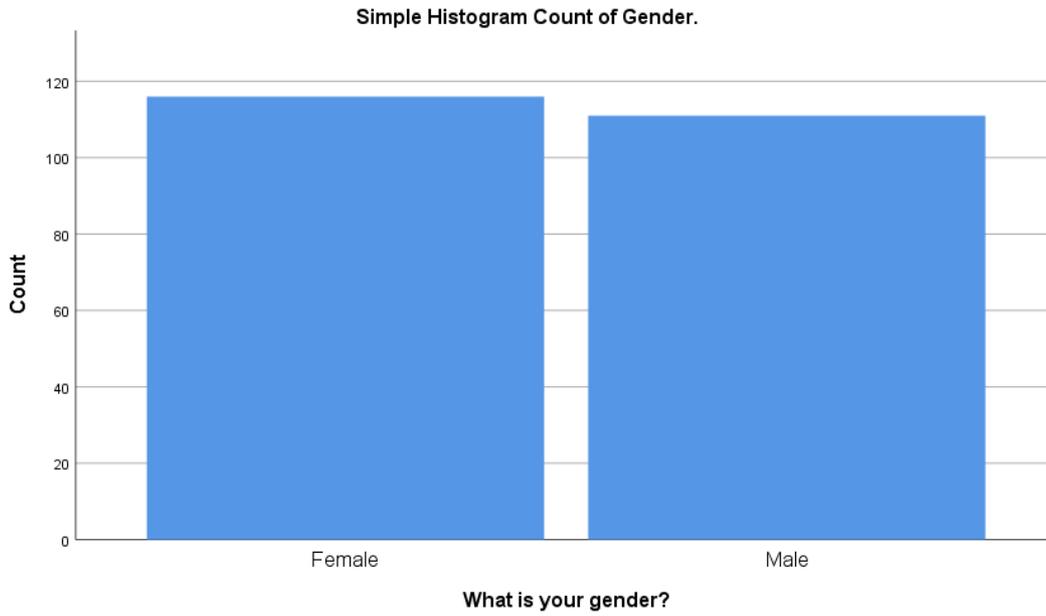
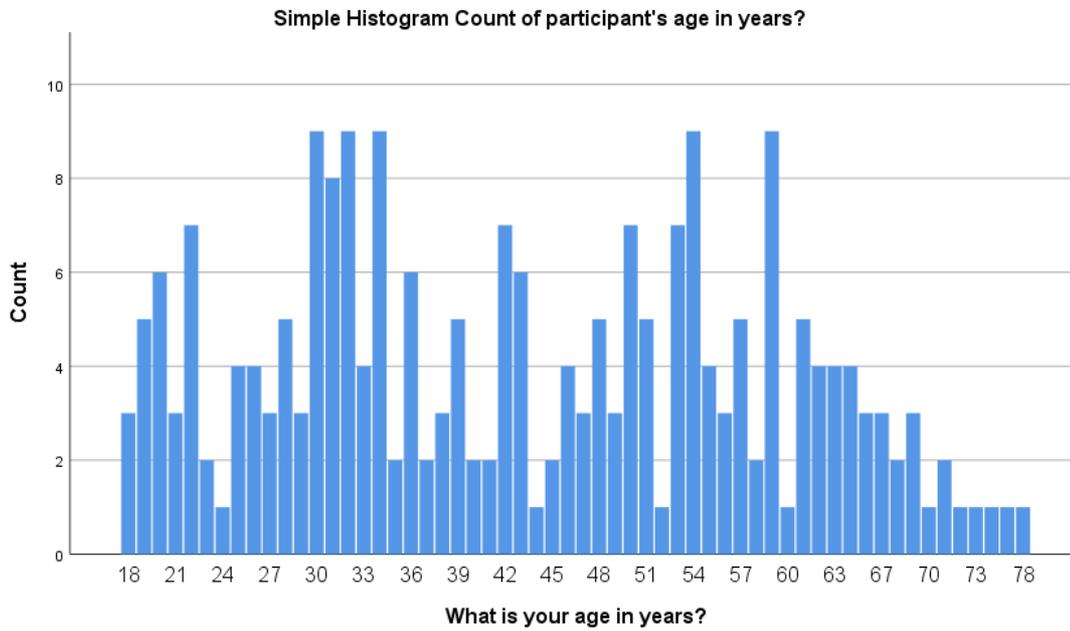


Figure D3 – Demographic measures

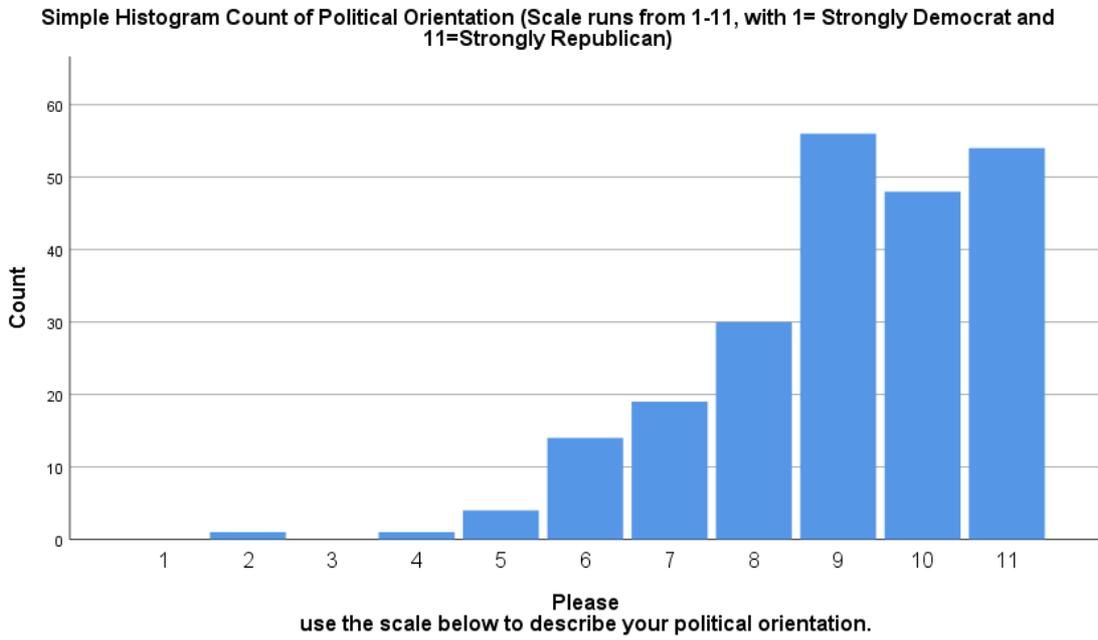
A) Histogram of gender distribution



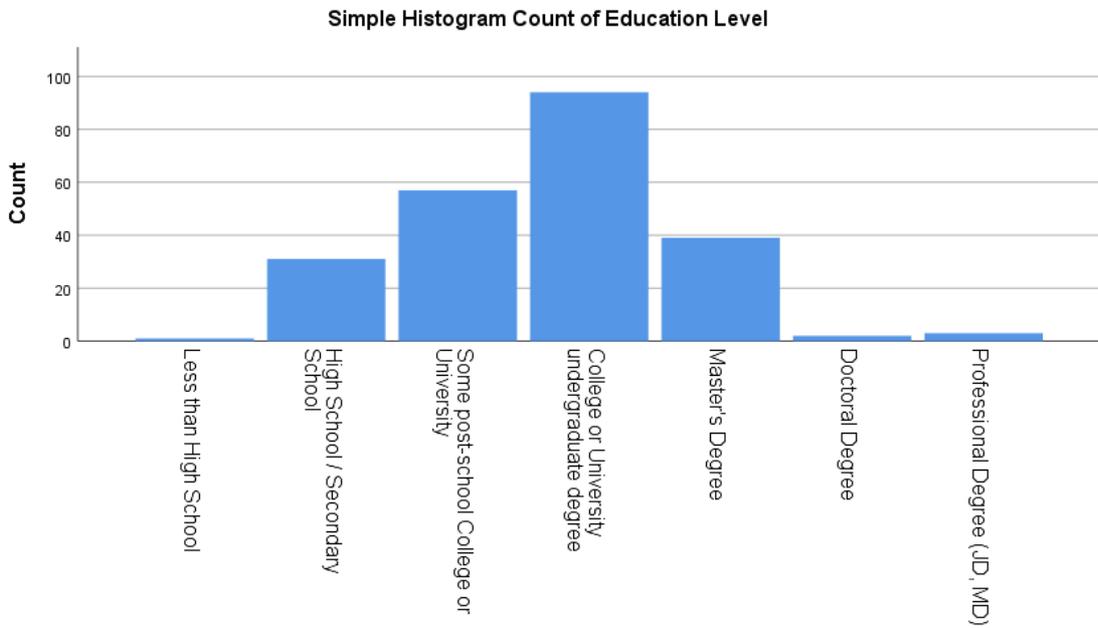
B) Histogram of age distribution



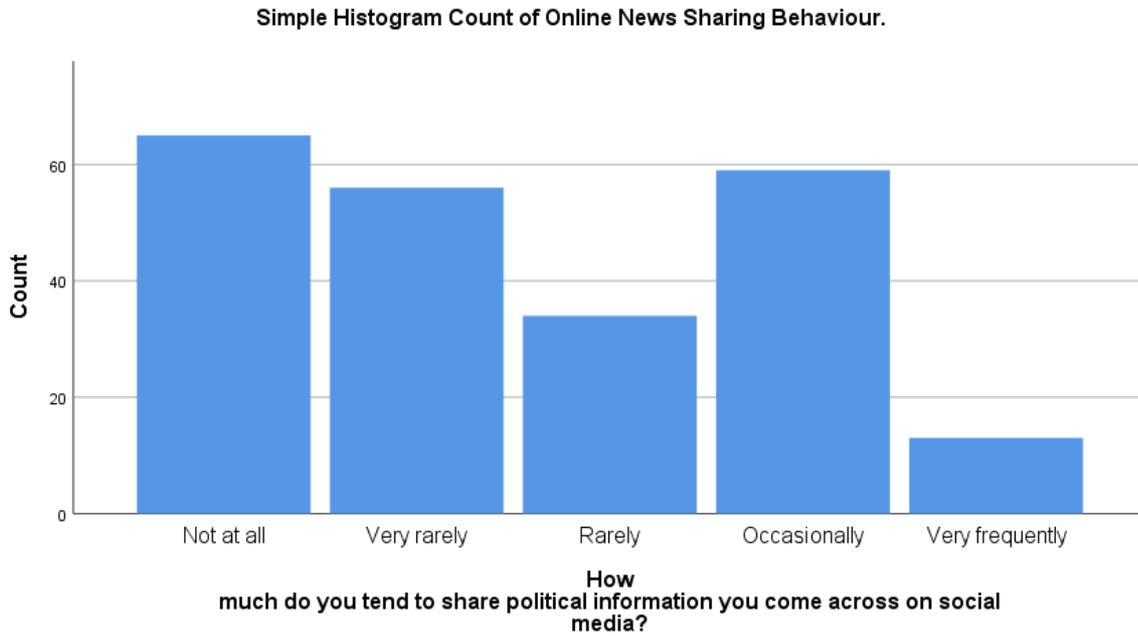
C) Histogram of political orientation



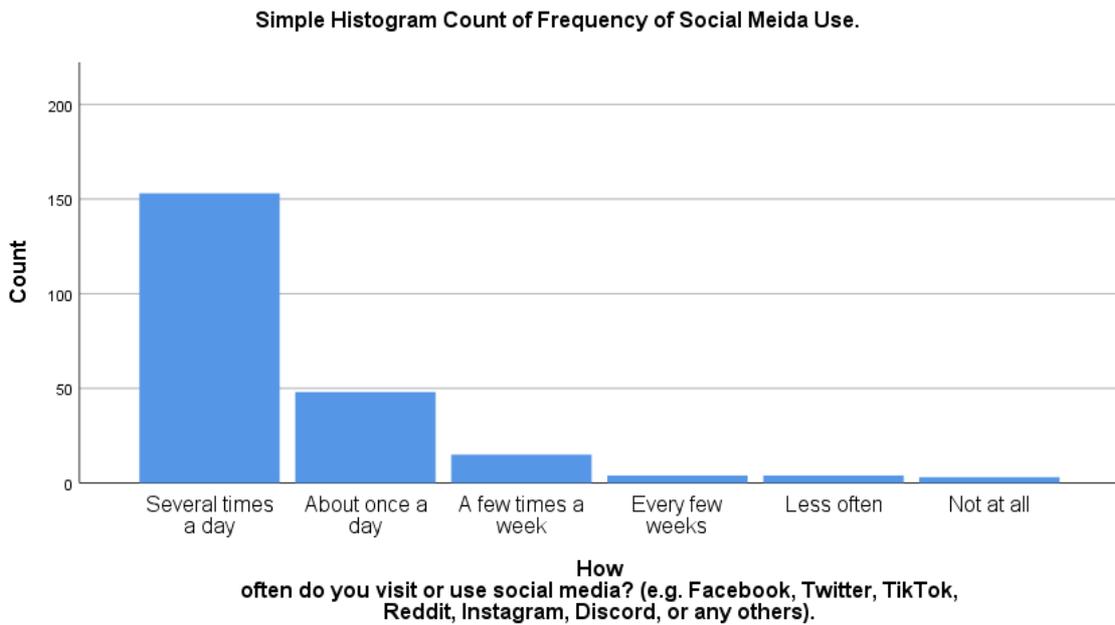
D) Histogram of education level



E) Histogram of online news sharing behaviour



F) Histogram of frequency of social media use



Appendix E - Means and standard deviations for predictor and outcome variables divided by gender (Study 1).

Variables	Women		Men	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age	45.05	14.06	41.44	16.25
Education level	3.69	1.07	3.69	1.01
Frequency of social media use	1.51	0.94	1.56	1.03
CRT/CRT2 scores	3.83	2.12	4.20	1.90
Attention to detail (AD ASD)	3.57	1.38	3.58	1.26
Social communication (SC ASD)	3.97	1.38	4.25	1.16
Cognitive-Perceptual (CP Schizotypy)	1.90	0.65	1.90	0.68
Interpersonal (IP Schizotypy) *	2.27	0.82	2.56	0.84
Disorganised (D Schizotypy)	2.50	0.84	2.39	0.81
Social anxiety (SA Schizotypy)	2.88	1.15	2.69	1.07
Frequency of political news sharing on social media	2.51	1.26	2.60	1.35
Engagement with false headlines	1.97	1.23	2.14	1.17
Engagement with accurate headlines	2.32	1.20	2.54	1.25
Belief in false headlines	1.97	0.64	1.83	0.67
Belief with accurate headlines	2.73	0.60	2.69	0.73

* The results of a one-way ANOVA demonstrated a significant difference between mean IP schizotypy scores for men and women ($F(1,225) = 6.82, p = .01$).

All other group differences were nonsignificant ($p > .05$)

Appendix F – Hierarchical regression analyses (Study 1)

Table F1 - Model 4.3 (engagement with false headlines as the dependent variable).

Variables	Block														
	1			2			3			4			5		
	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>
Gender	2.08	1.94	0.07	2.60	1.92	0.09	2.69	1.96	0.09	3.46	1.85	0.12	2.83	1.74	0.10
Age	-0.03	0.06	-0.03	-0.02	0.06	-0.02	0.05	0.07	0.05	0.02	0.06	0.03	-0.02	0.06	-0.02
Education level	-0.70	0.93	-0.05	-0.62	0.92	-0.04	-0.47	0.90	-0.03	-0.66	0.85	-0.05	-0.64	0.79	-0.05
Frequency of social media use	-0.70	0.99	-0.05	-1.00	0.98	-0.07	-1.22	0.96	-0.08	-1.50	0.90	-0.10	0.02	0.89	0.00
CRT/CRT2 scores	-	-	-	-1.24	0.48	-0.17*	-0.65	0.48	-0.09	-0.26	0.46	-0.04	0.02	0.43	0.00
Attention to detail (AD ASD)	-	-	-	-	-	-	0.04	0.19	0.01	-0.03	0.18	-0.01	-0.04	0.17	-0.01
Social communication (SC ASD)	-	-	-	-	-	-	-0.18	0.20	-0.08	-0.17	0.18	-0.08	-0.09	0.17	-0.04
Cognitive-Perceptual (CP Schizotypy)	-	-	-	-	-	-	0.59	0.15	0.38***	0.53	0.14	0.34***	0.34	0.14	0.22***
Interpersonal (IP Schizotypy)	-	-	-	-	-	-	-0.21	0.27	-0.07	-0.15	0.25	-0.05	-0.16	0.24	-0.06
Disorganised (D Schizotypy)	-	-	-	-	-	-	-0.18	0.22	-0.08	-0.14	0.21	-0.06	-0.02	0.19	-0.01
Social anxiety (SA Schizotypy)	-	-	-	-	-	-	-0.07	0.29	-0.02	-0.05	0.27	-0.01	-0.04	0.26	-0.01
Belief in false headlines	-	-	-	-	-	-	-	-	-	2.44	0.46	0.33***	2.25	0.43	0.31***
Frequency of political news sharing on social media	-	-	-	-	-	-	-	-	-	-	-	-	3.85	0.69	0.35***
Adjusted R²	.00			.02			.09			.19			.29		
Change in F for R²	0.63			6.79**			3.69***			28.42***			30.96***		
ANOVA (p)	.639			.099			.001			< .001			< .001		

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

Significant predictors are reported in bold.

Table F2 - Model 4.4 (belief in false headlines as the dependent variable).

Variables	Block														
	1			2			3			4			5		
	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>
Gender	-0.37	0.26	-0.09	-0.29	0.26	-0.07	-0.32	0.27	-0.08	-0.44	0.26	-0.11	-0.44	0.26	-0.11
Age	0.01	0.01	0.07	0.01	0.01	0.08	0.01	0.01	0.08	0.01	0.01	0.06	0.01	0.01	0.07
Education level	0.08	0.13	0.04	0.09	0.12	0.05	0.08	0.13	0.04	0.10	0.12	0.05	0.10	0.12	0.05
Frequency of social media use	0.19	0.13	0.10	0.15	0.13	0.07	0.12	0.13	0.06	0.17	0.13	0.09	0.15	0.13	0.07
CRT/CRT2 scores	-	-	-	-0.19	0.06	-0.19**	-0.16	0.07	-0.16*	-0.13	0.06	-0.13*	-0.13	0.06	-0.14*
Attention to detail (AD ASD)	-	-	-	-	-	-	0.03	0.03	0.08	0.03	0.03	0.07	0.03	0.03	0.07
Social communication (SC ASD)	-	-	-	-	-	-	0.00	0.03	-0.01	0.00	0.03	0.02	0.00	0.03	0.01
Cognitive-Perceptual (CP Schizotypy)	-	-	-	-	-	-	0.03	0.02	0.12	0.00	0.02	-0.01	0.00	0.02	0.00
Interpersonal (IP Schizotypy)	-	-	-	-	-	-	-0.03	0.04	-0.07	-0.02	0.04	-0.04	-0.01	0.04	-0.04
Disorganised (D Schizotypy)	-	-	-	-	-	-	-0.02	0.03	-0.06	-0.01	0.03	-0.03	-0.01	0.03	-0.04
Social anxiety (SA Schizotypy)	-	-	-	-	-	-	-0.01	0.04	-0.02	-0.01	0.04	-0.01	-0.01	0.04	-0.01
Engagement with false headlines	-	-	-	-	-	-	-	-	-	0.05	0.01	0.35***	0.05	0.01	0.37***
Frequency of political news sharing on social media	-	-	-	-	-	-	-	-	-	-	-	-	-0.08	0.11	-0.05
Adjusted R²		.01			.04			.03			.14			.14	
Change in F for R²		1.50			8.40**			0.75			28.42***			0.54	
ANOVA (p)		.202			.014			.069			< .001			< .001	

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

Significant predictors are reported in bold.

Table F3 - Model 4.5 (engagement with accurate headlines as the dependent variable).

Variables	Block														
	1			2			3			4			5		
	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>
Gender	3.03	1.97	0.10	3.61	1.95	0.12	2.94	1.93	0.10	2.89	1.86	0.10	2.15	1.66	0.07
Age	0.09	0.07	0.09	0.10	0.06	0.11	0.14	0.07	0.14*	0.12	0.06	0.13	0.07	0.06	0.07
Education level	0.24	0.95	0.02	0.33	0.93	0.02	0.30	0.89	0.02	0.33	0.85	0.02	0.34	0.76	0.02
Frequency of social media use	0.18	1.00	0.01	-0.15	0.99	-0.01	-0.38	0.95	-0.03	-0.56	0.91	-0.04	1.42	0.85	0.10
CRT/CRT2 scores	-	-	-	-1.38	0.48	-0.19**	-0.69	0.48	-0.09	-0.80	0.46	-0.11	-0.38	0.41	-0.05
Attention to detail (AD ASD)	-	-	-	-	-	-	0.18	0.19	0.06	0.16	0.18	0.06	0.15	0.16	0.05
Social communication (SC ASD)	-	-	-	-	-	-	-0.50	0.19	-0.22*	-0.44	0.19	-0.20*	-0.34	0.17	-0.15*
Cognitive-Perceptual (CP Schizotypy)	-	-	-	-	-	-	0.60	0.15	0.38***	0.60	0.14	0.38***	0.34	0.13	0.22*
Interpersonal (IP Schizotypy)	-	-	-	-	-	-	-0.02	0.26	-0.01	0.10	0.25	0.03	0.07	0.23	0.02
Disorganised (D Schizotypy)	-	-	-	-	-	-	-0.32	0.22	-0.14	-0.33	0.21	-0.15	-0.17	0.19	-0.08
Social anxiety (SA Schizotypy)	-	-	-	-	-	-	-0.10	0.29	-0.03	-0.22	0.28	-0.07	-0.19	0.25	-0.06
Belief in headlines (True)	-	-	-	-	-	-	-	-	-	1.92	0.45	0.26***	1.60	0.40	0.22***
Frequency of political news sharing on social media	-	-	-	-	-	-	-	-	-	-	-	-	5.02	0.66	0.44***
Adjusted R²	.00			.03			.14			.21			.37		
Change in F for R²	0.99			8.14**			5.85***			18.53***			57.07***		
ANOVA (p)	.413			.035			< .001			< .001			< .001		

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

Significant predictors are reported in bold.

Appendix G - Nonparametric correlation matrix (Spearman's rho) of significant predictor variables and outcome variables (Study 1).

	CP Schizotypy (1)	SC ASD (2)	Political news sharing (3)	CRT/CRT2 scores (4)	Belief in false headlines (5)	Belief in accurate headlines (6)	Engagement with false headlines (7)	Engagement with accurate headlines (8)
1	1.00	.23^{***}	.20^{***}	-.18^{***}	0.10	-0.03	.26^{***}	.19^{***}
2	-	1.00	-0.13	.15[*]	-0.09	-0.08	-0.11	-.23^{***}
3	-	-	1.00	-.16^{**}	0.10	0.07	.46^{***}	.52^{***}
4	-	-	-	1.00	-.22^{**}	0.05	-.20^{**}	-.19^{**}
5	-	-	-	-	1.00	.29^{***}	.35^{***}	.19^{**}
6	-	-	-	-	-	1.00	.14[*]	.26^{***}
7	-	-	-	-	-	-	1.00	.75^{***}

Significant correlations are reported in bold.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Appendix H – A copy of the preregistration document (Study 2).

1) **Data collection.** Have any data been collected for this study already?

- Yes, we already collected the data.
- No, no data have been collected for this study yet.
- It's complicated. We have already collected some data but explain in Question 8 why readers may consider this a valid **pre**-registration nevertheless.
(Note: "Yes" is not an accepted answer.)

2) **Hypothesis.** What's the main question being asked or hypothesis being tested in this study?

It is predicted that the expression of schizotypal personality traits (specifically cognitive perceptual schizotypal traits) will be associated with increased scores on measures of social media engagement and belief in relation to false news headlines. Therefore hypothesis 1 is:

H1a: Scores on the SPQ-BRU cognitive-perceptual schizotypy scale will be significant predictors of, and positively correlated with, the measure of false news engagement.

H1b: Scores on the SPQ-BRU cognitive-perceptual schizotypy scale will be significant predictors of, and positively correlated with, the measure of false news belief.

It is also predicted that increased levels of non-clinical Autism Spectrum Disorder (ASD) personality traits will be associated with reduced social media engagement and belief in relation to false news headlines. Therefore hypothesis 2 is:

H2a: Scores on all AQ-9 sub-scales will be significant predictors of, and negatively correlated with, the measure of false news engagement.

H2b: Scores on all AQ-9 sub-scales will be significant predictors of, and negatively correlated with, the measure of false news belief.

It is also predicted that better performance on measures of cognitive reflection will be associated with reduced social media engagement and belief in relation to false news headlines. Therefore hypothesis 3 is:

H3a: Scores on the CRT/CRT2 composite measure will be significant predictors of, and negatively correlated with, the measure of false news engagement.

H3b: Scores on the CRT/CRT2 composite measure will be significant predictors of, and negatively correlated with, the measure of false news belief.

It is also predicted that measures assessing the presence of a Jumping-to-conclusions (JTC) reasoning bias (with higher scores indicative of lower JTC bias) will be associated with reduced social media engagement and belief in relation to false news headlines. Therefore hypothesis 3 is:

H4a: Scores on the JTC measure will be significant predictors of, and negatively correlated with, the measure of false news engagement.

H4b: Scores on the JTC measure will be significant predictors of, and negatively correlated with, the measure of false news belief.

3) Dependent variable. Describe the key dependent variable(s) specifying how they will be measured.

The key outcome variable for all hypotheses addressing the assessment of social media engagement in relation to false news headlines (H1a, H2a, H3a, H4a) will be a *false news engagement* score indicating the self-reported likelihood of the participant either “liking”, responding with an emoji, sharing, or commenting on the presented false news article if it were to be encountered on a social media platform. This score will be calculated for each participant by combining the scores of all the engagement measures (comment, sharing, etc.).

The key outcome variable for all hypotheses addressing the assessment of belief in relation to false news headlines (H1b, H2b, H3b, H4b) will be a *false news belief score*, indicating the extent to which participants believe in the accuracy of a presented false news article. This score will be calculated by averaging individual belief scores from each false news stimuli presented.

In addition to the false news stimuli, a selection of true headlines will also be included and responses to those will be used in exploratory analysis. All news stimuli utilised in the study are derived from a public library of true and false news articles collected and pre-tested by Pennycook et al. (2021). All news stimuli included in the study were selected to provide an equal split of headlines that appeal to right-wing and left-wing participants, along with comparable levels of partisan appeal.

Cognitive reflection will be measured using a combined score derived from the first three questions of the Cognitive Reflection Test (CRT; Frederick, 2005) and the complete set of questions from the Cognitive Reflection Test 2 (CRT2; Thomson & Oppenheimer, 2016).

JTC bias will be measured using the total number of stimuli images viewed by participants before going on to guess the answer (aka “draws to decision”) in a computerised version of the classic Beads Task. The visual stimuli and instructions for the Beads Task were adapted from Garety et al. (2011), while the stimuli sequence was adapted from Ross et al. (2016).

The Schizotypal Personality Questionnaire – Brief Revised Updated (SPQ-BRU; Davidson et al., 2016) will be used to collect measures of schizotypy relating to the following domains: cognitive-perceptual schizotypy, inter-personal schizotypy, disorganised schizotypy and schizotypy-related social anxiety.

ASD domains (social communication and attention to detail) will be measured using the Autism Quotient-9 (AQ-9; Jia et al., 2019)

Political partisanship will be measured by using a 10-point scale (ranging from “strongly Democrat” to “strongly Republican”). Based on this score a binary variable will be created, with participants who score 1-5 being coded as “-1” and those who score 6-10 being coded as “1”. These scores will be used

as the basis for a measure of political congruence that will be included as a control variable in the final analysis.

Frequency of social media use will be measured using a 6-point scale.

Frequency of political news sharing on social media platforms will be measured using a 5-point scale.

Demographic information (age, sex and education level) will be collected via self-report.

4) Conditions. How many and which conditions will participants be assigned to?

All participants will be exposed to all measures and stimuli. Naturally occurring individual differences are the main variables of interest and therefore cannot be manipulated to assign participants to specific groups.

5) Analyses. Specify exactly which analyses you will conduct to examine the main question/hypothesis.

All proposed hypotheses will be tested using a series of multiple regression analyses.

The first regression model will explore the predictive value of the four schizotypy domains assessed by the SPQ-BRU, the two ASD trait domains assessed by the AQ-9, cognitive reflection measures as assessed by the CRT/CRT2, JTC bias measured as draws to decision on the Beads Task, and false right-wing news engagement scores on the outcome measure of *false right-wing news belief* scores.

The second regression model will explore the predictive value of the four schizotypy domains assessed by the SPQ-BRU, the two ASD trait domains assessed by the AQ-9, cognitive reflection measures as assessed by the CRT/CRT2, JTC bias measured as draws to decision on the Beads Task, and false left-wing news engagement scores on the outcome measure of *false left-wing news belief* scores.

The third regression model will explore the predictive value of the four schizotypy domains assessed by the SPQ-BRU, the two ASD trait domains assessed by the AQ-9, cognitive reflection measures as assessed by the CRT/CRT2, JTC bias measured as draws to decision on the Beads Task, and false right-wing news belief scores on the outcome measure of *false right-wing news engagement* scores.

The fourth regression model will explore the predictive value of the four schizotypy domains assessed by the SPQ-BRU, the two ASD trait domains assessed by the AQ-9, cognitive reflection measures as assessed by the CRT/CRT2, JTC bias measured as draws to decision on the Beads Task, and false left-wing news belief scores on the outcome measure of *false left-wing news engagement* scores.

All regression models will include control predictor variables, consisting of demographic variables (age, sex, education level), frequency of social media use, social media news sharing behaviour, and political congruence with the presented news headlines.

6) Outliers and Exclusions. Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Upon collection data will be screened and problematic responses will be deleted prior to analysis. Criteria for exclusion will be: 1) declining consent for the use of collected data, 2) zero variance in the

item responses to measures of schizotypy and ASD, 3) reporting an age below 18, 4) implausibly fast completion time (more than 2SD below mean completion time).

If the number of valid participant data sets falls below 248, due to participant exclusion and/or attrition, further recruitment will take place in order to meet the predefined power threshold.

Participants who report gender as other than Male or Female will be excluded (only) from analyses involving gender.

The study will be conducted using the Qualtrics platform which provides two measures of fraud: RelevantID and Google's invisible reCAPTCHA (Qualtrics, 2021). These tools provide metrics which indicate the likelihood of a participant trying to take a survey multiple times (in the case of the RelevantID duplicate score), as well as the use of automated bots (in the case of the invisible reCAPTCHA and RelevantID fraud score). Participants will therefore be excluded from the analysis if: 1) a participant's RelevantID fraud score is shown to be greater than or equal to 30 (indicative of bot activity), 2) a participant's RelevantID duplicate score was shown to be greater than or equal to 75 (indicative of a duplicate response), 3) a participant's invisible reCAPTCHA score was shown to be below 0.5 (indicative of bot activity).

The frequency and distribution of missing data will be subjected to analysis to determine how missing values are to be dealt with (e.g., If missing values are shown to be missing completely at random then a pairwise deletion approach will be utilised).

7) Sample Size. How many observations will be collected or what will determine sample size?

No need to justify decision, but be precise about exactly how the number will be determined.

Sample size has been determined via an a priori power analysis conducted in G*power 3.1 on the basis of providing adequate power ($\alpha = 0.05$, power = 80%) for the purposes of a multiple regression analysis. With a maximum of 15 predictor variables per regression model and an expected R^2 value of above 0.08, a minimum sample size of 248 participants is required. An additional 10% will be collected to account for participant attrition, totalling 273 participants. 15 participants will also be recruited for pilot testing. Therefore, a total sample of 288 participants will be sought.

8) Other. Anything else you would like to pre-register?

(e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

The main regression analyses will be repeated using equivalent belief and engagement scores calculated for the true headlines instead of the false stimuli in order to investigate the possibility of any significant effects being related to online news sharing in general, as opposed to false news specifically.

Individual SPQ-BRU subdomains will also be explored to further clarify the underlying relationship between specific schizotypal traits and news engagement/belief.

Additional exploratory analyses will also be conducted using the collected data.

Key references:

Davidson, C. A., Hoffman, L., & Spaulding, W. D. (2016). Schizotypal personality questionnaire – brief revised (updated): An update of norms, factor structure, and item content in a large non-clinical young adult sample. *Psychiatry Research*, 238, 345–355. <https://doi.org/10.1016/j.psychres.2016.01.053>

Frederick, S. (2005). Cognitive Reflection and Decision Making. *Journal of Economic Perspectives*, 19(4), 25–42. <https://doi.org/10.1257/089533005775196732>

Garety, P., Freeman, D., Jolley, S., Ross, K., Waller, H., & Dunn, G. (2011). Jumping to conclusions: The psychology of delusional reasoning. *Advances in Psychiatric Treatment*, 17(5), 332–339. <https://doi.org/10.1192/apt.bp.109.007104>

Jia, R., Steelman, Z. R., & Jia, H. H. (2019). Psychometric Assessments of Three Self-Report Autism Scales (AQ, RBQ-2A, and SQ) for General Adult Populations. *Journal of Autism and Developmental Disorders*, 49(5), 1949–1965. <https://doi.org/10.1007/s10803-019-03880-x>

Pennycook, G., Binnendyk, J., Newton, C., & Rand, D. G. (2021). A Practical Guide to Doing Behavioral Research on Fake News and Misinformation. *Collabra: Psychology*, 7(1), 25293. <https://doi.org/10.1525/collabra.25293>

Qualtrics (2021). *Fraud Detection*. <https://www.qualtrics.com/support/survey-platform/survey-module/survey-checker/fraud-detection/>

Ross, R. M., Pennycook, G., McKay, R., Gervais, W. M., Langdon, R., & Coltheart, M. (2016). Analytic cognitive style, not delusional ideation, predicts data gathering in a large beads task study. *Cognitive Neuropsychiatry*, 21(4), 300–314. <https://doi.org/10.1080/13546805.2016.1192025>

Thomson, K. S., & Oppenheimer, D. M. (2016). Investigating an alternate form of the cognitive reflection test. *Judgment and Decision Making*, 11(1), 15.

9) Name. Give a title for this AsPredicted pre-registration

Suggestion: use the name of the project, followed by study description.

Believing and engaging with online fake news: the role of schizotypy, ASD traits, cognitive reflection and jumping to conclusions.

Finally. For record keeping purposes, please tell us the type of study you are pre-registering.

- Class project or assignment
- Experiment
- Survey
- Observational/archival study
- Other:

Appendix I - Headline stimuli for the Social Media News Engagement/Belief Task (Study 2)

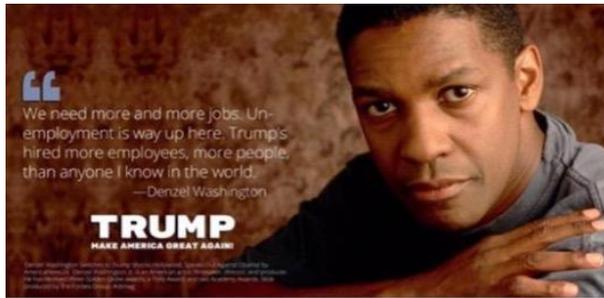
Figure I1 - Right-wing stimuli

Misinformation Stimuli (False Headlines).



THELASTLINEOFDEFENSE.ORG

Nancy Pelosi's Son Arrested For Murder



USALIBERTYPRESS.COM

Denzel Washington: With Trump We Avoided War With Russia And Orwellian Police State



UCONSERVATIVE.COM

Donald Trump Sent His Own Plane To Transport 200 Stranded Marines

Accurate stimuli (True Headlines).



REUTERS.COM

Plant a trillion trees: Republicans offer fossil-friendly climate fix



NBCNEWS.COM

Trump gets endorsement of NYC police union, warns 'no one will be safe in Biden's America'



APNEWS.COM

Trump welcomes 'The Walking Marine' to White House

WASHINGTON (AP) — President Donald Trump on Monday welcomed a Marin...

Figure 12- Left-wing stimuli

Misinformation Stimuli (False Headlines).



NOW8NEWS.COM

Hispanic Woman Claims, "Donald Trump Paid Me For Sex In Cancun, This Is Our Love Child"



THE-POSTILLON.COM

Trump Wants To Deport American Indians To India



BIPARTISANREPORT.COM

W.H. Staffers Defect, Releasing Private Tape Recording That Has Trump Silent

Accurate stimuli (True Headlines).



NPR.ORG

District Of Columbia Sues Inaugural Committee For 'Grossly Overpaying' At Trump Hotel



CNN.COM | BY DAN MERICA

Republican anxiety grows as Democratic Senate challengers outraise incumbents



WASHINGTONPOST.COM

Top Democrats say postmaster general acknowledged new policies that workers say are delaying mail

Appendix J – A copy of all materials used during data collection, including Participant Information Sheet and Debrief (Study 2).

J1 – Participant Information Sheet (PIS)

Thinking style, personality, and interactions with online news.

This research is being conducted as part of the University of Westminster's doctoral research programme.

Before you decide whether to participate in the study it is important for you to understand why the research is being conducted and what you will be expected to do.

Please read the information below carefully before making your decision

You are being invited to take part in a research study that will investigate how personality and the differences in thinking style influence the way people react to online news.

You have been selected to take part in the project based on characteristics identified by the pre-screening filters on the Prolific research platform.

Please take a moment to ensure that you meet the inclusion criteria:

- 1) Participants must be US residents.
- 2) Participants must be over the age of 18.

If you do not meet all the inclusion criteria outlined above, please do not continue further as your data will not be usable.

If you choose to take part in the study, you will first be asked to answer several questions relating to your demographic information.

Next, you will complete two sets of tasks:

Task 1: You will be shown a series of news headlines and asked to indicate how you would react to them if encountered on a social media platform. You will also be asked to judge how accurate you feel the headlines are. All news headlines included in the study are drawn from real social media content (please note: the University of Westminster does not endorse any of these headlines).

Task 2: You will be presented with a series of tests designed to assess thinking style. The first test involves viewing a series of coloured beads and then guessing which jar they came from, while the next test involves answering several problem-solving questions.

After finishing these tasks, you will be presented with two brief personality questionnaires.

Completing these tasks and questionnaires will take roughly **20 minutes**, after which you will be presented with additional information about the research.

Please note:

- Your participation is entirely voluntary.
- Individualised feedback on your test results will not be provided.
- You have the right to withdraw at any time without giving a reason. Data already submitted will not be included in any analysis.
- You do not have to answer specific questions if you do not wish to.
- No risks or benefits to you as an individual are anticipated as a result of participation.
- No personal identifying information (names, email address, etc.) will be collected. No individuals will be identifiable from any collated data, written report of the research, or any publications arising from it.
- If after completing the study you change your mind and wish for your data to be withdrawn, this can be done by submitting a request alongside your individual participant code (you will receive one at the end of the study) within 14 days of completion. After 14 days your responses will be completely anonymised and from them on data will not be able to be withdrawn.
- Data will be stored indefinitely on computer systems controlled by the University of Westminster. Data may be re-used in future research (at the University of Westminster or elsewhere) and may be made openly available to other researchers.
- The project is being conducted at the University of Westminster in the UK. It has been approved by the School of Social Sciences Psychology Ethics Committee (project code ETH2122-0644). It is not supported by external funding. The researcher running this project is Mr James Kempley (w1525877@my.westminster.ac.uk) who should be the first point of contact if you have any queries. The project is being supervised by Professor Tom Buchanan (t.buchanan@westminster.ac.uk). If you have any complaints, you may contact the Head of School Professor Dibyesh Anand (D.Anand@westminster.ac.uk).

CONSENT:

If you have read the information provided above and agree to give your consent to participate in the study, please tick “I wish to take part in the study” and then click the “continue” icon.

I wish to take part in the study.

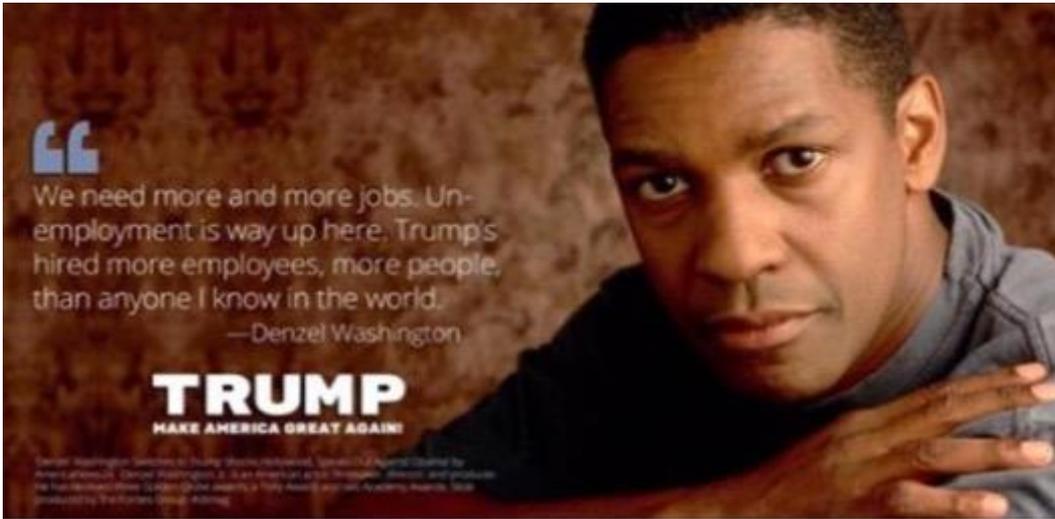
I do not wish to take part in the study.

J2 – Examples of the survey measures

Representative stimuli and measures for the Fake News Engagement and Belief tasks

1. **News headlines.** Presented in “Facebook” format (looking as they would if encountered on Facebook). A total of 12 headlines, half being examples of factual reporting and the other half being examples of fake news that has been previously distributed through social media. In addition, half the presented headlines exhibit a left-wing bias while the other half exhibit a right-wing bias. Stimuli will be presented to the participants in a randomised order. Participants will be shown the entire set of stimuli twice (the first round of exposure will measure engagement, the second will measure belief).
- a. **Fake news stimuli – right-wing bias.**





USALIBERTYPRESS.COM

Denzel Washington: With Trump We Avoided War With Russia And Orwellian Police State



UCONSERVATIVE.COM

Donald Trump Sent His Own Plane To Transport 200 Stranded Marines

b. Fake news stimuli – left-wing bias.



NOW8NEWS.COM

Hispanic Woman Claims, "Donald Trump Paid Me For Sex In Cancun, This Is Our Love Child"



THE-POSTILLON.COM

Trump Wants To Deport American Indians To India



BIPARTISANREPORT.COM

W.H. Staffers Defect, Releasing Private Tape Recording That Has Trump Silent

c. Factual news stimuli – right-wing bias



REUTERS.COM

Plant a trillion trees: Republicans offer fossil-friendly climate fix



NBCNEWS.COM

Trump gets endorsement of NYC police union, warns 'no one will be safe in Biden's America'



APNEWS.COM

Trump welcomes 'The Walking Marine' to White House

WASHINGTON (AP) — President Donald Trump on Monday welcomed a Marin...

d. Factual news stimuli – left-wing bias



NPR.ORG

District Of Columbia Sues Inaugural Committee For 'Grossly Overpaying' At Trump Hotel



CNN.COM | BY DAN MERICA

Republican anxiety grows as Democratic Senate challengers outraise incumbents



WASHINGTONPOST.COM

Top Democrats say postmaster general acknowledged new policies that workers say are delaying mail

2. Instructions to participants (Engagement measure):

“You will be presented with a series of actual news headlines. There are 6 in total.

We are interested in how you think you might interact with these headlines if you had encountered them on social media.

For each news headlines you will be asked to rate the likelihood that you would **“Like”** the post, **React** by posting an emoji, **Share** it, or make a **Comment**.

You will also be asked to indicate if you have ever previously seen the headline.”

3. Fake News Engagement measures.

- A) If you were to see the above article on social media, how likely would you be to **“Like”** it?
- B) If you were to see the above article on social media, how likely would you be to **React by posting an emoji?**
- C) If you were to see the above article on social media, how likely would you be to **Share** it?
- D) If you were to see the above article on social media, how likely would you be to leave a **Comment** on it?
- E) Are you familiar with the above headline (have you seen or heard about it before)?

For questions A-D, participants note their responses using a 6-point Likert scale:

1) Extremely unlikely, 2) Moderately unlikely, 3) Slightly unlikely, 4) Slightly likely, 5) Moderately likely, 6) Extremely likely.

For question E, participants respond with one of three options:

1) Yes, 2) Unsure, 3) No

4. Instructions to participants (Belief measure):

“You will now be presented the same set of headlines again. This time we would like you to reflect on the accuracy of each headline and rate how true you believe it to be.”

5. Fake News Belief measures.

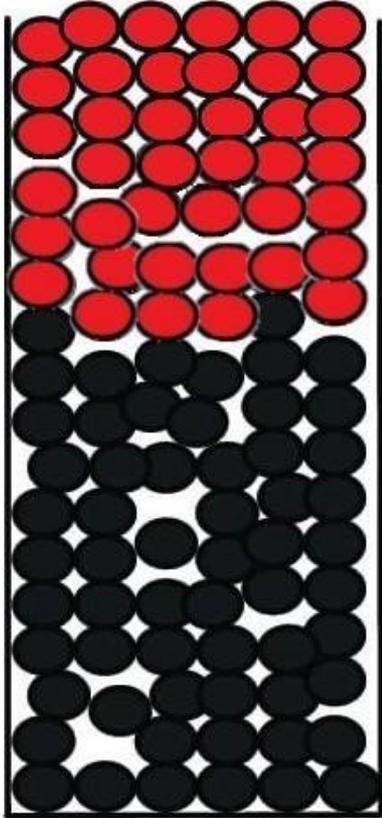
- A) To the best of your knowledge, is the claim in the above headline accurate?

Participants note their response to the question using a 4-point Likert scale:

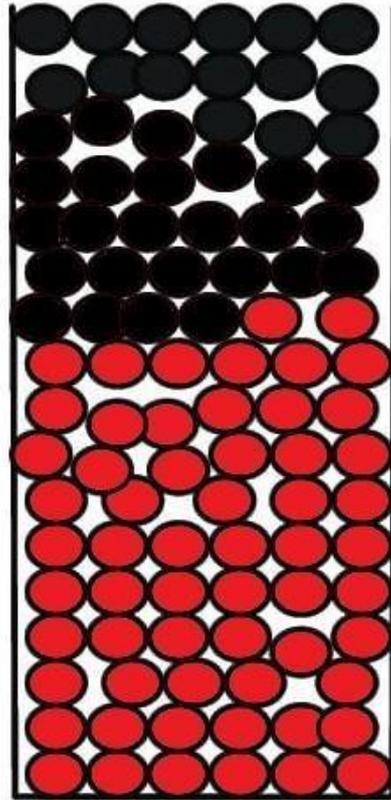
1) Not at all accurate, 2) Not very accurate, 3) Somewhat accurate, 4) Very accurate.

Representative stimuli and measures for The Beads Task (Jumping to conclusions task)**1) Introductory stimuli:**

There are two jars: A mainly red jar containing 60 red and 40 black beads and a mainly black jar containing 60 black and 40 red beads.

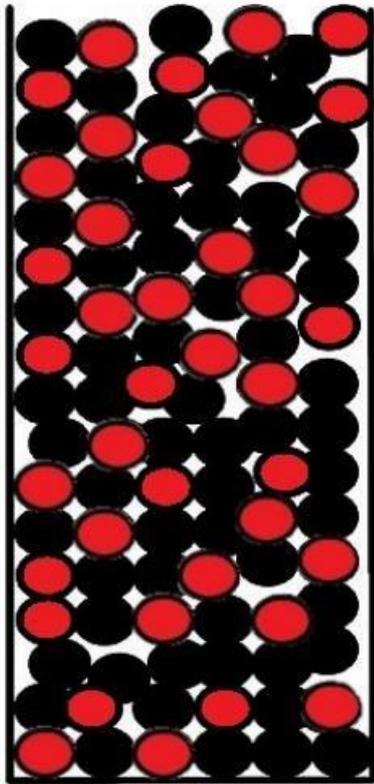


Mainly Black
Jar

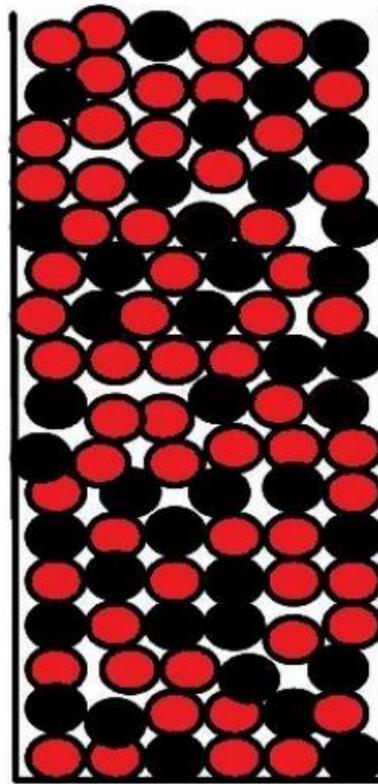


Mainly Red
Jar

The beads have been mixed up in the jar



Mainly Black
Jar

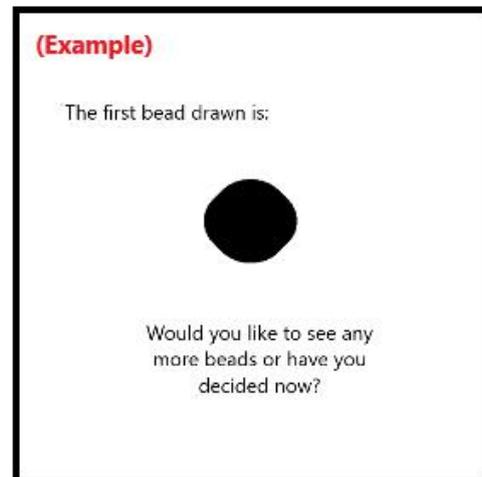
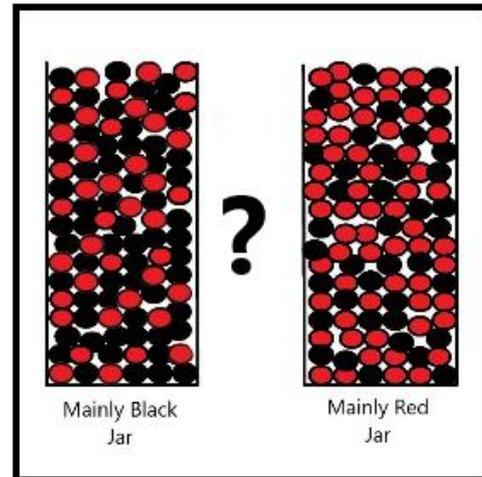


Mainly Red
Jar

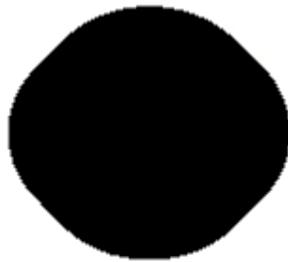
You will now be presented with beads drawn from one jar.

Your goal will be to guess whether the beads shown came from the mainly red jar or the mainly black jar.

Beads will be presented one at a time, after which you will be asked if you would like to guess which jar it came from or see another bead from the jar before making your decision.



The first bead drawn is:



Would you like to see any
more beads or have you
decided now?

2) Questions presented with each bead image:

Participants are presented with the following question alongside each bead image:

“Choose what action you would like to take”

The responses available to participants are the following:

- 1) *Guess which jar the bead comes from.*
- 2) *See another bead before making a decision.*

3) **Bead sequence:**

After displaying the first bead participants that request additional beads are shown either a red or black bead (see below) in the following sequence:

RRBBRBBBRRBBBBRRBRBBRBBBRRBRBBBRRBBBRRBBB

If participants choose to view another bead after the final item in the sequence the task will end.

The next bead drawn is:



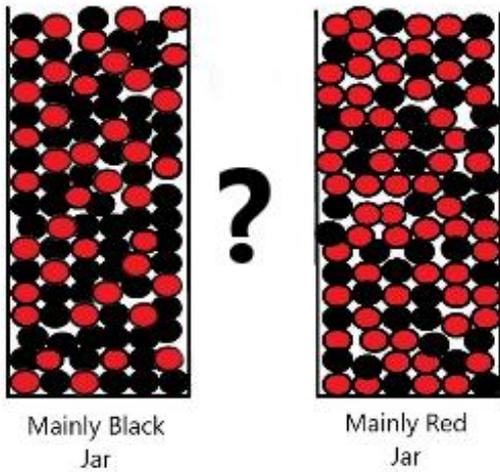
Would you like to see any more beads or have you decided now?

The next bead drawn is:



Would you like to see any more beads or have you decided now?

4) **Instructions when guessing the origin of the beads:**



Participants are presented with the following question alongside the above image:

“Which jar did the beads come from?”

The responses available to participants are the following:

- 1) *The mainly black jar.*
- 2) *The mainly red jar.*

**Non-clinical Schizotypy measure: Schizotypal Personality Questionnaire – Brief Revised
Updated (SPQ-BRU)**

Please indicate how much you agree with the each of the following statements:

item #	
1	I sometimes feel that people are talking about me.
2	I sometimes feel that other people are watching me.
3	When shopping, I get the feeling that other people are taking notice of me.
4	I often feel that others have it in for me.
5	I sometimes get concerned that friends or co-workers are not really loyal or trustworthy.
6	I often have to keep an eye out to stop people from taking advantage of me.
7	I feel that I cannot get 'close' to people.
8	I find it hard to be emotionally close to other people.
9	I feel that there is no one I am really close to outside of my immediate family, or people I can confide in or talk to about personal problems.
10	I tend to keep my feelings to myself.
11	I rarely laugh and smile.
12	I am not good at expressing my true feelings by the way I talk and look.
13	Other people see me as slightly eccentric (odd).
14	I am an odd, unusual person
15	I have some eccentric (odd) habits.
16	People sometimes comment on my unusual mannerisms and habits.
17	I often feel nervous when I am in a group of unfamiliar people.
18	I get anxious when meeting people for the first time.
19	I feel very uncomfortable in social situations involving unfamiliar people.
20	I sometimes avoid going to places where there will be many people because I will get anxious.
21	I believe in telepathy (mind-reading).
22	I believe in clairvoyance (psychic forces, fortune telling).
23	I have had experiences with astrology, seeing the future, UFO's, ESP, or a sixth sense.
24	I have felt that I was communicating with another person telepathically (by mind-reading).
25	I sometimes jump quickly from one topic to another when speaking.
26	I tend to wander off the topic when having a conversation.
27	I often ramble on too much when speaking.
28	I sometimes forget what I am trying to say.

29	I often hear a voice speaking my thoughts aloud.
30	When I look at a person or at myself in a mirror, I have seen the face change right before my eyes.
31	My thoughts are sometimes so strong that I can almost hear them.
32	Everyday things seem unusually large or small.

Participants note their response to the questions using a 5-point Likert scale:

1) Strongly disagree, 2) Disagree, 3) Neutral, 4) Agree, 5) Strongly agree

Non-clinical ASD trait measure: Autism Quotient-9 (AQ-9)

Please indicate how much you agree with the each of the following statements:

item #	
1	I usually notice car number plates or similar strings of information.
2	I find myself drawn more strongly to people than to things.
3	I tend to notice details that others do not.
4	I enjoy social chit-chat.
5	I am fascinated by numbers.
6	I find it hard to make new friends.
7	I enjoy social occasions.
8	I notice patterns in things all the time.
9	I enjoy meeting new people.

Participants note their response to the questions using a 7-point Likert scale:

1) Strongly disagree, 2) Disagree, 3) Somewhat disagree, 4) Neither agree or disagree, 5) Somewhat agree, 6) Agree, 7) Strongly agree

Heuristic processing bias measure: Cognitive Reflection Test/Cognitive Reflection Test 2
(CRT/CRT2)

Part 1

Please write the answers to these four questions in the text boxes below. You can use any combination of words and numbers.

- A. If you're running a race and you pass the person in second place, what place are you in?
- B. A farmer had 15 sheep and all but 8 died. How many are left?
- C. Emily's father has three daughters. The first two are named April and May. What is the third daughter's name?
- D. How many cubic feet of dirt are there in a hole that is 3' deep x 3' wide x 3' long?
- E. Have you seen any of these four questions before (for example, in another online survey)?
 - Yes
 - No

Part 2

Please write the answers to these three questions in the text boxes below. You can use any combination of words and numbers.

A bat and a ball cost £1.10 in total. The bat costs £1.00 more than the ball. How much does the ball cost?

If it takes 5 minutes for five machines to make five widgets, how long would it take for 100 machines to make 100 widgets?

In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

Have you seen any of these three questions before (for example, in another online survey)?

- Yes
- No

Demographic items

Questions about you.

- A. What is your age in years?
- B. Which country do you live in?
- C. What is your gender?
- Male
 - Female
 - Other
 - Prefer not to say
- D. What is the highest level of education you have completed?
- Less than High School
 - High School / Secondary School
 - Some post-school College or University
 - College or University undergraduate degree
 - Master's Degree
 - Doctoral Degree
 - Professional Degree (JD, MD)
- E. How often do you visit or use social media? (e.g. Facebook, Twitter, TikTok, Reddit, Instagram, Discord, or any others).
- Several times a day
 - About once a day
 - A few times a week
 - Every few weeks
 - Less often
 - Not at all
- F. How much do you tend to share political information you come across on social media?

Participants note their response to this question using a 5-point Likert scale:

1) Not at all, 2) Very rarely, 3) Rarely, 4) Occasionally, 5) Very frequently

- G. Please use the scale below to describe your political orientation:

Participants note their response to this question using an 11-point scale anchored at 'Strongly Democrat' and 'Strongly Republican'.

J3 – Participant Debrief

Thank you for taking part in the study.

Now that you have finished, we would like to provide you with some additional information regarding the purpose and goals of the research project.

The study that you have participated in is looking into the current issue around misleading news articles (also known as “fake news”) being circulated on social media platforms. We hope that the information we are gathering will one day contribute to reducing the spread of fake news and help protect people who are particularly at risk of being misled by false online information.

PLEASE NOTE: of the 12 news headlines you were presented with during the testing phase of the study, 6 headlines have been previously classified as fake news by independent fact checking organisations.

The following headlines have been proven to be FALSE:





FAKE NEWS

THELASTLINEOFDEFENSE.ORG

Nancy Pelosi's Son Arrested For Murder



FAKE NEWS

UCONSERVATIVE.COM

Donald Trump Sent His Own Plane To Transport 200 Stranded Marines



NOW8NEWS.COM

Hispanic Woman Claims, "Donald Trump Paid Me For Sex In Cancun, This Is Our Love Child"



THE-POSTILLON.COM

Trump Wants To Deport American Indians To India



The aim of the current study is to investigate how different personality traits and styles of thinking might make us more or less likely to either believe or engage with fake news when encountered on social media.

After completing the main tasks of the study, you were asked to complete two personality questionnaires. These were measures of schizotypy and non-clinical autistic traits. Despite how their names might sound, these are normal personality characteristics that describe behavior expressed by everyone to some extent. You also completed a cognitive reflection test, which measures the tendency to jump to answers quickly rather than reflecting on them. All these characteristics have been hypothesized to influence how people engage with fake news on social media.

This study builds upon previous research which has indicated that people who are more reliant on their sense of intuition when processing information, as well as being more prone to reacting to information impulsively, are more likely to believe and engage with fake news on social media. Fake news has become increasingly common on social media platforms and represents a major challenge to society, as different social groups are targeted with misleading information which often promotes division and a skewed worldview.

Contrary to what many people might think, most of the fake news on social media is circulated by regular users (as opposed to “bots” or paid actors), and therefore understanding the psychological factors that lead to people sharing fake news will be important in combating its spread.

Thanks to research involving participants such as yourself, we are learning more about how and why fake news spreads on social media, and what we can do to prevent it.

For more information on how to identify fake news, familiarise yourself with the SHARE Checklist (available at <https://sharechecklist.gov.uk>). The SHARE Checklist has been created by the UK Government to help assist the public in identifying misleading information online.

We at the University of Westminster would like to thank you once again for your participation in this study.

Your individual participation code is `{e://Field/ID%20code}`.

You can use this if you wish to get in touch about your participation.

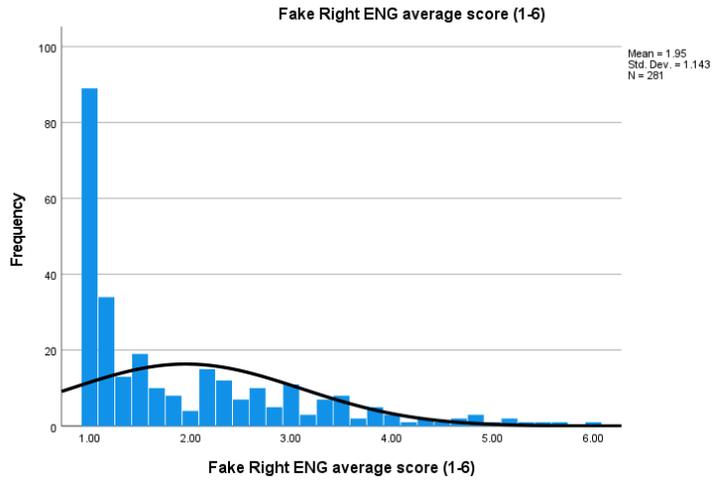
If you wish to withdraw your data, please email the researcher running this project (available at w1525877@my.westminster.ac.uk) stating your participant code and asking to withdraw, within 14 days of participating.

The study is now complete. Please click the “ → ” icon to return to Prolific to log your participation and receive your compensation.

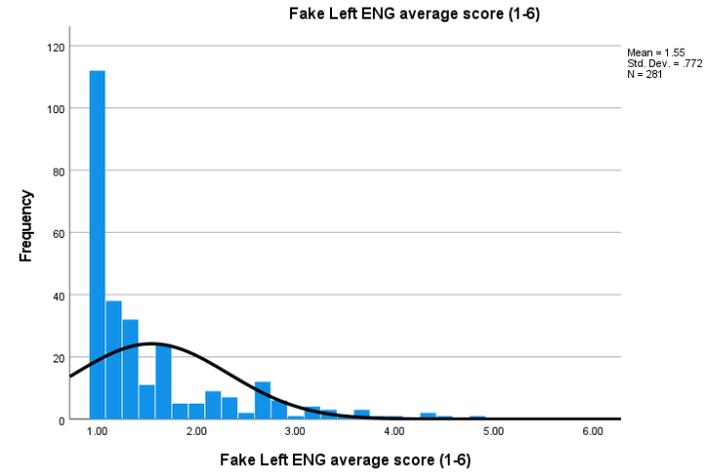
The project is being conducted at the University of Westminster in the UK. It has been approved by the School of Social Sciences Psychology Ethics Committee (project code ETH2122-0644). It is not supported by external funding. The researcher running this project is Mr James Kempley (w1525877@my.westminster.ac.uk) who should be the first point of contact if you have any queries. The project is being supervised by Professor Tom Buchanan (t.buchanan@westminster.ac.uk). If you have any complaints, you may contact the Head of School Professor Dibyesh Anand (D.Anand@westminster.ac.uk).

Appendix K - Histograms for demographic and predictor variables (Study 2)

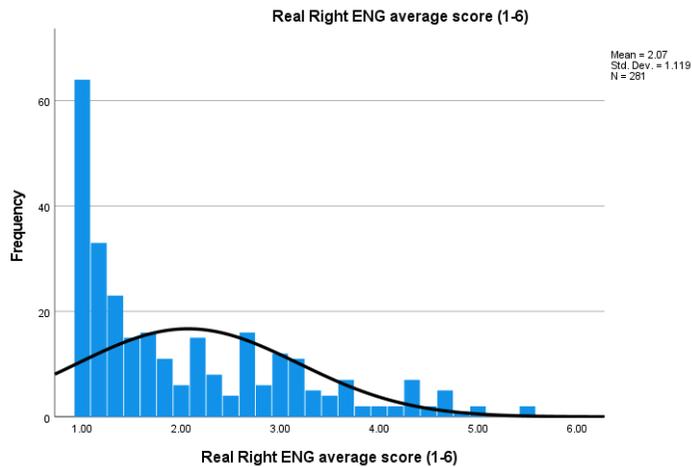
Figure K1 - Histograms for frequencies of all belief and engagement measures.



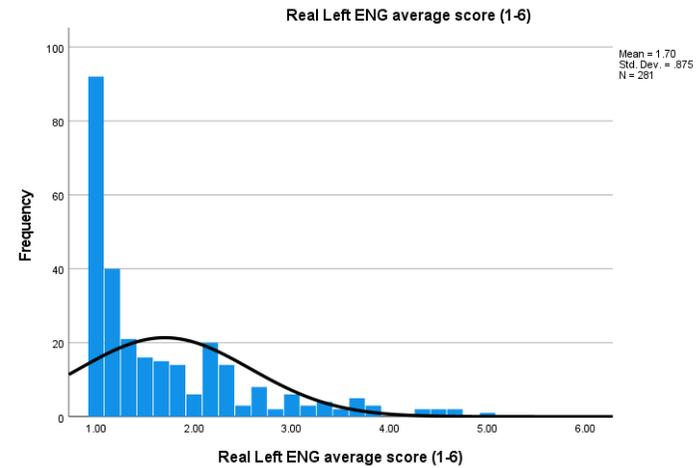
A) Average engagement with fake RW headlines



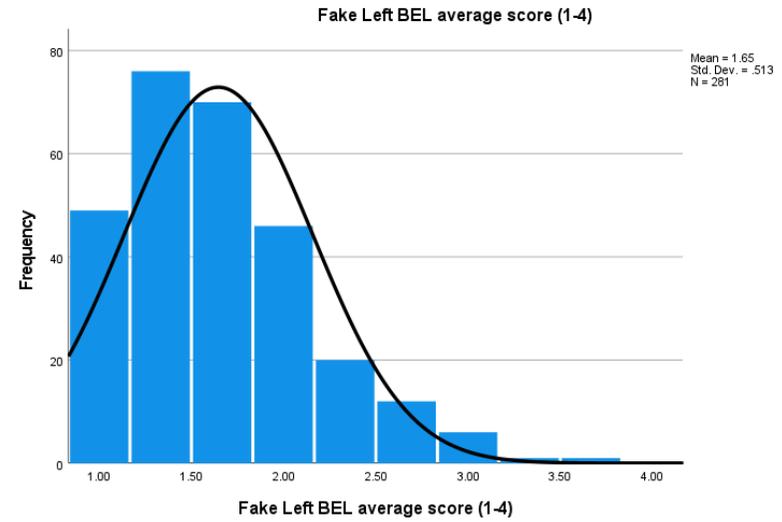
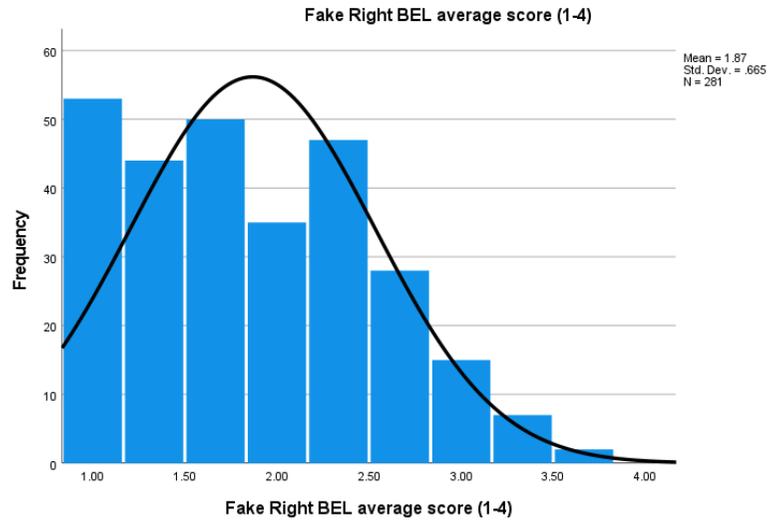
B) Average engagement with fake LW headlines



C) Average engagement with true RW headlines

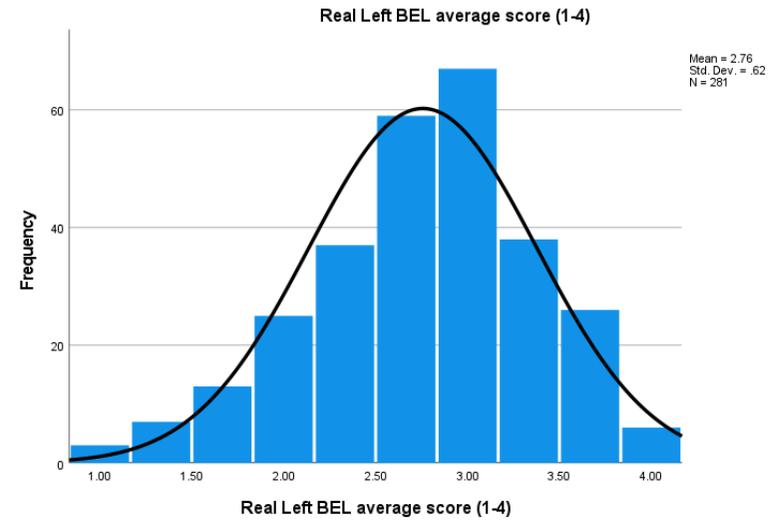
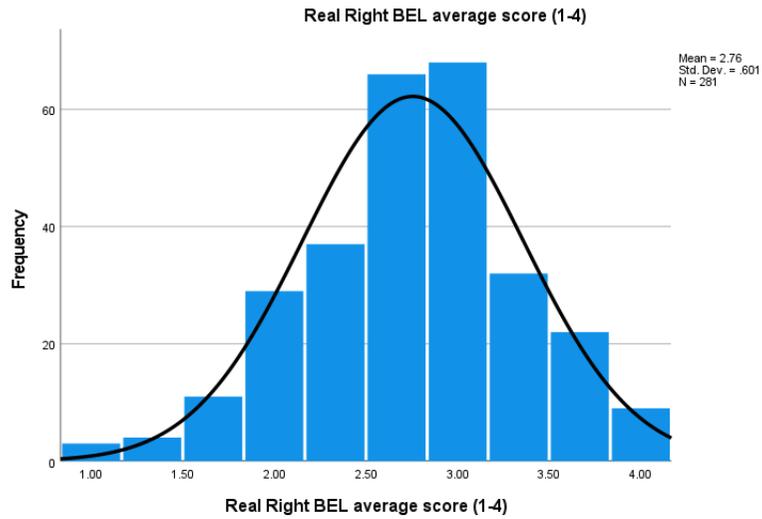


D) Average engagement with true LW headlines



E) Average belief in fake RW headlines

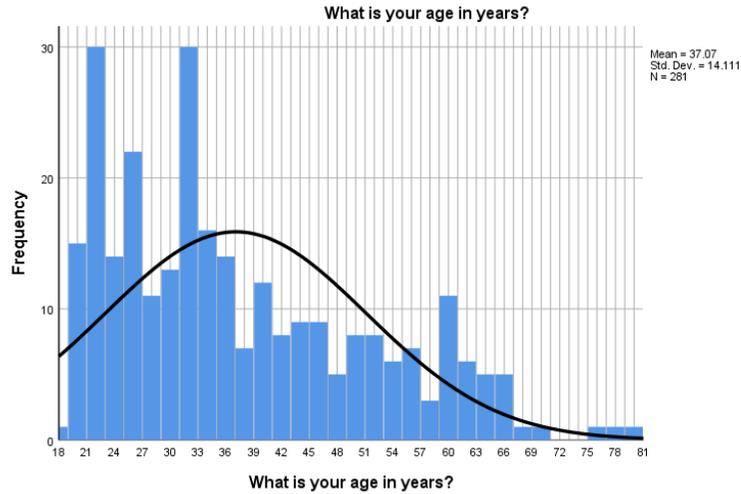
F) Average belief in fake LW headlines



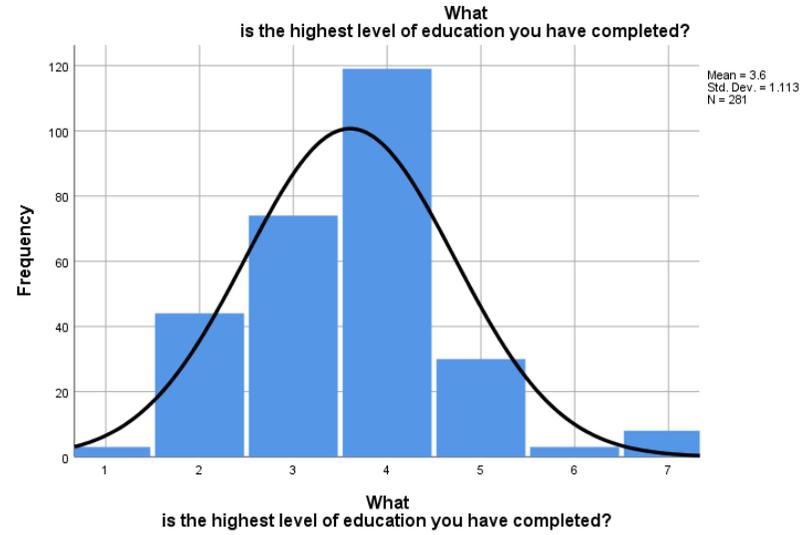
G) Average belief in fake headlines

H) Average belief in fake headlines

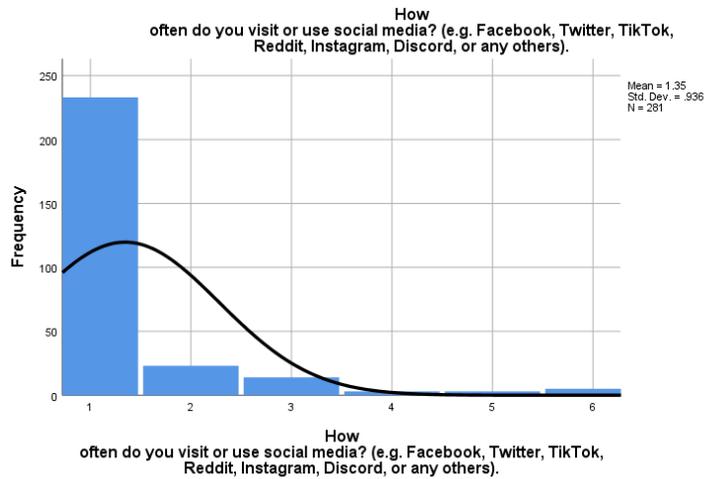
Figure K2 – Histograms displaying frequencies of political orientation scores and demographic features.



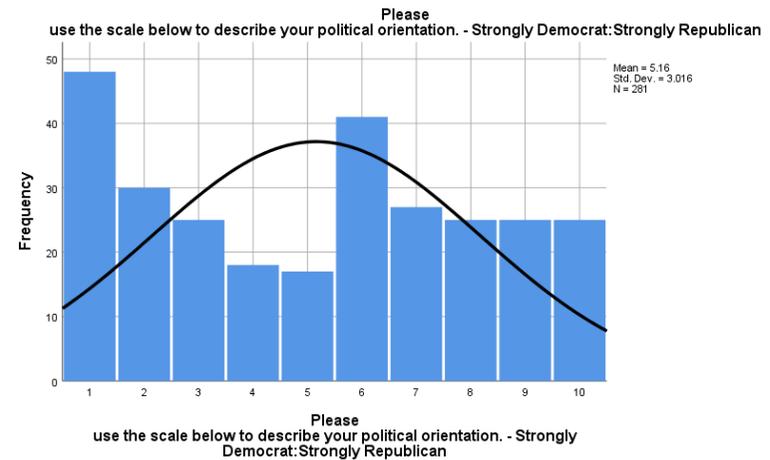
A) Histogram of age distribution



B) Histogram of education level

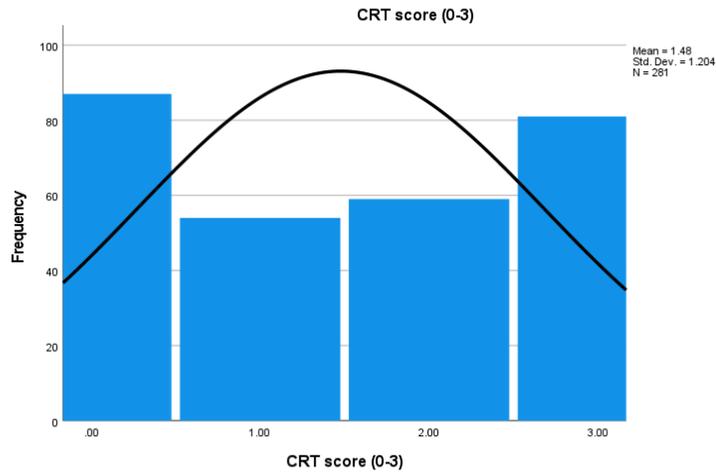


C) Histogram of frequency of social media use

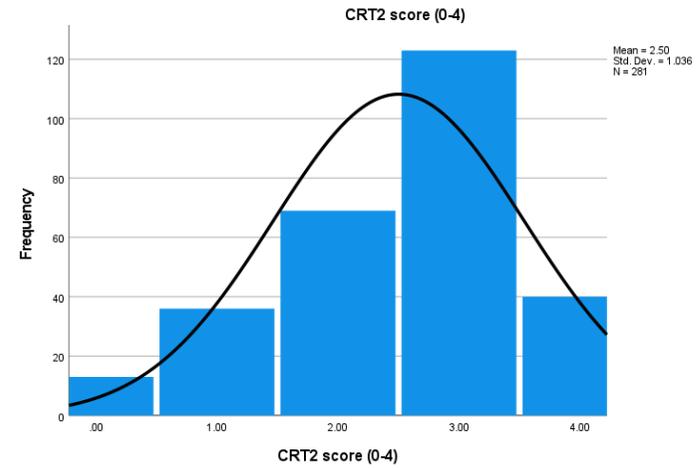


D) Histogram of age distribution

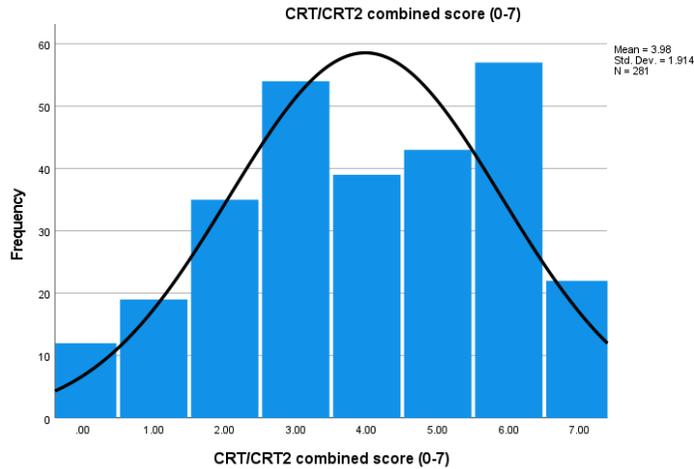
Figure K3 – Histograms displaying the frequency of CRT, CRT2, CRT/CRT2 and The Beads Task scores.



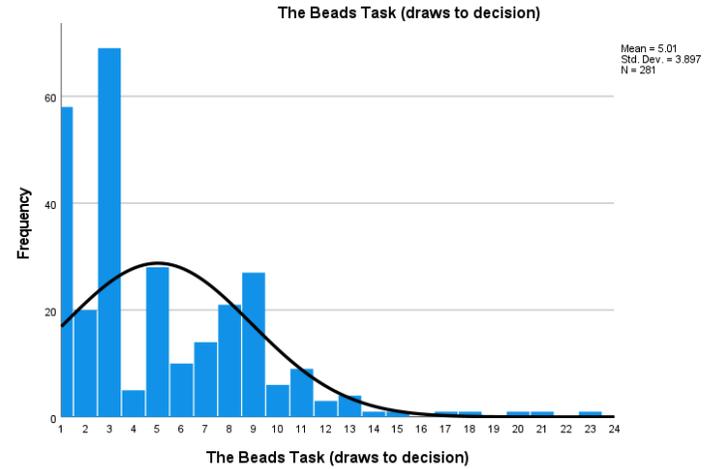
A) Histogram of CRT score distribution



B) Histogram of CRT2 score distribution



C) Histogram of CRT/CRT2 score distribution



D) Histogram of The Beads Task score (i.e., draws to decision)

Appendix L - Hierarchical regression analyses (Study 2)

Table L1 - Model 5.1b (engagement with false RW headlines).

Variables	Block																	
	1			2			3			4			5			6		
	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>
Gender †	0.08	0.14	0.03	0.18	0.14	0.08	0.17	0.14	0.07	0.23	0.12	0.10*	0.30	0.12	0.13*	0.26	0.11	0.12*
Age	0.01	0.01	0.07	0.00	0.01	0.02	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.01
Education level	-0.06	0.06	-0.06	-0.04	0.06	-0.03	-0.05	0.06	-0.05	0.00	0.05	0.00	0.03	0.05	0.03	0.03	0.05	0.03
Frequency of social media use	-0.05	0.08	-0.04	-0.06	0.07	-0.05	-0.07	0.07	-0.06	-0.14	0.06	-0.11*	-0.11	0.06	-0.09	-0.01	0.06	-0.01
Draws-to-decision (Beads Task)	-	-	-	-0.04	0.02	-0.12*	-0.02	0.02	-0.06	-0.01	0.02	-0.02	0.00	0.01	-0.02	-0.01	0.01	-0.02
CRT/CRT2 score	-	-	-	-0.10	0.04	-0.17**	-0.07	0.04	-0.12	-0.07	0.03	-0.11*	-0.06	0.03	-0.11*	-0.04	0.03	-0.07
Attention to detail (AD-ASD)	-	-	-	-	-	-	0.07	0.05	0.08	0.03	0.05	0.03	0.02	0.04	0.02	-0.01	0.04	-0.01
Social communication (SC-ASD)	-	-	-	-	-	-	-0.11	0.07	-0.13	-0.11	0.06	-0.13	-0.11	0.06	-0.13	-0.10	0.05	-0.12
Interpersonal (IP Schizotypy)	-	-	-	-	-	-	0.00	0.10	0.00	-0.02	0.09	-0.02***	-0.02	0.09	-0.01	0.00	0.08	0.00
Cognitive-Perceptual (CP Schizotypy)	-	-	-	-	-	-	0.50	0.13	0.31***	0.45	0.11	0.28*	0.37	0.11	0.23**	0.27	0.10	0.17**
Disorganised (D Schizotypy)	-	-	-	-	-	-	-0.35	0.10	-0.30***	-0.22	0.08	-0.18	-0.12	0.08	-0.10	-0.12	0.08	-0.10
Social anxiety (SA Schizotypy)	-	-	-	-	-	-	0.00	0.08	0.00	0.11	0.07	0.11	0.12	0.07	0.12	0.15	0.06	0.16*
Political orientation	-	-	-	-	-	-	-	-	-	0.19	0.02	0.51***	0.15	0.02	0.40***	0.16	0.02	0.42***
Belief in false RW headlines	-	-	-	-	-	-	-	-	-	-	-	-	0.43	0.10	0.25***	0.43	0.10	0.25***
Frequency of political news sharing on social media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.28	0.04	0.30***
Adjusted R²	-.01			.04			.12			.35			.39			.47		
Change in F for R²	.68			7.31***			5.26***			94.59***			18.60***			41.44***		
ANOVA (p)	.609			.009			< .001			< .001			< .001			< .001		

Significant predictor variables in bold.

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

†Gender was coded as -1 = women, 1 = men

Table L2 - Model 5.2b (engagement with false LW headlines).

Variables	Block																	
	1			2			3			4			5			6		
	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>
Gender †	0.20	0.09	0.13*	0.21	0.10	0.13*	0.24	0.10	0.16*	0.22	0.09	0.14*	0.20	0.09	0.13*	0.18	0.09	0.11
Age	-0.01	0.00	-0.10	-0.01	0.00	-0.11	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.00	0.00
Education level	-0.08	0.04	-0.11	-0.07	0.04	-0.10	-0.06	0.04	-0.09	-0.08	0.04	-0.12	-0.08	0.04	-0.11	-0.08	0.04	-0.11*
Frequency of social media use	-0.05	0.05	-0.06	-0.05	0.05	-0.06	-0.05	0.05	-0.06	-0.03	0.05	-0.03	-0.02	0.05	-0.02	0.04	0.05	0.05
Draws-to-decision (Beads Task)	-	-	-	-0.01	0.01	-0.03	0.00	0.01	0.00	0.00	0.01	-0.02	0.00	0.01	-0.01	0.00	0.01	-0.01
CRT/CRT2 score	-	-	-	-0.01	0.03	-0.03	-0.01	0.03	-0.01	-0.01	0.03	-0.02	0.00	0.03	0.00	0.01	0.02	0.03
Attention to detail (AD-ASD)	-	-	-	-	-	-	-0.04	0.04	-0.07	-0.02	0.04	-0.04	-0.02	0.04	-0.04	-0.04	0.03	-0.07
Social communication (SC-ASD)	-	-	-	-	-	-	-0.06	0.05	-0.11	-0.06	0.05	-0.11	-0.07	0.05	-0.13	-0.07	0.05	-0.12
Interpersonal (IP Schizotypy)	-	-	-	-	-	-	0.02	0.07	0.03	0.03	0.07	0.048	0.04	0.07	0.04	0.05	0.07	0.06
Cognitive-Perceptual (CP Schizotypy)	-	-	-	-	-	-	0.17	0.09	0.15	0.18	0.09	0.17*	0.16	0.09	0.14	0.09	0.09	0.09
Disorganised (D Schizotypy)	-	-	-	-	-	-	0.10	0.07	0.12	0.06	0.07	0.07	0.07	0.07	0.09	0.08	0.06	0.09
Social anxiety (SA Schizotypy)	-	-	-	-	-	-	0.02	0.06	0.03	-0.01	0.06	-0.02	-0.01	0.06	-0.01	0.01	0.05	0.02
Political orientation	-	-	-	-	-	-	-	-	-	-0.06	0.02	-0.22***	-0.04	0.02	-0.17*	-0.03	0.02	-0.13*
Belief in false LW headlines	-	-	-	-	-	-	-	-	-	-	-	-	0.24	0.09	0.16*	0.29	0.09	0.19**
Frequency of political news sharing on social media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.17	0.04	0.28***
Adjusted R²	.03			.03			.05			.09			.11			.18		
Change in F for R²	3.20*			.22			2.26*			12.90***			6.64*			22.02***		
ANOVA (p)	.014			.044			.010			< .001			< .001			< .001		

Significant predictor variables in bold.

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

†Gender was coded as -1 = women, 1 = men

Table L3 - Model 5.3b (engagement with true RW headlines).

Variables	Block																	
	1			2			3			4			5			6		
	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>
Gender †	0.15	0.14	0.07	0.27	0.14	0.12	0.27	0.14	0.12*	0.33	0.12	0.15**	0.28	0.12	0.13*	0.25	0.11	0.11*
Age	0.01	0.00	0.08	0.00	0.00	0.03	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	-0.03
Education level	-0.01	0.06	-0.01	0.02	0.06	0.02	0.01	0.06	0.01	0.06	0.05	0.06	0.06	0.05	0.06	0.06	0.05	0.06
Frequency of social media use	-0.07	0.07	-0.06	-0.09	0.07	-0.07	-0.09	0.07	-0.07	-0.15	0.06	-0.12*	-0.13	0.06	-0.11*	-0.02	0.06	-0.02
Draws-to-decision (Beads Task)	-	-	-	-0.04	0.02	-0.13*	-0.02	0.02	-0.08	-0.01	0.02	-0.05	-0.01	0.02	-0.04	-0.01	0.01	-0.04
CRT/CRT2 score	-	-	-	-0.12	0.04	-0.20**	-0.10	0.04	-0.17**	-0.09	0.03	-0.16**	-0.09	0.03	-0.15**	-0.06	0.03	-0.11*
Attention to detail (AD-ASD)	-	-	-	-	-	-	0.04	0.05	0.05	0.01	0.05	0.01	-0.01	0.05	-0.01	-0.04	0.04	-0.05
Social communication (SC-ASD)	-	-	-	-	-	-	0.01	0.07	0.01	0.01	0.06	0.01	0.02	0.06	0.02	0.02	0.06	0.03
Interpersonal (IP Schizotypy)	-	-	-	-	-	-	-0.12	0.10	-0.10	-0.14	0.09	-0.12	-0.12	0.09	-0.10	-0.10	0.08	-0.08
Cognitive-Perceptual (CP Schizotypy)	-	-	-	-	-	-	0.45	0.13	0.29***	0.41	0.12	0.26***	0.42	0.11	0.26***	0.32	0.11	0.20**
Disorganised (D Schizotypy)	-	-	-	-	-	-	-0.24	0.09	-0.21*	-0.13	0.09	-0.11	-0.10	0.09	-0.08	-0.10	0.08	-0.09
Social anxiety (SA Schizotypy)	-	-	-	-	-	-	-0.05	0.08	-0.06	0.04	0.07	0.04	0.03	0.07	0.03	0.06	0.07	0.06
Political orientation	-	-	-	-	-	-	-	-	-	0.16	0.02	0.43***	0.14	0.02	0.39***	0.16	0.02	0.43***
Belief in true RW headlines	-	-	-	-	-	-	-	-	-	-	-	-	0.35	0.10	0.19**	0.33	0.09	0.18***
Frequency of political news sharing on social media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.30	0.05	0.33***
Adjusted R²	.02			.03			.16			.33			.37			.39		
Change in F for R²	2.25			2.88			8.02***			70.51***			18.60***			7.52**		
ANOVA (p)	.064			.024			< .001			< .001			< .001			< .001		

Significant predictor variables in bold.

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

†Gender was coded as -1 = women, 1 = men

Table L4 - Model 5.4b (engagement with true LW headlines).

Variables	Block																	
	1			2			3			4			5			6		
	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>	<i>B</i>	<i>SE B</i>	<i>b</i>
Gender †	0.35	0.10	0.20**	0.37	0.11	0.21**	0.40	0.11	0.23***	0.37	0.11	0.21**	0.35	0.11	0.20**	0.31	0.10	0.18**
Age	0.00	0.00	0.02	0.00	0.00	0.02	0.01	0.00	0.09	0.01	0.00	0.10	0.01	0.00	0.11	0.00	0.00	0.06
Education level	0.04	0.05	0.04	0.04	0.05	0.05	0.04	0.05	0.05	0.02	0.05	0.02	0.02	0.05	0.02	0.01	0.04	0.02
Frequency of social media use	-0.13	0.06	-0.14*	-0.13	0.06	-0.14*	-0.12	0.06	-0.13*	-0.09	0.06	-0.10	-0.09	0.06	-0.09	0.00	0.05	0.00
Draws-to-decision (Beads Task)	-	-	-	0.01	0.01	0.04	0.01	0.01	0.06	0.01	0.01	0.04	0.01	0.01	0.05	0.01	0.01	0.04
CRT/CRT2 score	-	-	-	-0.03	0.03	-0.06	-0.02	0.03	-0.05	-0.03	0.03	-0.05	-0.02	0.03	-0.05	0.00	0.03	-0.01
Attention to detail (AD-ASD)	-	-	-	-	-	-	-0.01	0.04	-0.02	0.00	0.04	0.01	0.00	0.04	0.01	-0.02	0.04	-0.03
Social communication (SC-ASD)	-	-	-	-	-	-	-0.05	0.06	-0.07	-0.05	0.05	-0.07	-0.04	0.05	-0.06	-0.03	0.05	-0.05
Interpersonal (IP Schizotypy)	-	-	-	-	-	-	-0.03	0.08	-0.04	-0.02	0.08	-0.03	-0.02	0.08	-0.03	-0.01	0.07	-0.01
Cognitive-Perceptual (CP Schizotypy)	-	-	-	-	-	-	0.16	0.10	0.13	0.18	0.10	0.15	0.21	0.10	0.17*	0.14	0.10	0.11
Disorganised (D Schizotypy)	-	-	-	-	-	-	0.09	0.08	0.10	0.04	0.08	0.04	0.04	0.07	0.04	0.04	0.07	0.04
Social anxiety (SA Schizotypy)	-	-	-	-	-	-	-0.03	0.06	-0.04	-0.07	0.06	-0.10	-0.09	0.06	-0.12	-0.06	0.06	-0.09
Political orientation	-	-	-	-	-	-	-	-	-	-0.07	0.02	-0.26***	-0.07	0.02	-0.23***	-0.05	0.02	-0.19**
Belief in true LW headlines	-	-	-	-	-	-	-	-	-	-	-	-	0.12	0.09	0.09	0.15	0.08	0.11
Frequency of political news sharing on social media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.24	0.04	0.34***
Adjusted R²	.04			.04			.04			.10			.10			.20		
Change in F for R²	3.84**			.51			1.34			16.99***			1.92			34.56***		
ANOVA (p)	.005			.014			.021			< .001			< .001			< .001		

Significant predictor variables in bold.

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

†Gender was coded as -1 = women, 1 = men

Table L5 - Model 5.5b (belief in false RW headlines).

Variables	Block																	
	1			2			3			4			5			6		
	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>
Gender †	-0.15	0.08	-0.11	-0.12	0.08	-0.09	-0.18	0.08	-0.13*	-0.14	0.07	-0.11*	-0.18	0.07	-0.13*	-0.18	0.07	-0.13*
Age	0.00	0.00	-0.02	0.00	0.00	-0.05	-0.01	0.00	-0.15*	-0.01	0.00	-0.18**	-0.01	0.00	-0.18**	-0.01	0.00	-0.16**
Education level	-0.07	0.04	-0.12	-0.06	0.04	-0.10	-0.08	0.03	-0.14*	-0.05	0.03	-0.09	-0.05	0.03	-0.09	-0.05	0.03	-0.09
Frequency of social media use	-0.01	0.04	-0.02	-0.02	0.04	-0.03	-0.02	0.04	-0.03	-0.06	0.04	-0.08	-0.04	0.04	-0.05	-0.06	0.04	-0.09
Draws-to-decision (Beads Task)	-	-	-	-0.02	0.01	-0.12	-0.01	0.01	-0.06	-0.01	0.01	-0.03	0.00	0.01	-0.02	0.00	0.01	-0.02
CRT/CRT2 score	-	-	-	-0.02	0.02	-0.07	0.00	0.02	-0.01	0.00	0.02	0.00	0.01	0.02	0.02	0.00	0.02	0.01
Attention to detail (AD-ASD)	-	-	-	-	-	-	0.05	0.03	0.09	0.02	0.03	0.04	0.02	0.03	0.04	0.03	0.03	0.05
Social communication (SC-ASD)	-	-	-	-	-	-	0.00	0.04	0.00	0.00	0.04	0.00	0.02	0.03	0.03	0.02	0.03	0.04
Interpersonal (IP Schizotypy)	-	-	-	-	-	-	-0.01	0.06	-0.01	-0.02	0.05	-0.03	-0.02	0.05	-0.02	-0.02	0.05	-0.03
Cognitive-Perceptual (CP Schizotypy)	-	-	-	-	-	-	0.21	0.07	0.23**	0.18	0.07	0.20**	0.12	0.06	0.12	0.13	0.06	0.14*
Disorganised (D Schizotypy)	-	-	-	-	-	-	-0.28	0.05	-0.41***	-0.21	0.05	-0.31***	-0.18	0.05	-0.26***	-0.17	0.05	-0.25***
Social anxiety (SA Schizotypy)	-	-	-	-	-	-	-0.09	0.05	-0.15	-0.03	0.04	-0.05	-0.05	0.04	-0.08	-0.06	0.04	-0.10
Political orientation	-	-	-	-	-	-	-	-	-	0.10	0.01	0.45***	0.07	0.01	0.32***	0.06	0.01	0.27***
Engagement with false RW headlines	-	-	-	-	-	-	-	-	-	-	-	-	0.15	0.03	0.26***	0.18	0.04	0.32***
Frequency of political news sharing on social media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.08	0.03	-0.15**
Adjusted R²	.02			.03			.16			.33			.37			.39		
Change in F for R²	2.25			2.88			8.02***			70.51***			18.60***			7.52**		
ANOVA (p)	.064			.024			< .001			< .001			< .001			< .001		

Significant predictor variables in bold.

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

†Gender was coded as -1 = women, 1 = men

Table L6 - Model 5.6b (belief in false LW headlines).

Variables	Block																	
	1			2			3			4			5			6		
	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>
Gender †	0.06	0.06	0.06	0.08	0.06	0.08	0.09	0.06	0.09	0.08	0.06	0.07	0.05	0.06	0.05	0.06	0.06	0.05
Age	-0.01	0.00	-0.22***	-0.01	0.00	-0.24***	-0.01	0.00	-0.21**	-0.01	0.00	-0.19**	-0.01	0.00	-0.19**	-0.01	0.00	-0.17**
Education level	-0.01	0.03	-0.01	0.00	0.03	0.00	0.01	0.03	0.02	-0.01	0.03	-0.02	0.00	0.03	0.00	0.00	0.03	0.00
Frequency of social media use	-0.04	0.03	-0.07	-0.04	0.03	-0.08	-0.05	0.03	-0.08	-0.02	0.03	-0.04	-0.02	0.03	-0.04	-0.04	0.03	-0.08
Draws-to-decision (Beads Task)	-	-	-	-0.01	0.01	-0.06	-0.01	0.01	-0.05	-0.01	0.01	-0.08	-0.01	0.01	-0.07	-0.01	0.01	-0.07
CRT/CRT2 score	-	-	-	-0.02	0.02	-0.07	-0.02	0.02	-0.07	-0.02	0.02	-0.08	-0.02	0.02	-0.08	-0.03	0.02	-0.09
Attention to detail (AD-ASD)	-	-	-	-	-	-	-0.01	0.02	-0.03	0.00	0.02	0.00	0.00	0.02	0.01	0.01	0.02	0.03
Social communication (SC-ASD)	-	-	-	-	-	-	0.04	0.03	0.11	0.04	0.03	0.11	0.05	0.03	0.12	0.05	0.03	0.12
Interpersonal (IP Schizotypy)	-	-	-	-	-	-	-0.03	0.05	-0.06	-0.02	0.05	-0.04	-0.03	0.04	-0.05	-0.03	0.04	-0.06
Cognitive-Perceptual (CP Schizotypy)	-	-	-	-	-	-	0.10	0.06	0.14	0.12	0.06	0.16*	0.10	0.06	0.13	0.11	0.06	0.15*
Disorganised (D Schizotypy)	-	-	-	-	-	-	-0.02	0.04	-0.04	-0.06	0.04	-0.12	-0.07	0.04	-0.13	-0.07	0.04	-0.13
Social anxiety (SA Schizotypy)	-	-	-	-	-	-	0.02	0.04	0.04	-0.02	0.04	-0.04	-0.01	0.04	-0.03	-0.02	0.04	-0.05
Political orientation	-	-	-	-	-	-	-	-	-	-0.06	0.01	-0.33***	-0.05	0.01	-0.30***	-0.05	0.01	-0.31***
Engagement with false LW headlines	-	-	-	-	-	-	-	-	-	-	-	-	0.10	0.04	0.15*	0.13	0.04	0.19**
Frequency of political news sharing on social media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.06	0.03	-0.15*
Adjusted R²				.05			.05			.15			.17			.18		
Change in F for R²				4.46**			1.58			30.87***			6.64*			6.08*		
ANOVA (p)				.002			.002			< .001			< .001			< .001		

Significant predictor variables in bold.

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

†Gender was coded as -1 = women, 1 = men

Table L7 - Model 5.7b - Hierarchical regression (belief in true RW headlines).

Variables	Block																	
	1			2			3			4			5			6		
	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>	<i>B</i>	<i>SEB</i>	<i>b</i>
Gender †	0.09	0.07	0.08	0.11	0.07	0.09	0.10	0.08	0.09	0.12	0.07	0.10	0.08	0.07	0.07	0.08	0.07	0.07
Age	0.00	0.00	0.03	0.00	0.00	0.01	0.00	0.00	-0.06	0.00	0.00	-0.08	0.00	0.00	-0.08	0.00	0.00	-0.07
Education level	-0.02	0.03	-0.03	-0.01	0.03	-0.02	-0.02	0.03	-0.04	-0.01	0.03	-0.02	-0.02	0.03	-0.03	-0.02	0.03	-0.03
Frequency of social media use	-0.04	0.04	-0.07	-0.05	0.04	-0.07	-0.04	0.04	-0.06	-0.06	0.04	-0.09	-0.04	0.04	-0.06	-0.05	0.04	-0.08
Draws-to-decision (Beads Task)	-	-	-	-0.01	0.01	-0.09	-0.01	0.01	-0.10	-0.01	0.01	-0.08	-0.01	0.01	-0.07	-0.01	0.01	-0.07
CRT/CRT2 score	-	-	-	-0.01	0.02	-0.04	-0.01	0.02	-0.04	-0.01	0.02	-0.03	0.00	0.02	0.00	0.00	0.02	0.00
Attention to detail (AD-ASD)	-	-	-	-	-	-	0.06	0.03	0.14*	0.05	0.03	0.12	0.05	0.03	0.12	0.06	0.03	0.12*
Social communication (SC-ASD)	-	-	-	-	-	-	-0.02	0.04	-0.05	-0.02	0.04	-0.05	-0.02	0.04	-0.05	-0.02	0.04	-0.05
Interpersonal (IP Schizotypy)	-	-	-	-	-	-	-0.07	0.06	-0.11	-0.08	0.05	-0.12	-0.06	0.05	-0.10	-0.06	0.05	-0.10
Cognitive-Perceptual (CP Schizotypy)	-	-	-	-	-	-	-0.02	0.07	-0.02	-0.03	0.07	-0.04	-0.08	0.07	-0.10	-0.08	0.07	-0.09
Disorganised (D Schizotypy)	-	-	-	-	-	-	-0.11	0.05	-0.18*	-0.08	0.05	-0.13	-0.07	0.05	-0.11	-0.06	0.05	-0.10
Social anxiety (SA Schizotypy)	-	-	-	-	-	-	0.01	0.04	0.02	0.03	0.04	0.07	0.03	0.04	0.06	0.03	0.04	0.05
Political orientation	-	-	-	-	-	-	-	-	-	0.05	0.01	0.23***	0.03	0.01	0.13	0.02	0.01	0.11
Engagement with true RW headlines	-	-	-	-	-	-	-	-	-	-	-	-	0.12	0.04	0.23**	0.14	0.04	0.25***
Frequency of political news sharing on social media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.03	0.03	-0.07
Adjusted R²	.00			.00			.05			.09			.13			.13		
Change in F for R²	.75			1.62			3.45**			13.68***			11.78**			1.00		
ANOVA (p)	.561			.401			.009			< .001			< .001			< .001		

Significant predictor variables in bold.

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

†Gender was coded as -1 = women, 1 = men

Table L8 - Model 5.8b (belief in true LW headlines).

Variables	Block																	
	1			2			3			4			5			6		
	<i>B</i>	<i>SE</i> <i>B</i>	<i>b</i>	<i>B</i>	<i>SE</i> <i>B</i>	<i>b</i>	<i>B</i>	<i>SE</i> <i>B</i>	<i>b</i>									
Gender †	0.20	0.07	0.16**	0.20	0.08	0.16**	0.23	0.08	0.19**	0.21	0.07	0.17**	0.19	0.08	0.16*	0.19	0.07	0.15*
Age	0.00	0.00	-0.08	0.00	0.00	-0.09	0.00	0.00	-0.07	0.00	0.00	-0.05	0.00	0.00	-0.06	0.00	0.00	-0.05
Education level	0.04	0.03	0.07	0.04	0.03	0.07	0.04	0.03	0.08	0.03	0.03	0.05	0.02	0.03	0.04	0.02	0.03	0.04
Frequency of social media use	-0.09	0.04	-0.13*	-0.09	0.04	-0.13*	-0.08	0.04	-0.12*	-0.06	0.04	-0.09	-0.05	0.04	-0.08	-0.07	0.04	-0.10
Draws-to-decision (Beads Task)	-	-	-	0.00	0.01	0.01	-0.01	0.01	-0.04	-0.01	0.01	-0.06	-0.01	0.01	-0.06	-0.01	0.01	-0.06
CRT/CRT2 score	-	-	-	0.00	0.02	-0.01	-0.01	0.02	-0.03	-0.01	0.02	-0.04	-0.01	0.02	-0.03	-0.01	0.02	-0.04
Attention to detail (AD-ASD)	-	-	-	-	-	-	-0.01	0.03	-0.01	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.03	0.03
Social communication (SC-ASD)	-	-	-	-	-	-	-0.08	0.04	-0.18*	-0.08	0.04	-0.18*	-0.08	0.04	-0.17*	-0.08	0.04	-0.17*
Interpersonal (IP Schizotypy)	-	-	-	-	-	-	-0.01	0.06	-0.01	0.00	0.05	0.00	0.00	0.05	0.00	0.00	0.05	0.00
Cognitive-Perceptual (CP Schizotypy)	-	-	-	-	-	-	-0.21	0.07	0.24**	-0.19	0.07	-0.22**	-0.20	0.07	-0.23**	-0.19	0.07	-0.22**
Disorganised (D Schizotypy)	-	-	-	-	-	-	0.05	0.05	0.08	0.01	0.05	0.01	0.01	0.05	0.01	0.01	0.05	0.01
Social anxiety (SA Schizotypy)	-	-	-	-	-	-	0.15	0.04	0.29**	0.12	0.04	0.23**	0.12	0.04	0.23**	0.12	0.04	0.23**
Political orientation	-	-	-	-	-	-	-	-	-	-0.06	0.01	0.29***	-0.06	0.01	0.27***	-0.06	0.01	0.27***
Engagement with true LW headlines	-	-	-	-	-	-	-	-	-	-	-	-	0.06	0.04	0.08	0.08	0.04	0.11
Frequency of political news sharing on social media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.04	0.03	-0.09
Adjusted R²	.03			.03			.08			.15			.15			.16		
Change in F for R²	3.38*			.02			3.60**			23.76***			1.92			1.97		
ANOVA (p)	.010			.039			.001			< .001			< .001			< .001		

Significant predictor variables in bold. **p* < .05. ***p* < .01. ****p* < .001. †Gender was coded as -1 = women, 1 = men

Appendix M - SPQ-BRU subscale analysis

M1 Schizotypy subscales: rationale for reanalysis

While studies 1 & 2 demonstrated that schizotypy domain measures were useful in predicting misinformation vulnerability, we did not explore the significance of any individual subscales. Examining the schizotypy subscales (reflecting more specific manifestations of schizotypal traits) can provide a slightly clearer perspective on the pattern of association between specific schizotypal traits and outcomes measures.

For example, the Cognitive-Perceptual (CP) schizotypy domain of the SPQ-BRU incorporates the following subscale measures: Magical Thinking, Unusual Perceptions, Ideas of Reference, and Suspiciousness. While this cluster of traits may share underlying cognitive roots (e.g., hypermentalisation, increased perception of meaning in randomness, intuitive reasoning bias) their specific manifestations could provide additional insight into the phenomenology and personal motivations surrounding the established schizotypy-misinformation vulnerability relationship.

Therefore, data from study 1 & 2 will be re-examined using a series of regression models where schizotypy subscales are used instead of domain measures (for more details on the factorial structure of the SPQ-BRU see Davidson et al., 2016; Raine, 1991). Regression models will be designed to mirror each of the models from Study 1 & 2 that demonstrated a schizotypy domain measure to significantly predict either belief or engagement toward inaccurate (i.e. misinformation) stimuli.

M2 Schizotypy subscales: results of reanalysis

M2.1 Reanalysis of data from Study 1

Study 1 originally demonstrated that the Cognitive-Perceptual (CP) schizotypy domain measure significantly contributed to predicting engagement with right-wing misinformation stimuli (while no schizotypy domains were shown to significantly predict belief in misinformation stimuli). Therefore, a new regression model (Model M1) was created to predict engagement with inaccurate right-wing headlines using data from Study 1. This reanalysis used all 9 SPQ-BRU subscales and the significant predictors from the original regression model (see Table M1 for full list of variables and outcomes).

The regression analysis indicated that the Unusual Perceptions SPQ-BRU subscale significantly predicted engagement with inaccurate right-wing headlines ($\beta = .15, p = .046$). These

results are congruent with the previous findings from study 1, as the Unusual Perceptions subscale comprises part of the CP schizotypy domain.

Table M1 - Reanalysis of Study 1 data (including only significant predictors from original analysis and SPQ-BRU subscales in place of domain measures)

Corresponding Schizotypy Domain	Regression Variables	Model M1 (DV = Engagement with inaccurate RW headlines)		
		<i>B</i>	<i>SE B</i>	β
Cognitive Perceptual	Ideas of reference	0.19	0.40	0.04
	Suspiciousness	0.30	0.41	0.06
	Magical thinking	0.16	0.30	0.04
	Unusual perceptions	0.73	0.36	0.15*
Interpersonal	Constricted affect	-0.26	0.45	-0.04
	No close friends	-0.18	0.33	-0.04
Disorganised	Odd speech	-0.18	0.27	-0.05
	Eccentric behaviour	0.17	0.33	0.04
Social Anxiety	Social anxiety	-0.09	0.24	-0.03
	Belief in inaccurate RW headlines	2.14	0.42	0.29***
	Online news sharing behaviour	3.93	0.66	0.35***
	Adjusted R²	.29		
F	9.30***			

Significant predictor variables reported in bold.

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

M2.2 Reanalysis of data from Study 2

In Study 2 several schizotypy domains were shown to significantly predict misinformation belief (for both left and right-wing stimuli) and engagement (right-wing only). Engagement with right-wing misinformation was significantly predicted by CP and Social Anxiety (SA) schizotypy domain measures. In contrast, CP and Disorganised (D) schizotypy domain measures significantly predicted belief in right-wing misinformation. Finally, belief in left-wing misinformation was significantly predicted by CP schizotypy.

Therefore, three new regression models (Models M2, M3, and M4; See Table M2) were created using the data from Study 2 to predict: 1) engagement with inaccurate right-wing headlines, 2) belief in inaccurate right-wing headlines, 3) belief in inaccurate left-wing headlines. As with the reanalysis of Study 1 data, these new regression models utilised the SPQ-BRU subscales and significant predictors from their original models as independent variables (see Table x2 for full list of variables and outcomes).

Model M2 sought to predict measures of engagement with inaccurate right-wing headlines. The regression model results indicated that Odd Speech ($\beta = -.15, p = .016$) and Magical Thinking ($\beta = .11, p = .026$) SPQ-BRU subscales acted as significant predictors. Magical Thinking comprises part of the CP schizotypy domain (shown to be significant in the domain-level analysis in Study 2). At the same time, Odd Speech is part of the D schizotypy domain (which was not significant in the domain level analysis). While SA traits were significant in the original domain-level analysis they failed to significantly contribute to this regression model at the subscale-level of analysis. Gender also failed to achieve significance as a predictor variable, contrary to the outcomes of the original regression model in Study 2.

Model M3 sought to predict measures of belief in inaccurate right-wing headlines. The regression model results indicated that the only schizotypy sub-scale to significantly predict belief in right-wing misinformation was the Eccentric Behaviour measure ($\beta = -.17, p = .009$). The Eccentric Behaviour subscale is part of the D schizotypy domain, which was a significant predictor in the domain-level analysis conducted in Study 2. The domain-level analysis also indicated that CP schizotypy traits acted as a significant predictor, however none of the individual subscales that comprise the CP domain were shown to significantly predict belief in right-wing misinformation in the current analysis.

Model M4 sought to predict measures of belief in inaccurate left-wing headlines. The regression model results showed only the Eccentric Behaviour schizotypy subscale to significantly predict belief in left-wing misinformation ($\beta = -.16, p = .028$). This result was slightly unexpected, as

the domain-level analysis from Study 2 indicated only CP schizotypy traits to significantly predict belief in left-wing misinformation (and Eccentric Behaviour belongs to the D schizotypy domain). Furthermore, while Age significantly predict belief in inaccurate left-wing headlines in Study 2, the current results demonstrated Age did not significantly contribute to the regression model.

Table M2 - Reanalysis of Study 2 data (including only significant predictors from original analysis and SPQ-BRU subscales in place of domain measures)

Corresponding Schizotypy Domain	Regression Variables	Model M2 (DV = Engagement with inaccurate RW headlines)			Model M3 (DV = Belief in inaccurate RW headlines)			Model M4 (DV = Belief in inaccurate LW headlines)		
		<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Cognitive Perceptual	Ideas of reference	0.02	0.03	0.06	0.01	0.02	0.05	0.01	0.01	0.04
	Suspiciousness	0.02	0.03	0.05	0.02	0.02	0.09	0.01	0.01	0.05
	Magical thinking	0.04	0.02	0.11*	0.01	0.01	0.04	0.00	0.01	0.01
	Unusual Perceptions	0.01	0.02	0.02	0.00	0.01	0.02	0.02	0.01	0.13
Interpersonal	Constricted affect	-0.04	0.03	-0.09	0.00	0.02	0.01	0.01	0.02	0.05
	No close friends	0.01	0.02	0.02	-0.01	0.01	-0.04	0.00	0.01	-0.02
Disorganised	Odd speech	-0.04	0.02	-0.15*	-0.01	0.01	-0.08	0.00	0.01	-0.02
	Eccentric behaviour	0.01	0.02	0.04	-0.03	0.01	-0.17**	-0.02	0.01	-0.16*
Social Anxiety	Social anxiety	0.03	0.01	0.11	-0.01	0.01	-0.10	0.00	0.01	-0.01
	Gender (M=1, F=-1)	0.20	0.11	0.09	-0.18	0.07	-0.13**	-	-	-
	Age	-	-	-	-0.01	0.00	-0.16**	0.00	0.00	-0.12
	Political orientation (low scores = LW, high scores = RW)	0.16	0.02	0.43***	0.06	0.01	0.27***	-0.05	0.01	-0.31***
	Online news sharing behaviour	0.29	0.04	0.32***	-0.07	0.03	-0.13*	-0.05	0.02	-0.12*
	Belief in inaccurate RW headlines	0.49	0.09	0.28***	-	-	-	-	-	-
	Engagement with inaccurate RW headlines	-	-	-	0.19	0.04	0.32***	-	-	-
	Engagement with inaccurate LW headlines	-	-	-	-	-	-	0.13	0.04	0.20**
	Adjusted R²	.47			.38			.17		
	F	20.17***			13.05***			5.46***		

Significant predictor variables reported in bold.

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

M3 Discussion and interpretation of findings

M3.1 Reanalysis of Study 1 data

An exploration of the significance of individual schizotypy subscales using data from Study 1 demonstrated that the Unusual Perceptions subscale of the SPQ-BRU significantly predicted engagement with inaccurate right-wing headlines (with higher levels of Unusual Experience being associated with greater levels of engagement). Unusual Perceptions, within the context of schizotypal traits, refers to the tendency for an individual to experience perceptual and/or cognitive distortions. These might include hallucinations (e.g., hearing voices), bodily illusions (e.g., seeing faces morph in a mirror/picture), experiences involving “mindreading” (e.g., feeling that you can hear or influence other people’s thoughts), or the sensation of being in the company of a presence when alone (this can be interpreted as ghost/spirits, or sometimes the disembodied presence of a specific individual).

It has been previously shown that people who experience unusual perceptions (and other aspects of cognitive-perceptual schizotypy) tend to be more open and accepting toward strange and unusual beliefs (Dagnall et al., 2010, 2017; Wolfradt et al., 1999). This may reflect a more liberal threshold of acceptance toward unusual and unlikely events as, in the experience of those prone to unusual schizotypal experiences, their personal reality will have already shown itself to be somewhat unstable, unpredictable, and capable of “breaking the rules” of rationality. Alternatively, the tendency toward unusual perceptions may result from reasoning errors (e.g., overactive pattern recognition, erroneous perceptions of agency in randomness, overconfidence in subjective judgements, system 1 bias) which can interfere with meta-cognitive processes involved in error monitoring, sense-making, and reality testing. Therefore, the tendency for those who are prone to unusual schizotypal experiences to believe unusual and unlikely narratives may stem from a reduced capacity to dismiss dubious claims, arising from an inability to appropriately incorporate tell-tale markers of inauthenticity and low probability into their reasoning processes.

Regardless of the underlying reason, novel narratives and unlikely accounts of events (such as some of the dubious claims presented in online misinformation content) are less likely to be dismissed by those who have experienced strange and unusual things, which might help to explain why elevated levels of Unusual Perceptions were associated with an increase in engagement with right-wing misinformation.

M3.2 Reanalysis of Study 2 data

The reanalysis of data from Study 2 using schizotypy subscales in place of domain measures demonstrated that Odd Speech and Magical Thinking were significant predictors of engagement with

right-wing misinformation stimuli, with higher levels of Magical Thinking and Lower levels of Odd Speech being associated with an increase in right-wing misinformation engagement.

Odd Speech refers to the tendency to ramble, frequently engage in tangents, abruptly switch subjects during conversation, lose track of what you were talking about, and generally speak unusually. It has been suggested that this schizotypal trait may stem from atypical semantic processing exacerbated by stress, resulting in unusual semantic associations when forming and arranging language (Minor et al., 2011). Why Odd Speech would be negatively associated with engagement with right-wing misinformation is not entirely clear, however it may be the case that atypical semantic processing of misinformation reduces its efficacy in convincing the reader to propagate it further (i.e., perhaps cognitive disorganisation reduces the efficacy of the misinformation's message to evoke intuitive and emotional responses).

Magical Thinking refers to the tendency to make sense of the world non-rationally, leaning toward the belief that unseen forces or thought alone can influence and shape reality (Elek et al., 2021; Saarinen et al., 2022). This trait may arise from the need to make sense of schizotypy related perceptual distortions and can be expressed as belief in concepts such as telepathy, miracles, prophetic dreams, or contact with the dead (Mohr & Claridge, 2015). Magical thinking is also associated with reports of paranormal, mystical, or otherwise anomalous personal experiences. The association between increased levels of Magical Thinking and engagement with inaccurate right-wing headlines might reflect a more permissive threshold of believability (as discussed previously in relation to Unusual Perceptions), or perhaps reflect a receptivity to non-rational argumentation strategies (e.g. arguments based purely on emotion or the invocation of magical concepts).

Regarding belief in both left-wing and right-wing misinformation, it was demonstrated that Eccentric Behaviour significantly predicted both outcomes (as Eccentric Behaviour traits increased, the tendency to believe either left-wing or right-wing misinformation decreased). Eccentric Behaviour traits, within the context of schizotypy, refer to an awareness of other people perceiving their behaviour as strange, unusual, or eccentric. This trait often reflects unusual habits, mannerisms, or a general reluctance to adhere to typical social norms. Why these traits would be negatively associated with belief in left- or right-wing misinformation is not particularly obvious. However, as one of the components of the D schizotypy domain (along with Odd Speech), it may be that as cognitive disorganisation levels increase the efficacy of misinformation argumentation becomes reduced due to idiosyncratic processing.

M3.3 Conclusion

The reanalysis of Study 1 & 2 data using SPQ-BRU subscales in place of domain measures has provided a somewhat mixed set of results. While some of the results appear to provide additional insight into the relationships highlighted in the original analyses (such as the prominent role of specific CP schizotypy subscales in the prediction of right-wing misinformation engagement), other results do not align with the original analyses (such as the lack of significant CP subscales predicting either left- or right-wing belief measures despite the domain measure being significant). These findings imply that while using SPQ-BRU sub-scales provides insight into particularly strong relationships between specific lower-order traits and vulnerability measures, composite schizotypy domain measures may capture patterns of association that would go unnoticed at the lower-order level.

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Appendix N - Discernment analysis

N1 Discernment measures: rationale for reanalysis

Belief measures in the original Studies 1 & 2 analyses were calculated by averaging the responses to questions that asked participants to numerically rate the extent to which they believed the presented stimuli were factually accurate. Separate belief scores were calculated for true and false stimuli (as well as left-wing and right-wing in Study 2).

These scores reflected the extent to which participants endorsed the presented stimuli group as accurate; however, they did not inform us of an individual's likelihood of believing false information *relative* to accurate information.

In contrast, there is an approach to calculating belief in true and false materials known as "truth discernment". Truth discernment is calculated by subtracting the belief score of false content from the belief score of accurate content (creating a measure similar to 'sensitivity' in signal detection theory).

A truth discernment measure would indicate either a tendency to believe accurate information over false information (reflected in positive score values) or a tendency to believe false information over accurate information (reflected in negative score values). Factors associated with a reduced ability to discern truth (or perhaps even a bias toward endorsing false information over accurate information) potentially have severe implications for misinformation vulnerability.

Using truth discernment measures, we can explore how the variables of interest included in the present study relate to the ability to discern truth from misinformation. We can also explore the potential predictive utility of truth discernment as a predictor of misinformation vulnerability.

Furthermore, the same approach to calculating and analysing truth discernment using belief measures can be applied to engagement measures that have been collected, creating an "engagement discernment" score that reflects an individual's tendency to engage with truthful stimuli relative to inaccurate stimuli. The calculation of engagement discernment will provide similar insights to truth discernment, allowing for an exploration of how likely it is for a participant to engage with misinformation and their preferences for engaging with accurate vs misinformation content.

Therefore, data from both previous studies will be reanalysed, and discernment scores (truth and engagement discernment) will be calculated and analysed.

First, discernment scores will be used in regression models as the dependent variable, along with a range of predictor variables used in the original misinformation belief/engagement analyses.

Next, discernment scores will be added to the existing regression models predicting misinformation vulnerability outcomes (i.e., belief/engagement with misinformation stimuli) to explore their potential predictive value alongside the already established significant predictors.

N2 Calculation of discernment measures and distributions of scores

Truth and engagement discernment scores were calculated using data from Study 1 and Study 2 (see Table N1 for descriptive statistics).

G2.1 Study 1 data

The distribution of truth discernment scores calculated using the data from Study 1 demonstrated a normal distribution with a slight negative skew and a mean above zero (see Figure N1 A), indicating a general tendency for the participants to believe accurate headlines over inaccurate headlines. Roughly 10% of the sample had a truth discernment score below zero, implying that these individuals tended to believe erroneous information more than accurate information. An additional 10% of participants demonstrated roughly equal preference toward belief in accurate and inaccurate stimuli (represented by zero scores).

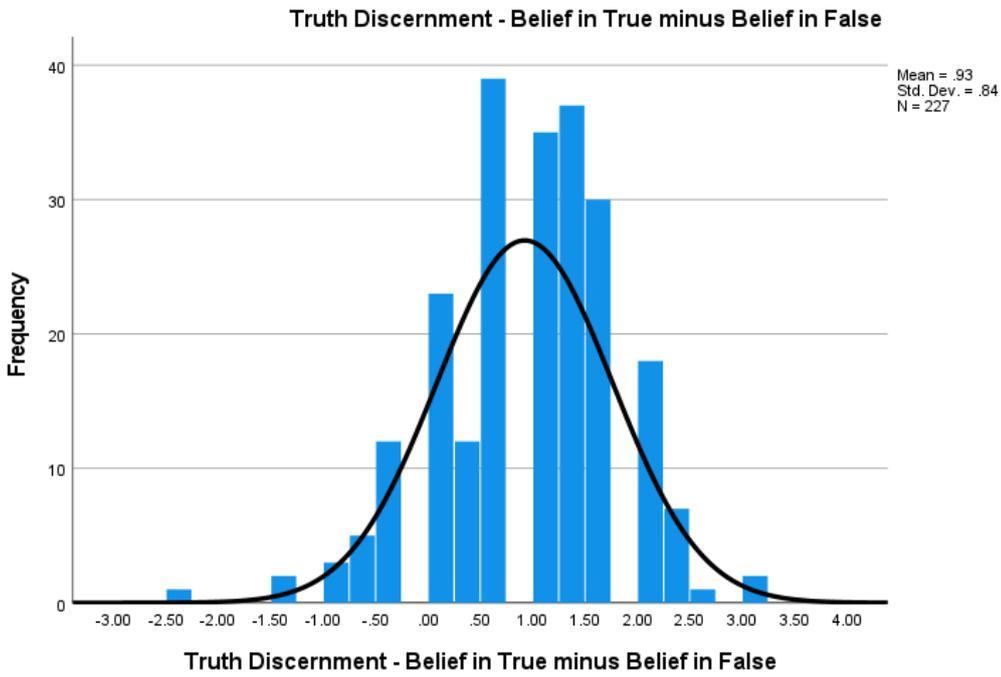
The distribution of engagement discernment scores also demonstrated a normal distribution and a mean above zero (see Figure N1 B), indicating a general tendency for the participants to engage with accurate headlines over inaccurate headlines. Roughly 21% of the sample had an engagement discernment score below zero, implying that these individuals tended to engage with inaccurate rather than accurate information. An additional 20% of participants demonstrated roughly equal preference toward engaging with accurate and inaccurate stimuli (i.e., a score of zero).

Discernment measures were then entered into a correlation matrix, along with all demographic, predictor, and outcome variables utilised in the original regression analyses (see Table N2). The correlation matrix was then assessed for signs of multicollinearity (e.g. a correlation between predictor variables $>.70$; Daoud, 2017), which was not found.

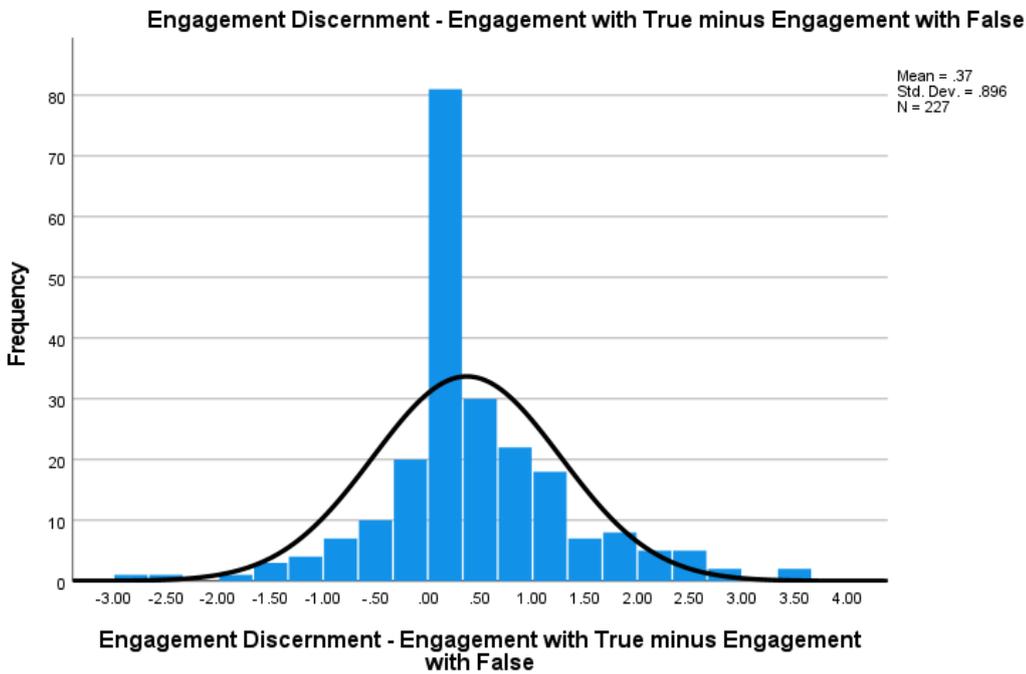
Table N1 - Descriptive statistics for discernment measures calculated using data from both Study 1 and Study 2.

Variables			Skewness		Kurtosis	
	<i>M</i>	<i>SD</i>	Statistic	Std. Error	Statistic	Std. error
Study 1 Data						
Truth Discernment (RW)	.93	.84	-.49	.16	.57	.32
Engagement Discernment (RW)	.37	.90	.46	.16	1.80	.32
Study 2 Data						
Truth Discernment (Bipartisan)	1.00	.57	.33	.15	-.03	.29
Truth Discernment (RW)	.89	.69	.30	.15	-.02	.29
Truth Discernment (LW)	1.11	.68	-.08	.15	-.17	.29
Engagement Discernment (Bipartisan)	.13	.52	.60	.15	2.29	.29
Engagement Discernment (RW)	.12	.64	-.22	.15	4.93	.29
Engagement Discernment (LW)	.16	.72	.38	.15	5.21	.29

Figure N1 - Distribution of discernment scores calculated using data from Study 1.



A) Distribution of truth discernment scores (with possible scores ranging from -3 to 3).



B) Distribution of engagement discernment scores (with possible scores ranging from -5 to 5).

Table N2 - Bivariate correlation matrix comparing discernment measures to demographic measures and all IV/DV variables from the regression analyses conducted in study 1.

Variables	Correlation (Pearson's <i>r</i>)	
	Truth Discernment (RW headlines)	Engagement Discernment (RW headlines)
1) Truth Discernment (RW headlines)	1.00	-
2) Engagement discernment (RW headlines)	0.30***	1.00
3) Gender (M=1, F=-1)	0.08	0.03
4) Age	0.00	0.17*
5) Education level	-0.04	0.09
6) Frequency of social media use	0.02	0.10
7) Political orientation	0.01	0.03
8) Frequency of political news sharing on social media	0.00	0.13
9) CRT/CRT2 scores	0.17**	-0.02
10) Attention to detail (ASD)	-0.05	0.08
11) Social communication (ASD)	-0.03	-0.20**
12) Interpersonal (IP Schizotypy)	-0.03	-0.10
13) Cognitive-Perceptual (CP Schizotypy)	-0.06	-0.08
14) Disorganised (D Schizotypy)	-0.02	-0.14*
15) Social anxiety (SA Schizotypy)	0.03	-0.17*
16) Engagement with false RW headlines.	-0.13*	-0.35***
17) Belief in false RW headlines	-0.60***	-0.21***
18) Engagement with true RW headlines	0.09	0.39***
19) Belief in true RW headlines	0.48***	0.16*

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

Small effect size ($r > .15$) highlighted in green. **Medium** effect size ($r > .25$) highlighted in yellow. **Large** effect size ($r > .35$) highlighted in red.

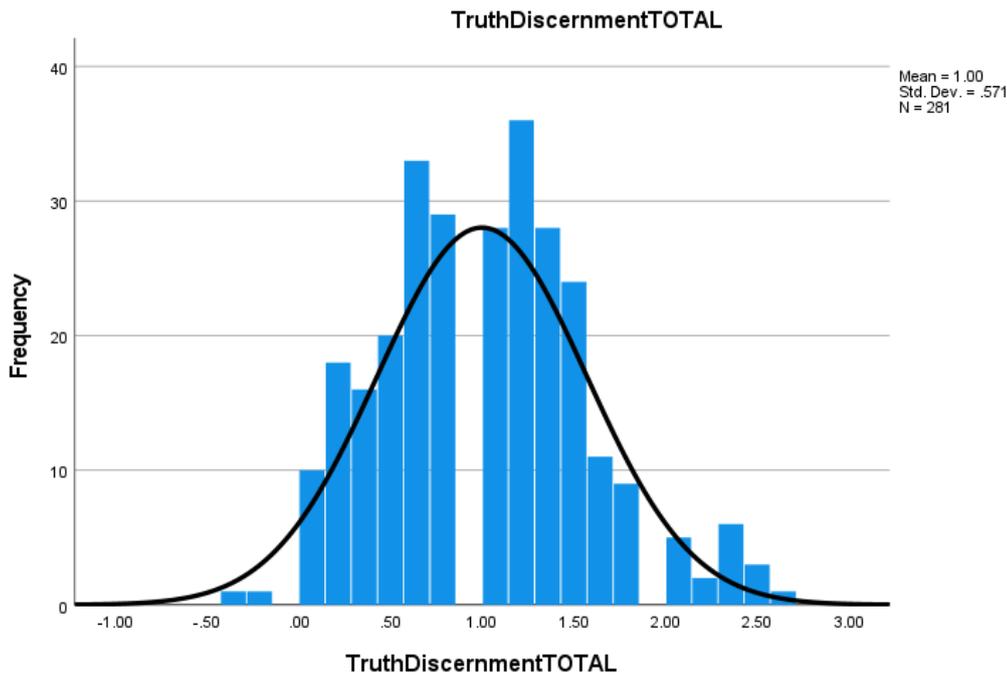
N2.2 Study 2 data

The distribution of Bipartisan Truth Discernment scores calculated from Study 2 (see Figure N2 A) was normally distributed with a mean above zero, indicating a tendency for participants to believe accurate headlines over inaccurate headlines regardless of partisan appeal. Less than 1% of participants had a score below zero (indicating a tendency to believe false information more frequently than accurate information) while 4% of participants indicated roughly equal endorsement of false and accurate headlines (indicated by a score of zero). Similarly, the distribution of RW Truth Discernment scores (Figure N2 A) and LW Truth Discernment scores (Figure N3 A) also indicated that most participants believed accurate headlines more frequently than inaccurate headlines. Around 5% of participants indicated a tendency to believe inaccurate RW headlines over accurate RW headlines, and a further 9% displayed equal support for accurate and inaccurate headlines. Similarly, 3% of participants indicated a tendency to believe inaccurate LW headlines over accurate LW headlines, while another 6% displayed equal support between accurate and inaccurate headlines.

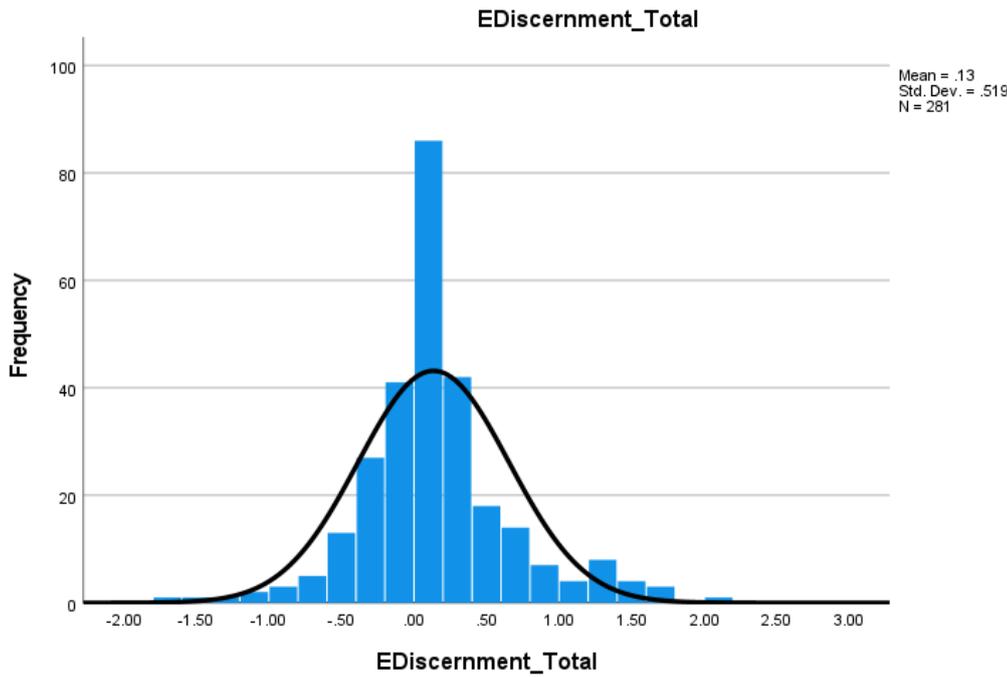
Bipartisan Engagement Discernment scores (Figure N2 B) indicated that participants generally engaged with accurate headlines over inaccurate headlines. However, 34% of participants tended to engage with inaccurate headlines more than accurate ones, and a further 15% displayed equal support for inaccurate and accurate headlines. Upon separately examining the distribution of Engagement Discernment scores for RW headlines (Figure N2 B) and LW headlines (Figure N3 B), it was demonstrated that a sizeable minority of participants displayed a bias in favour of engaging with inaccurate headlines (28% for RW headlines, 25% for LW headlines) and those who equally engaged with inaccurate and accurate headlines were numerous (26% for RW headlines, 29% for LW headlines). Subsequently, a minority of participants were shown to engage with more accurate than inaccurate headlines (46% for both RW and LW headlines).

All discernment measures were entered into a correlation matrix, along with all predictor and outcome measures utilised in the original regression analyses (see Table N3). The correlation matrix was then assessed for correlations between predictor variables $>.70$ as an indicator of multicollinearity (Daoud, 2017). While some of the variables did display correlations above $.70$, none of these variables would be included simultaneously as predictors in the planned analysis, therefore these relationships pose no issue. Discernment measures were shown to significantly correlate with each other (with significant r values ranging from $.12$ - $.84$), with the exception of LW Truth Discernment and RW Engagement Discernment (which demonstrated a weak and nonsignificant positive correlation with each other). It is worth noting that the correlation between RW Truth Discernment and LW Engagement Discernment was also weak, despite reaching a level of statistical significance (with an r value falling below $.15$, which has been suggested as a minimum effect size of interest in correlational individual differences research (Gignac & Szodorai, 2016).

Figure N2 - Distribution of bipartisan discernment scores calculated using data from Study 2.

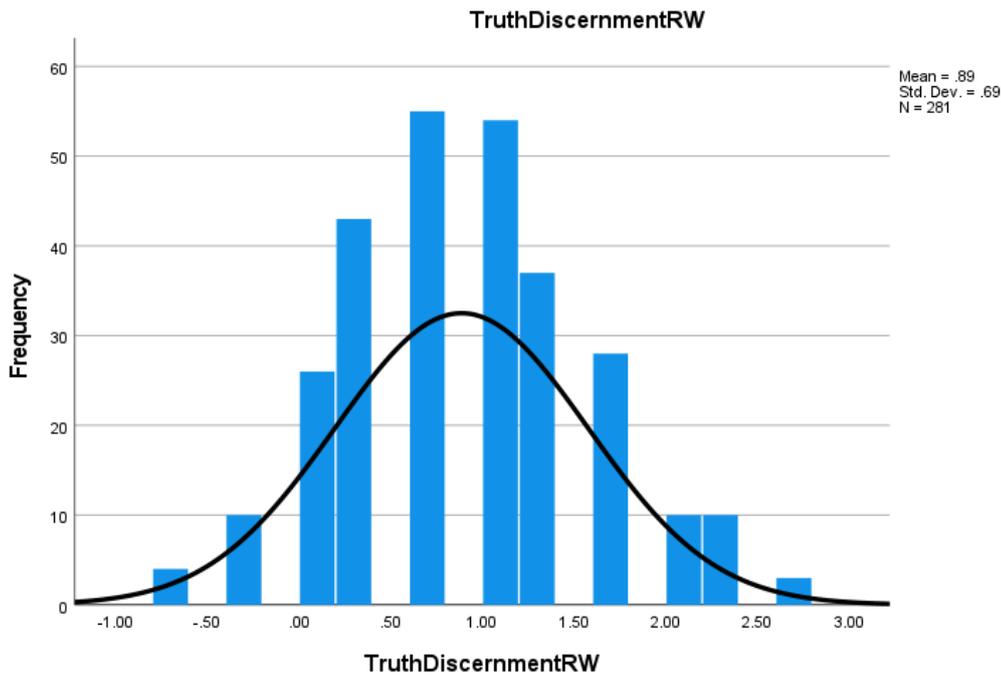


A) Distribution of bipartisan Truth Discernment scores (with possible scores ranging from -3 to 3).

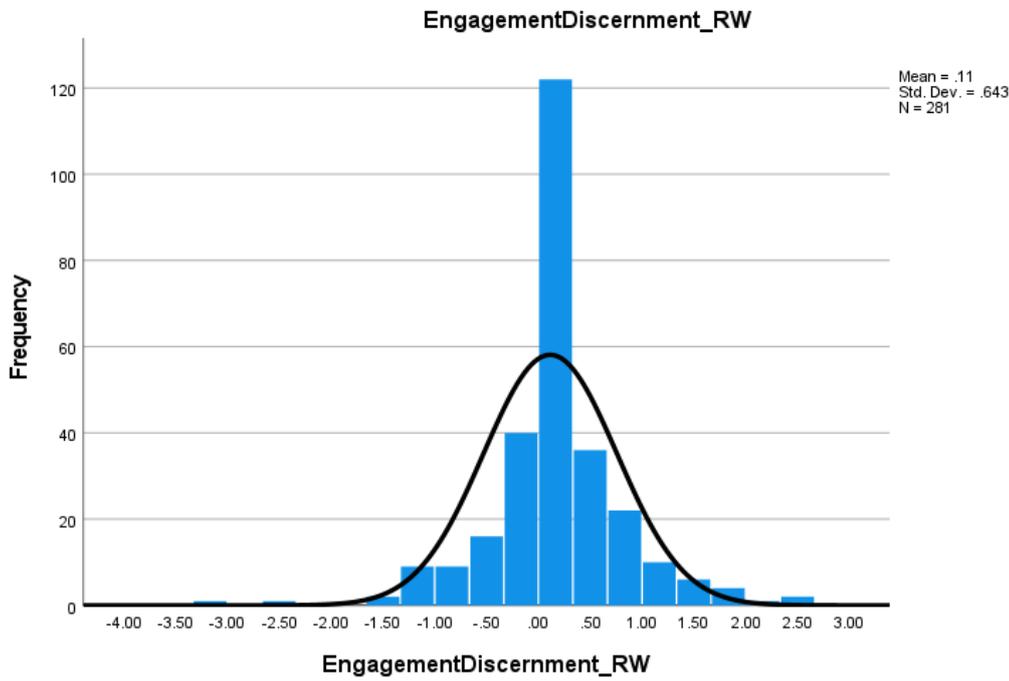


B) Distribution of bipartisan Engagement Discernment scores (with possible scores ranging from -5 to 5).

Figure N3 - Distribution of right-wing discernment scores calculated using data from Study 2.

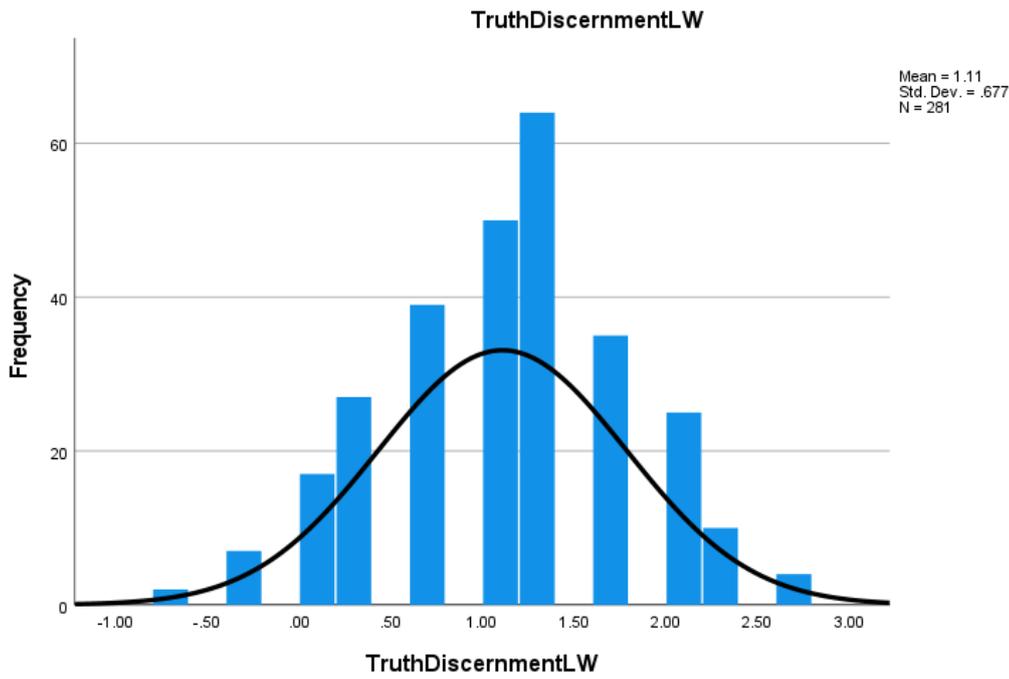


A) Distribution of right-wing Truth Discernment scores (possible scores range from -3 to 3).

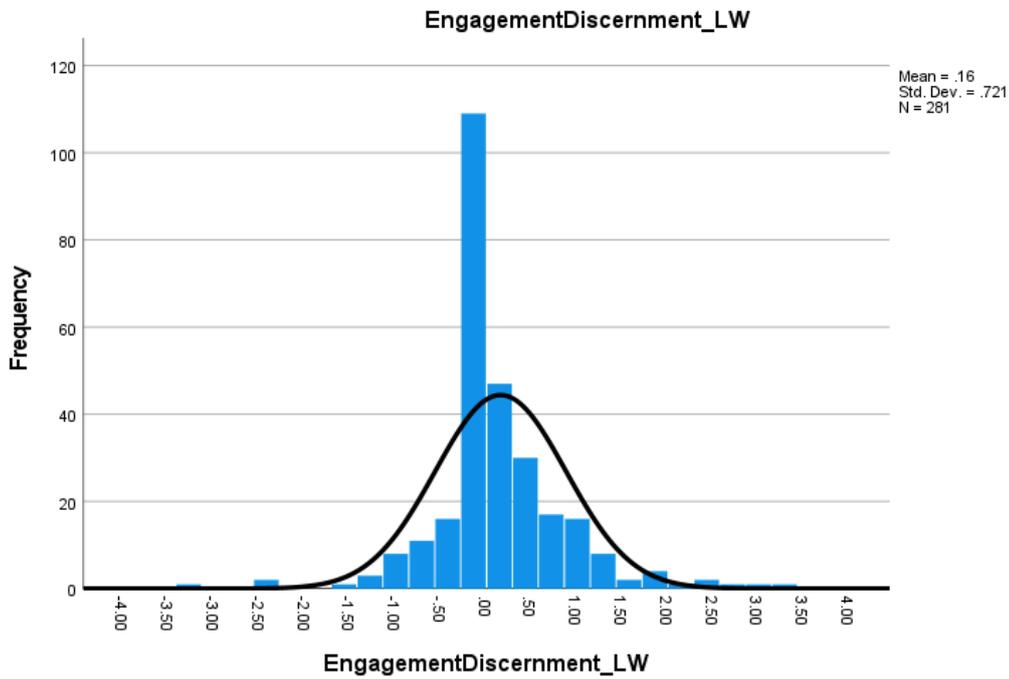


B) Distribution of right-wing Engagement Discernment scores (possible scores range from -5 to 5).

Figure N4 - Distribution of left-wing discernment scores calculated using data from Study 2.



A) Distribution of left-wing Truth Discernment scores (possible scores range from -3 to 3).



B) Distribution of left-wing Engagement Discernment scores (possible scores range from -5 to 5).

Table N3 - Bivariate correlation matrix comparing discernment measures to demographic measures and all IV/DV variables from the regression analyses conducted in Study 2

Variables	Correlation (Pearson's r)					
	Truth Discernment			Engagement Discernment		
	Bipartisan	RW	LW	Bipartisan	RW	LW
1) Truth Discernment (Bipartisan)	1.00					
2) Truth Discernment (RW)	0.84***	1.00				
3) Truth Discernment (LW)	0.83***	0.40***	1.00			
4) Engagement Discernment (Bipartisan)	0.28***	0.23***	0.24***	1.00		
5) Engagement Discernment (RW)	0.19**	0.23***	0.08	0.73***	1.00	
6) Engagement Discernment (LW)	0.23***	0.12*	0.26***	0.79***	0.16**	1.00
7) Gender (M=1, F=-1)	0.17**	0.18**	0.10	0.12	0.06	0.11
8) Age	0.10	0.07	0.09	0.12*	0.03	0.15**
9) Education level	0.10	0.10	0.08	0.18**	0.10	0.18**
10) Frequency of social media use (lower scores = more frequent use)	-0.01	0.01	-0.02	-0.03	-0.01	-0.03
11) Frequency of political news sharing on social media	0.05	0.07	0.00	0.16**	0.08	0.16**
12) Political orientation (low scores = LW, high scores = RW)	-0.17**	-0.25***	-0.04	-0.12*	-0.16**	-0.03
13) Draws to decision (JTC)	0.06	0.04	0.06	0.04	-0.01	0.06
14) CRT/CRT2 scores	0.09	0.07	0.07	-0.01	-0.01	0.00
15) Attention to detail (ASD)	-0.03	0.02	-0.06	-0.03	-0.05	0.00
16) Social communication (ASD)	-0.07	0.01	-0.12*	0.00	0.09	-0.08
17) Interpersonal (IP Schizotypy)	-0.10	-0.05	-0.11	-0.11	-0.03	-0.12*
18) Cognitive-Perceptual (CP Schizotypy)	-0.23***	-0.14*	-0.25***	-0.12*	-0.05	-0.12*
19) Disorganised (D Schizotypy)	0.01	0.07	-0.06	-0.07	0.03	-0.13*
20) Social anxiety (SA Schizotypy)	0.02	0.05	-0.01	-0.12*	-0.01	-0.17**
21) Engagement with false RW headlines	-0.20***	-0.22***	-0.11	-0.15*	-0.32***	0.07
22) Engagement with false LW headlines	-0.09	-0.01	-0.14*	-0.13*	0.14	-0.31***
23) Belief in false RW headlines	-0.42***	-0.61***	-0.09	-0.16**	-0.20***	-0.05
24) Belief in false LW headlines	-0.33***	-0.07	-0.49***	-0.06	0.10	-0.18**
25) Engagement with true RW headlines	-0.10	-0.10	-0.06	0.27***	0.25***	0.16**
26) Engagement with true LW headlines	0.11	0.09	0.09	0.53***	0.25***	0.55***
27) Belief in true RW headlines	0.50***	0.48***	0.36***	0.09	0.04	0.09
28) Belief in true LW headlines	0.63***	0.37***	0.69***	0.21**	0.17**	0.14*

Significant correlations shown in bold.

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

Small effect size ($r > .15$) highlighted in green.

Medium effect size ($r > .25$) highlighted in yellow.

N3 Regression analysis - predictors of discernment measures

N3.1 Reanalysis of data from Study 1

N3.1.1 Predictors of discernment measures

Two regression models were created to predict the discernment measures that were calculated using data from Study 1 (Models 3a and 3b; see Table N4). The predictor variables included in these regression models consisted of all predictor variables included in the original analyses, except for belief/engagement measures. In place of the original belief/engagement measures, discernment measures were used as predictors (with truth discernment used as a predictor of engagement discernment and vice versa).

Model 3a sought to predict Truth Discernment toward RW headlines (the only type of headlines used in Study 1). The regression analysis was significant ($F(13,213) = 2.90, p < .001$) with an adjusted $R^2 = .10$. The results of the analysis indicated that Engagement Discernment ($\beta = .33, p < .001$) and CRT/CRT2 scores ($\beta = .18, p = .008$) acted as significant predictors.

Model 3b sought to predict Engagement Discernment toward RW headlines. The regression analysis was significant ($F(13,213) = 3.87, p < .001$) with an adjusted $R^2 = .14$. The results of the analysis indicated that the only significant predictor was Truth Discernment ($\beta = .31, p < .001$).

N.3.1.2 Discernment measures as predictors of misinformation vulnerability

Two additional regression models were also created to explore the use of discernment measures as predictors of misinformation belief and misinformation engagement (Models 3c and 3d; see Table N4). The predictor variables included in these regression models consisted of all predictor variables included in the original analyses in addition to discernment measures (with Truth Discernment used as a predictor of misinformation engagement and Engagement Discernment used as a predictor of misinformation belief).

Model 3c sought to predict engagement with false RW headlines. The regression analysis was significant ($F(14,212) = 7.60, p < .001$) with an adjusted $R^2 = .29$. However, truth discernment was not shown to contribute significantly to the prediction of engagement with false RW headlines.

Model 3d sought to predict belief in false RW headlines. The regression analysis was significant ($F(14,212) = 4.04, p < .001$) with an adjusted $R^2 = .16$. The results of the analysis indicated that CRT/CRT2 scores ($\beta = -.14, p = .035$), engagement with false RW headlines ($\beta = .15, p < .001$), and Engagement Discernment ($\beta = -.17, p = .022$) were significant predictors of belief in false RW headlines.

Table N4 - Regression models with discernment measures as DVs and predictors of misinformation vulnerability (using data from Study 1)

Variables	Model 3a (DV = Truth discernment)			Model 3b (DV = Engagement discernment)			Model 3c (DV = engagement with false RW headlines)			Model 3d (DV = belief in false RW headlines)		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
1. Gender (M=1, F=-1)	0.14	0.11	0.08	-0.04	0.12	-0.02	0.23	0.14	0.10	-0.14	0.09	-0.10
2. Age	0.00	0.00	-0.04	0.01	0.00	0.10	0.00	0.01	-0.02	0.00	0.00	0.09
3. Education level	-0.05	0.05	-0.07	0.08	0.05	0.09	-0.05	0.07	-0.04	0.04	0.04	0.06
4. Frequency of social media use (lower scores = more frequent use)	0.01	0.06	0.01	0.09	0.06	0.10	-0.01	0.07	-0.01	0.06	0.04	0.10
5. Frequency of political news sharing on social media	0.00	0.05	-0.01	0.09	0.05	0.13	0.31	0.06	0.34***	0.00	0.04	0.00
6. CRT/CRT2 scores	0.08	0.03	0.18**	-0.02	0.03	-0.05	0.00	0.04	0.00	-0.05	0.02	-0.14*
7. Attention to detail (ASD)	-0.01	0.01	-0.08	0.01	0.01	0.08	0.00	0.01	-0.01	0.01	0.01	0.09
8. Social communication (ASD)	0.00	0.01	-0.03	-0.02	0.01	-0.15	-0.01	0.01	-0.03	0.00	0.01	-0.02
9. Interpersonal (IP Schizotypy)	-0.01	0.02	-0.07	0.02	0.02	0.10	-0.01	0.02	-0.05	0.00	0.01	-0.03
10. Cognitive-Perceptual (CP Schizotypy)	-0.01	0.01	-0.06	0.00	0.01	-0.02	0.03	0.01	0.22*	0.00	0.01	0.02
11. Disorganised (D Schizotypy)	0.01	0.01	0.06	-0.01	0.01	-0.07	0.00	0.02	-0.01	-0.01	0.01	-0.05
12. Social anxiety (SA Schizotypy)	0.02	0.02	0.12	-0.01	0.02	-0.05	-0.01	0.02	-0.02	0.00	0.01	-0.02
13. Belief in false RW headlines	-	-	-	-	-	-	0.66	0.14	0.36***	-	-	-
14. Engagement with false RW headlines	-	-	-	-	-	-	-	-	-	0.15	0.04	0.28***
15. Truth discernment	-	-	-	0.33	0.07	0.31***	0.12	0.10	0.09	-	-	-
16. Engagement discernment	0.31	0.07	0.33***	-	-	-	-	-	-	-0.12	0.05	-0.17*
Adjusted R²	.10			.14			.29			.16		
F	2.90***			3.87***			7.60***			4.04***		

Significant predictor variables reported in bold.

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

N3.2 Reanalysis of data from Study 2

N3.2.1 Predictors of discernment measures

Six regression models were created to predict both truth discernment and engagement discernment scores for RW, LW and combined (Bipartisan) headlines using data from Study 2 (Models 4a-4f; see Table N5). As with the data from Study 1, predictor variables included in these regression models consisted of those included in the original analyses, except for belief/engagement measures. In place of the original belief/engagement variables, discernment measures that were matched in terms of political content (either RW, LW, or bipartisan) were used instead, with Engagement Discernment measures used to predict Truth Discernment measures and vice versa.

Model 4a sought to predict Bipartisan Truth Discernment. The regression analysis was significant ($F(15,265) = 4.05, p < .001$) with an adjusted $R^2 = .17$. The results of the analysis indicated that Social Communication ASD traits ($\beta = -.21, p = .011$), CP schizotypy ($\beta = -.32, p < .001$), D schizotypy ($\beta = .16, p = .050$), SA schizotypy ($\beta = .24, p = .003$), and Bipartisan Engagement Discernment ($\beta = .23, p < .001$) were all significant predictors.

Model 4b sought to predict Truth Discernment towards RW headlines. The regression analysis was significant ($F(15,265) = 4.02, p < .001$) with an adjusted $R^2 = .14$. The results of the analysis indicated that the significant predictors included in the model were Gender ($\beta = .18, p = .004$), Political Orientation ($\beta = -.20, p = .001$), CP schizotypy ($\beta = -.23, p = .005$), D schizotypy ($\beta = .16, p = .048$), and Engagement Discernment towards RW headlines ($\beta = .17, p = .005$).

Model 4c sought to predict Truth Discernment towards LW headlines. The regression analysis was significant ($F(15,265) = 3.82, p < .001$) with an adjusted $R^2 = .13$. The results of the analysis indicated that the significant predictors included in the model were Social Communication ASD traits ($\beta = -.25, p = .003$), CP schizotypy ($\beta = -.32, p < .001$), SA schizotypy ($\beta = .26, p = .002$), and Engagement Discernment towards LW headlines ($\beta = .24, p < .001$).

Model 4d sought to predict Bipartisan Engagement Discernment. The regression analysis was significant ($F(15,265) = 3.65, p < .001$) with an adjusted $R^2 = .12$. The results of the analysis indicated that the significant predictors included in the model were Education ($\beta = .15, p = .012$), Frequency of online news sharing ($\beta = .12, p = .043$), Social Communication ASD traits ($\beta = .21, p = .012$), SA schizotypy ($\beta = -.187, p = .032$), and Bipartisan Truth Discernment ($\beta = .24, p < .001$).

Model 4e sought to predict Engagement Discernment towards RW headlines. The regression analysis was significant ($F(15,265) = 2.24, p < .001$) with an adjusted $R^2 = .06$. The results of the analysis indicated that the significant predictors included in the model were Social Communication ASD traits ($\beta = .25, p = .004$) and RW Truth Discernment ($\beta = .18, p = .005$).

Model 4f sought to predict Engagement Discernment towards LW headlines. The regression analysis was significant ($F(15,265) = 3.40, p < .001$) with an adjusted $R^2 = .11$. The results of the analysis indicated that the significant predictors included in the model were Education ($\beta = .14, p = .020$), Frequency of online news sharing ($\beta = .12, p = .044$), and LW Truth Discernment ($\beta = .25, p < .001$).

Table N5 - Regression models with discernment scores as DVs (using data from Study 2)

Variables	Regression Models																	
	DV = Truth Discernment measures									DV = Engagement Discernment measures								
	Model 4a (Bipartisan)			Model 4b (RW)			Model 4c (LW)			Model 4d (Bipartisan)			Model 4e (RW)			Model 4f (LW)		
	B	SEB	δ	B	SEB	δ	B	SEB	δ	B	SEB	δ	B	SEB	δ	B	SEB	B
1) Gender (M=1, F=-1)	0.17	0.07	0.15	0.24	0.08	0.18**	0.10	0.08	0.08	0.07	0.06	0.07	0.04	0.08	0.03	0.11	0.09	0.07
2) Age	0.00	0.00	0.10	0.00	0.00	0.10	0.00	0.00	0.07	0.00	0.00	0.03	0.00	0.00	-0.03	0.00	0.00	0.07
3) Education level	0.02	0.03	0.04	0.03	0.04	0.06	0.01	0.04	0.02	0.07	0.03	0.15*	0.05	0.03	0.09	0.09	0.04	0.14*
4) Frequency of social media use (lower scores = more frequent use)	0.00	0.04	0.00	0.01	0.04	0.02	-0.02	0.04	-0.03	-0.02	0.03	-	0.00	0.04	0.01	-	0.05	-0.04
5) Frequency of political news sharing on social media	0.01	0.03	0.03	0.03	0.03	0.06	0.00	0.03	0.00	0.05	0.03	0.12*	0.03	0.03	0.06	0.07	0.04	0.12*
6) Political orientation (low scores = LW, high scores = RW)	-0.02	0.01	-0.11	-0.05	0.01	-0.20***	0.00	0.01	0.00	-0.02	0.01	-	-0.02	0.01	-0.11	-	0.01	-0.05
7) Draws to decision (JTC)	0.00	0.01	-0.03	-0.01	0.01	-0.03	0.00	0.01	-0.02	0.00	0.01	0.02	-0.01	0.01	-0.04	0.01	0.01	0.07
8) CRT/CRT2 scores	0.01	0.02	0.02	0.00	0.02	0.00	0.01	0.02	0.04	-0.02	0.02	-	-0.02	0.02	-0.07	-	0.02	-0.04
9) Attention to detail (ASD)	0.02	0.03	0.04	0.03	0.03	0.06	0.00	0.03	0.00	0.00	0.02	-	-0.03	0.03	-0.06	0.02	0.03	0.04
10) Social communication (ASD)	-0.09	0.03	-0.21*	-0.04	0.04	-0.08	-0.13	0.04	-0.25**	0.08	0.03	0.21*	0.12	0.04	0.25*	0.05	0.05	0.09
11) Interpersonal (IP Schizotypy)	0.00	0.05	0.01	-0.04	0.06	-0.05	0.04	0.06	0.05	-0.08	0.05	-	-0.11	0.06	-0.15	-	0.06	-0.07
12) Cognitive-Perceptual (CP Schizotypy)	-0.26	0.06	-0.32***	-0.22	0.08	-0.22**	-0.31	0.08	-	0.02	0.06	0.03	-0.01	0.08	-0.02	0.06	0.08	0.06
13) Disorganised (D Schizotypy)	0.09	0.05	0.16*	0.12	0.06	0.16*	0.08	0.06	0.11	0.01	0.04	0.02	0.07	0.06	0.10	-	0.06	-0.05
14) Social anxiety (SA Schizotypy)	0.12	0.04	0.24**	0.08	0.05	0.14	0.15	0.05	0.26**	-0.08	0.04	-	-0.08	0.05	-0.14	-	0.05	-0.15
15) Truth Discernment (Bipartisan)	-	-	-	-	-	-	-	-	-	0.22	0.06	0.24***	-	-	-	-	-	-
16) Truth Discernment (RW)	-	-	-	-	-	-	-	-	-	-	-	-	0.17	0.06	0.18**	-	-	-
17) Truth Discernment (LW)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.27	0.06	0.25***
18) Engagement Discernment (Bipartisan)	0.25	0.06	0.23***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19) Engagement Discernment (RW)	-	-	-	0.18	0.06	0.17**	-	-	-	-	-	-	-	-	-	-	-	-
20) Engagement Discernment (LW)	-	-	-	-	-	-	0.23	0.06	0.24***	-	-	-	-	-	-	-	-	-
Adjusted R ²	.17			.14			.13			.12			.06			.11		
F	4.05***			4.02***			3.82***			3.65***			2.24***			3.40***		

Significant predictor variables reported in bold. * $p < .05$. ** $p < .01$. *** $p < .001$.

N3.2.2 Discernment measures as predictors of misinformation vulnerability

Four regression models were created to explore the use of discernment measures as predictors of misinformation belief and misinformation engagement (Models 5a-5d; see Table N6). The models were constructed using the same protocol as those for Study 1 (all predictor variables included in the original analyses in addition to discernment measures). While each regression analysis was shown to be statistically significant none of the discernment measures were shown to significantly contribute to the models. Furthermore, the pattern of significant predictors and R^2 values were shown to mirror the original analysis.

Table N6 - Regression models with RW and LW discernment measures as predictors of misinformation vulnerability (using data from Study 2)

Variables	Regression models											
	DV = misinformation belief Measures						DV = misinformation engagement Measures					
	Model 5a (RW)			Model 5b (LW)			Model 5c (RW)			Model 5d (LW)		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
1) Gender (M=1, F=-1)	-0.17	0.07	-0.13**	0.07	0.06	0.07	0.25	0.11	0.11*	0.19	0.09	0.12*
2) Age	-0.01	0.00	-0.16**	-0.01	0.00	-0.16*	0.00	0.00	0.01	0.00	0.00	0.00
3) Education level	-0.05	0.03	-0.09	0.01	0.03	0.01	0.03	0.05	0.03	-0.08	0.04	-0.11
4) Frequency of social media use (lower scores = more frequent use)	-0.06	0.04	-0.09	-0.05	0.03	-0.08	-0.01	0.06	-0.01	0.04	0.05	0.05
5) Frequency of political news sharing on social media	-0.08	0.03	-0.15**	-0.05	0.03	-0.12*	0.28	0.04	0.30***	0.17	0.04	0.28***
6) Political orientation (low scores = LW, high scores = RW)	0.06	0.01	0.27***	-0.06	0.01	-0.32***	0.16	0.02	0.42***	-0.04	0.02	-0.14*
7) Draws to decision (JTC)	0.00	0.01	-0.02	-0.01	0.01	-0.06	0.00	0.01	-0.02	0.00	0.01	-0.01
8) CRT/CRT2 scores	0.00	0.02	0.01	-0.03	0.02	-0.10	-0.04	0.03	-0.07	0.01	0.02	0.03
9) Attention to detail (ASD)	0.02	0.03	0.05	0.01	0.02	0.03	-0.01	0.04	-0.02	-0.04	0.03	-0.07
10) Social communication (ASD)	0.02	0.03	0.04	0.05	0.03	0.12	-0.10	0.05	-0.12	-0.08	0.05	-0.13
11) Interpersonal (IP Schizotypy)	-0.02	0.05	-0.03	-0.03	0.04	-0.06	0.01	0.08	0.01	0.05	0.07	0.06
12) Cognitive-Perceptual (CP Schizotypy)	0.13	0.06	0.14*	0.11	0.06	0.16*	0.28	0.10	0.17**	0.08	0.09	0.07
13) Disorganised (D Schizotypy)	-0.17	0.05	-0.25***	-0.07	0.04	-0.13	-0.12	0.08	-0.10	0.08	0.06	0.10
14) Social anxiety (SA Schizotypy)	-0.06	0.04	-0.10	-0.02	0.04	-0.06	0.15	0.06	0.15*	0.02	0.05	0.03
15) Truth Discernment (RW)	-	-	-	-	-	-	0.09	0.09	0.06	-	-	-
16) Truth Discernment (LW)	-	-	-	-	-	-	-	-	-	-0.08	0.08	-0.07
17) Engagement Discernment (RW)	-0.01	0.05	-0.01	-	-	-	-	-	-	-	-	-
18) Engagement Discernment (LW)	-	-	-	-0.08	0.04	-0.11	-	-	-	-	-	-
19) Engagement with false RW headlines	0.18	0.04	0.31***	-	-	-	-	-	-	-	-	-
20) Engagement with false LW headlines	-	-	-	0.10	0.04	0.14*	-	-	-	-	-	-
21) Belief in false RW headlines	-	-	-	-	-	-	0.53	0.11	0.31***	-	-	-
22) Belief in false LW headlines	-	-	-	-	-	-	-	-	-	0.23	0.11	0.15*
Adjusted R ²	.39			.19			.47			.18		
F	12.05***			5.09***			16.50***			4.72***		

Significant predictor variables reported in bold.

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

N4 Discussion and interpretation of findings

N4.1 Reanalysis of data from Study 1

The results of the analysis that sought to predict discernment measures indicated that as Truth Discernment scores increased, so did Engagement Discernment scores. These findings suggest that both truth discernment and engagement discernment may share a common underlying factor that influences overall discernment ability. It was also demonstrated that Truth Discernment was positively correlated and significantly predicted by CRT/CRT2 scores. These findings suggest that cognitive reflection may play a role in facilitating Truth Discernment (which might help to explain why CRT/CRT2 scores were shown to be negatively correlated and a significant predictor of belief in false RW headlines in the original analysis).

When exploring the potential utility of discernment measures as predictors of misinformation vulnerability it was demonstrated that Engagement Discernment scores contributed to the prediction of belief in false RW headlines (with higher scores being associated with lower levels of belief in false RW headlines). However, Truth Discernment scores did not contribute to the prediction of engagement with false RW headlines. These findings suggest that while accurate beliefs were predicted by discerning engagement behaviour, misinformation engagement was not predicted by a more discerning approach to belief judgments. This may reflect a willingness among the participants to engage with inaccurate headlines (perhaps in an effort to debunk, debate, or ridicule).

N4.2 Reanalysis of data from Study 2

As with the results calculated using data from Study 1, the regression models that sought to predict discernment measures indicated that Truth Discernment scores and Engagement Discernment scores were positively correlated and significantly predicted each other (see B for a detailed breakdown). These findings further support the notion of a shared underlying factor that might influence overall discernment ability.

Higher RW Truth Discernment scores were also shown to be significantly associated with lower CP schizotypy scores and higher D schizotypy scores, suggesting that CP schizotypy traits were associated with poor truth discernment while D schizotypy traits were associated with better truth discernment. The association between CP schizotypy and poor truth discernment is supported by the hypothesised link between CP schizotypy and analytical reasoning errors, however the association between D schizotypy and increased truth discernment is surprising. Furthermore, better RW truth discernment was also shown to be associated with male participants and those who identified with LW political ideology. While the reason behind an association with Gender is not entirely clear, RW truth discernment may be better among LW participants due to a lack of congruent partisan bias (i.e., LW participants are not influenced by motivations stemming from RW partisanship, therefore they are less likely to believe RW misinformation based on in-group bias).

Better LW Truth Discernment was shown to be significantly associated with lower Social Communication ASD and CP schizotypy traits, and higher levels of SA schizotypy traits. Again, while the negative association with CP schizotypy was in line with expectations, exactly why higher levels of social anxiety and would be associated with better LW Truth Discernment is not clear. On the other hand, the link between fewer communication deficits and increased LW truth Discernment could possibly reflect that increased communicative ability might protect against believing misinformation content (e.g., perhaps having better communication skills makes it easier to identify when media

content is being manipulative or deceptive and therefore increases belief accuracy). However, this explanation does not account for why this significant relationship was demonstrated for Truth Discernment for LW headlines alone.

Other than higher RW Truth Discernment scores, better RW Engagement Discernment was shown to be significantly associated with higher levels of Social Communication ASD traits. This might reflect a tendency for those with social and communication deficits to be more discerning when engaging with RW headlines, perhaps in an attempt to avoid engaging with controversial content (thereby avoiding online arguments and conflict with others, which could be particularly taxing for those with social and communication deficits). However, this explanation does not account why this relationship was not observed for LW Engagement Discernment.

Greater LW Engagement Discernment was shown to be significantly associated with higher levels of Education. These findings suggest that being more educated was associated with being more discerning when engaging with LW headlines, which could be argued to be a result of a more critical thinking or perhaps even higher levels of political expertise resulting from increased Education. However, we again must question why this relationship does not seem to apply to RW engagement (or any of the Truth Discernment measures). Furthermore, being a frequent sharer of online political news content was also associated with better LW engagement Discernment. It may be the case that frequent sharing of political news reflects high levels of political engagement, which could be associated with greater political knowledge (which in turn might help guide engagement discernment and reduce engagement with misinformation).

Finally, when exploring discernment scores as predictors of misinformation vulnerability (see Table N6), it was demonstrated that discernment measures did not significantly contribute to the prediction of either misinformation belief or engagement when assessed alongside the pre-existing predictor variables from the original analysis. This suggests that while discernment measures provide insight into engagement and belief judgments, these scores do not capture any significant relationship that is not better represented by the existing predictor variables.

N4.3 Conclusions

In conclusion, the analysis of discernment measures for Studies 1 & 2 demonstrated that Truth Discernment and Engagement Discernment significantly predicted each other and were positively correlated.

Furthermore, a wide range of other predictor variables were shown to predict discernment measures significantly, although there was very little agreement when comparing the results derived from the data for Study 1 with those from Study 2. Of particular interest was the relationship between CP schizotypy and Truth discernment observed in Study 2, which demonstrated that CP schizotypy traits were generally associated with poorer truth discernment (in line with the hypothesised role of CP schizotypy and judgement errors driven by reasoning biases).

Finally, when utilising discernment measures as predictors of misinformation vulnerability, the results derived from Study 1 and Study 2 were also shown to diverge from each other. Study 1 data indicated Engagement Discernment to be negatively associated with (and a significant predictor of) belief in false RW headlines, while the analysis using Study 2 data demonstrated that discernment measures did not contribute to the prediction of any misinformation vulnerability measures.

Appendix O - A copy of the preregistration document (Study 3).

1) Data collection. Have any data been collected for this study already?

- Yes, we already collected the data.
- No, no data have been collected for this study yet.
- It's complicated. We have already collected some data but explain in Question 8 why readers may consider this a valid pre-registration nevertheless.
(Note: "Yes" is not an accepted answer.)

2) Hypothesis. What's the main question being asked or hypothesis being tested in this study?

It is predicted that the expression of schizotypal personality traits (specifically positive schizotypal traits) will be associated with increased scores on measures of engagement and belief in relation to false news headlines. Therefore hypothesis 1 is:

H1a: Scores on the MSS-B positive schizotypy subscale will be significant predictors of, and positively correlated with, measures of false news engagement.

H1b: Scores on the MSS-B positive schizotypy subscale will be significant predictors of, and positively correlated with, measures of false news belief.

It is also predicted that a greater need for cognitive closure will be associated with increased engagement and belief in relation to false news headlines. Therefore hypothesis 2 is:

H2a: Scores on the Brief NFCS will be significant predictors of, and positively correlated with, measures of false news engagement.

H2b: Scores on the Brief NFCS will be significant predictors of, and positively correlated with, measures of false news belief.

Finally, it is also predicted that the endorsement of conspiratorial beliefs will be associated with increased engagement and belief in relation to false news headlines. Therefore hypothesis 3 is:

H3a: Scores on the GCBS will be significant predictors of, and positively correlated with, measures of false news engagement.

H3b: Scores on the GCBS will be significant predictors of, and positively correlated with, measures of false news belief.

3) Dependent variable. Describe the key dependent variable(s) specifying how they will be measured.

The key outcome variable for all hypotheses addressing the assessment of social media engagement in relation to false news headlines (H1a, H2a, H3a) will be a *false news engagement* score indicating the self-reported likelihood of the participant either "liking", responding with an emoji, sharing, or commenting on the presented false news article if it were to be encountered on a social media

platform. This score will be calculated for each participant by combining the scores of all the engagement measures (comment, sharing, etc.).

The key outcome variable for all hypotheses addressing the assessment of belief in relation to false news headlines (H1b, H2b, H3b) will be a *false news belief score*, indicating the extent to which participants believe in the accuracy of a presented false news article. This score will be calculated by averaging individual belief scores from each false news stimuli presented.

In addition to the false news stimuli, a selection of true headlines will also be included and responses to those will be used in exploratory analysis. All news stimuli utilised in the study are derived from a public library of true and false news articles collected and pre-tested by Pennycook et al. (2021). All news stimuli included in the study were selected to appeal to right-wing participants, with stimuli selected to create comparable levels of partisan appeal between the true and false headlines.

The Multidimensional Schizotypy Scale – Brief (MSS-B; Gross et al., 2018) will be used to measure schizotypal personality traits. the MSS-B consists of the following subscales: Positive schizotypy, Negative schizotypy, and Disorganised schizotypy.

Individual differences in the desire for cognitive closure will be measured using an average score derived from the 15-item Brief Need for Closure Scale (NFCS; Roets & Van Hiel, 2011).

Individual differences in the endorsement of conspiratorial beliefs will be measured using the Generic Conspiracy Beliefs Scale (GCBS; Brotherton et al., 2013).

Standard demographic information (age, sex, education level) will be collected via self-report. In addition, measures of political orientation and online news sharing will also be collected. Political orientation will be measured by using an 11-point scale (ranging from “strongly Democrat” to “strongly Republican”) while online news sharing behaviour will be measured using a 5-point scale (indicating the frequency of online news sharing).

4) Conditions. How many and which conditions will participants be assigned to?

All participants will be exposed to all measures and stimuli. Naturally occurring individual differences are the main variables of interest and therefore cannot be manipulated to assign participants to specific groups.

5) Analyses. Specify exactly which analyses you will conduct to examine the main question/hypothesis.

All proposed hypotheses will be tested using a series of multiple regression analyses.

The first regression model will explore the predictive value of the three schizotypy domains assessed by the MSS-B, the average score for the Brief NFCS, the average score of the GCBS, and the average belief score for false headline stimuli on the outcome measure of *engagement with false headlines*.

The second regression model will explore the predictive value of three schizotypy domains assessed by the MSS-B, the average score for the Brief NFCS, the average score of the GCBS, and the average engagement score for false headline stimuli on the outcome measure of *belief in false headlines*.

All regression models will also include control variables, consisting of demographic variables (age, sex, education level), political orientation, and online news sharing behaviour.

) Outliers and Exclusions. Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Upon collection data will be screened and problematic responses will be deleted prior to analysis. Criteria for exclusion will be: 1) declining consent for the use of collected data, 2) zero variance in the item responses to measures of schizotypy, 3) reporting an age below 20, 4) answering “no” to the question “Do you live in the United States?”, 5) implausibly fast completion time (more than 2SD below mean completion time), 6) responding to a hidden question that will only be observable to automated bots.

If the number of valid participant data sets falls below 221, due to participant exclusion and/or attrition, further recruitment will take place in order to meet the predefined power threshold.

Participants who report gender as other than Male or Female will be excluded from the analysis, as a binary gender variable will be used as a control variable.

The study will be conducted using the Qualtrics platform which provides two measures of fraud: RelevantID and Google’s invisible reCAPTCHA (Qualtrics, 2021). These tools provide metrics which indicate the likelihood of a participant trying to take a survey multiple times (in the case of the RelevantID duplicate score), as well as the use of automated bots (in the case of the invisible reCAPTCHA and RelevantID fraud score). Participants will therefore be excluded from the analysis if: 1) a participant’s RelevantID fraud score is shown to be greater than or equal to 30 (indicative of bot activity), 2) a participant’s RelevantID duplicate score was shown to be greater than or equal to 75 (indicative of a duplicate response), 3) a participant’s invisible reCAPTCHA score was shown to be below 0.5 (indicative of bot activity).

The frequency and distribution of missing data will be subjected to analysis to determine how missing values are to be dealt with (e.g., If missing values are shown to be missing completely at random then a pairwise deletion approach will be utilised).

7) Sample Size. How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.

Sample size has been determined via an a priori power analysis conducted in G*power 3.1.9.4 on the basis of providing adequate power ($\alpha = 0.05$, power = 80%) for the purposes of a multiple regression analysis. With a maximum of 11 predictor variables per regression model and an expected R^2 value of above 0.08, a minimum sample size of 221 participants is required. An additional 10% will be collected to account for participant attrition, totalling 243 participants. 15 participants will also be recruited for pilot testing. Therefore, a total sample of 258 (rounded up to 260) participants will be sought.

8) Other. Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

Additional exploratory analyses will be conducted using the collected data (e.g., using hierarchical regression to explore the moderating relationships between variables).

Key references:

Brotherton, R., French, C. C., & Pickering, A. D. (2013). Measuring Belief in Conspiracy Theories: The Generic Conspiracist Beliefs Scale. *Frontiers in Psychology, 4*.

<https://doi.org/10.3389/fpsyg.2013.00279>

Gross, G. M., Kwapil, T. R., Burgin, C. J., Raulin, M. L., Silvia, P. J., Kemp, K. C., & Barrantes-Vidal, N. (2018). Validation of the Multidimensional Schizotypy Scale-Brief in Two Large Samples. *Journal of Psychopathology and Behavioral Assessment, 40*(4), 669–677. <https://doi.org/10.1007/s10862-018-9668-4>

Pennycook, G., Binnendyk, J., Newton, C., & Rand, D. G. (2021). A Practical Guide to Doing Behavioral Research on Fake News and Misinformation. *Collabra: Psychology, 7*(1), 25293.

<https://doi.org/10.1525/collabra.25293>

Qualtrics (2021). *Fraud Detection*. <https://www.qualtrics.com/support/survey-platform/survey-module/survey-checker/fraud-detection/>

Roets, A., & Van Hiel, A. (2011). Item selection and validation of a brief, 15-item version of the Need for Closure Scale. *Personality and Individual Differences, 50*(1), 90–94.

<https://doi.org/10.1016/j.paid.2010.09.004>

9) Name. Give a title for this AsPredicted pre-registration

Suggestion: use the name of the project, followed by study description.

Schizotypal personality traits, the need for cognitive closure, and conspiracism: relationships with online misinformation vulnerability.

inally. For record keeping purposes, please tell us the type of study you are pre-registering.

Class project or assignment

Experiment

Survey

Observational/archival study

Other:

Appendix P - Visual stimuli for the *Online Misinformation Engagement/Belief Task (Study 3)*

Misinformation Stimuli (False Headlines).



MIAMIPOST.CO

Trump Reveals Which Democratic President Was Also KKK Member, Liberals In Meltdown Mode



THELASTLINEOFDEFENSE.ORG

BREAKING: Bill Clinton Love Child Danney Williams Found Dead—Cause Of Death Is...Suspicious



WORLDNEWSDAILYREPORT.COM

Kenya: Authorities Release Barack Obama's "Real" Birth Certificate

Accurate stimuli (True Headlines).



NYTIMES.COM

Justice Dept. Says Facts Did Not Justify Continued Wiretap of Trump Aide



REUTERS.COM

Plant a trillion trees: Republicans offer fossil-friendly climate fix



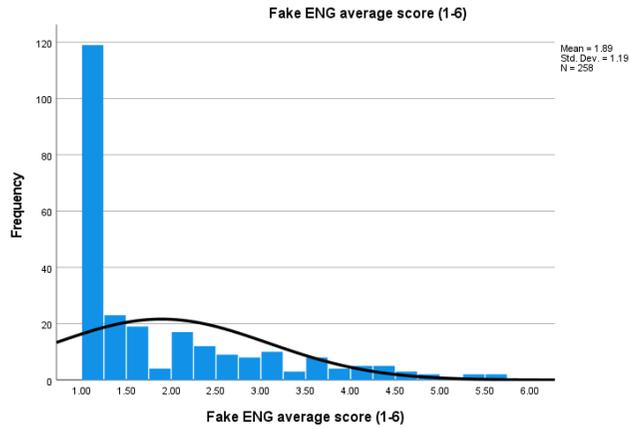
NBCNEWS.COM

Trump gets endorsement of NYC police union, warns 'no one will be safe in Biden's America'

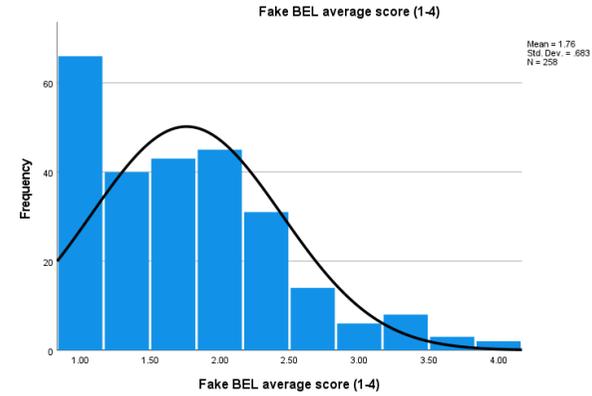
Note: Images in the left column were used as misinformation stimuli, while the images in the right column were used as accurate stimuli.

Appendix Q – Histograms for demographic and predictor variables (Study 3)

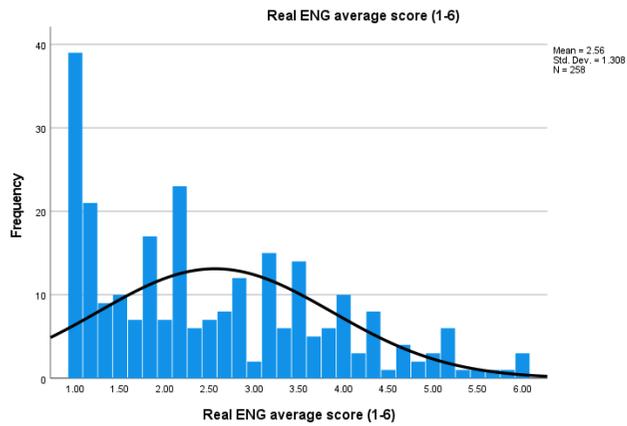
Figure Q1 - Histograms displaying score distributions of all belief and engagement measures.



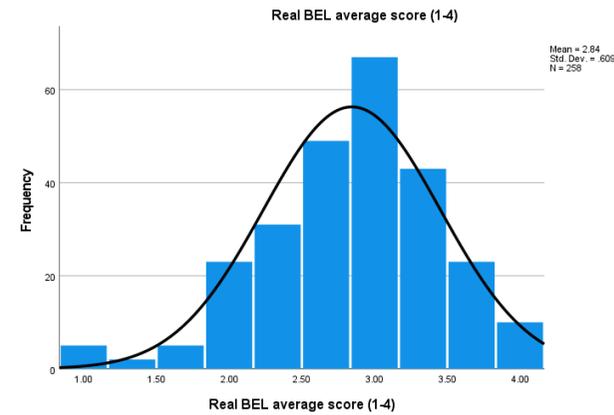
A) Average engagement with fake headlines



B) Average belief in fake headlines

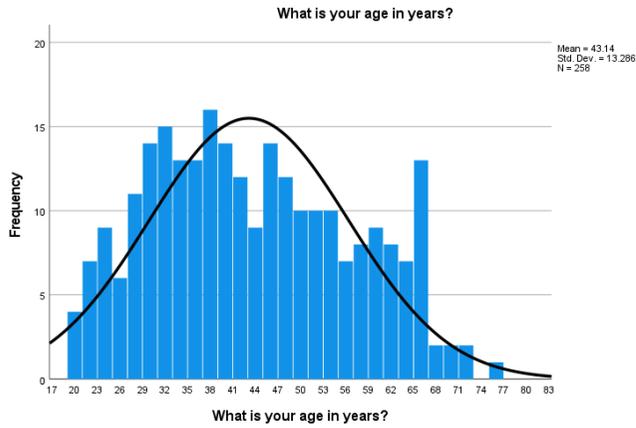


C) Average engagement with true headlines

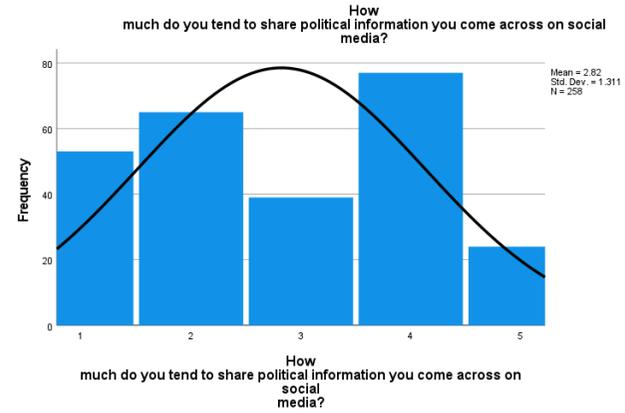


D) Average belief in true headlines

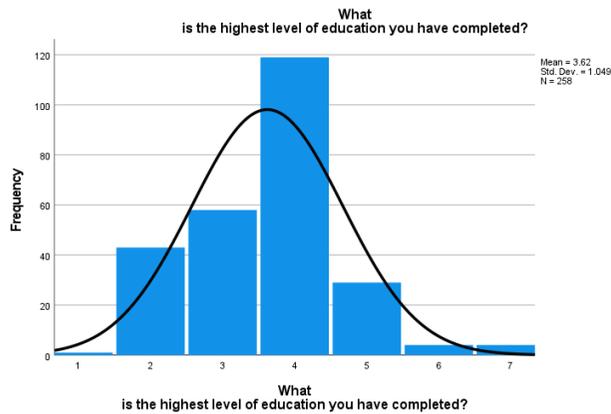
Figure Q2 - Histograms displaying frequencies of age, education, online news sharing, and political orientation.



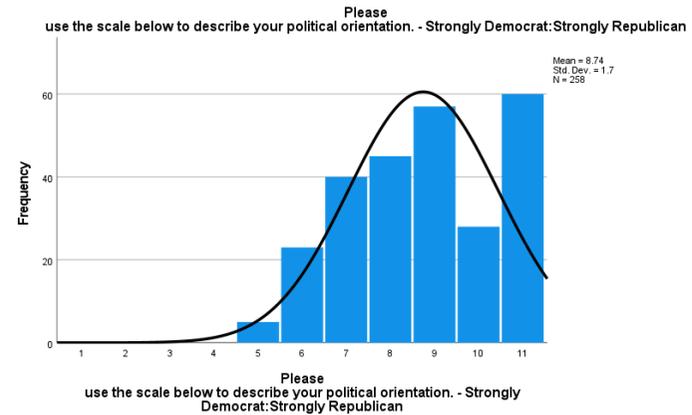
A) Histogram of age distribution



B) Histogram of online news sharing behaviour

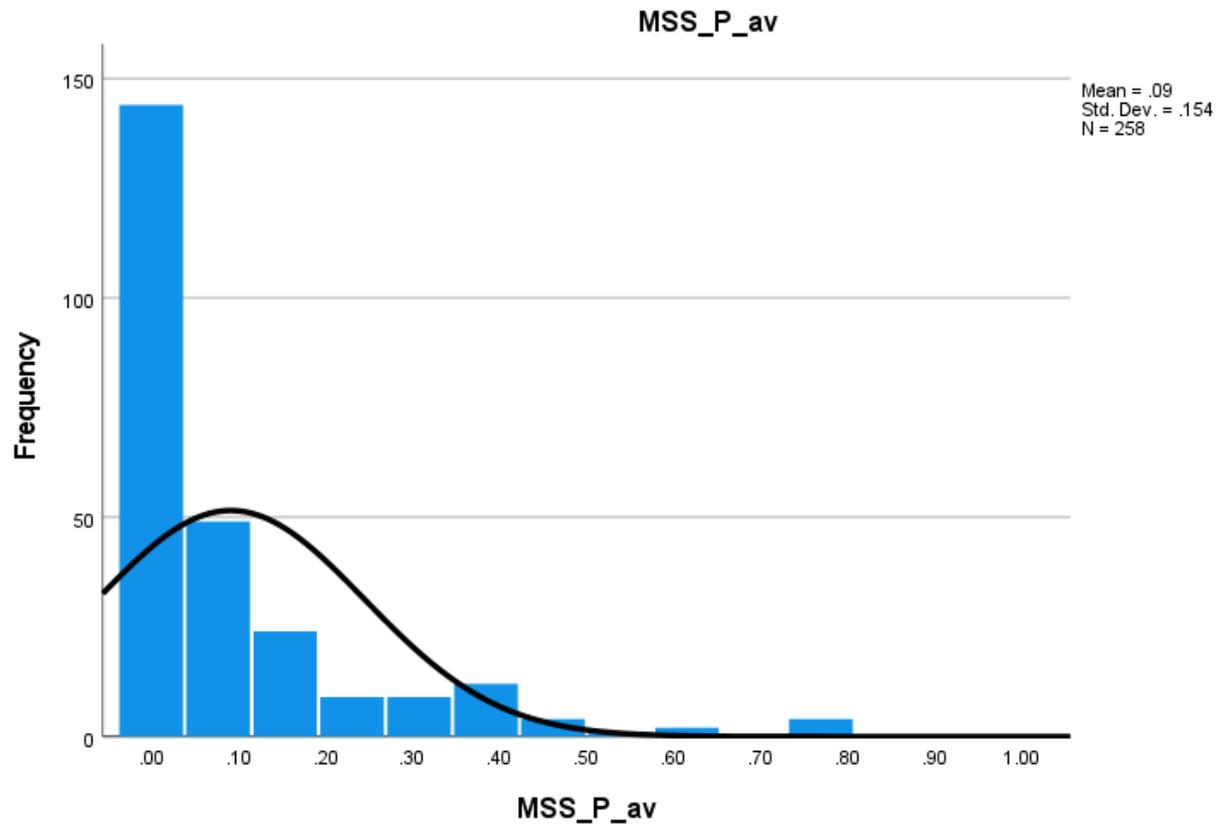


C) Histogram of education level

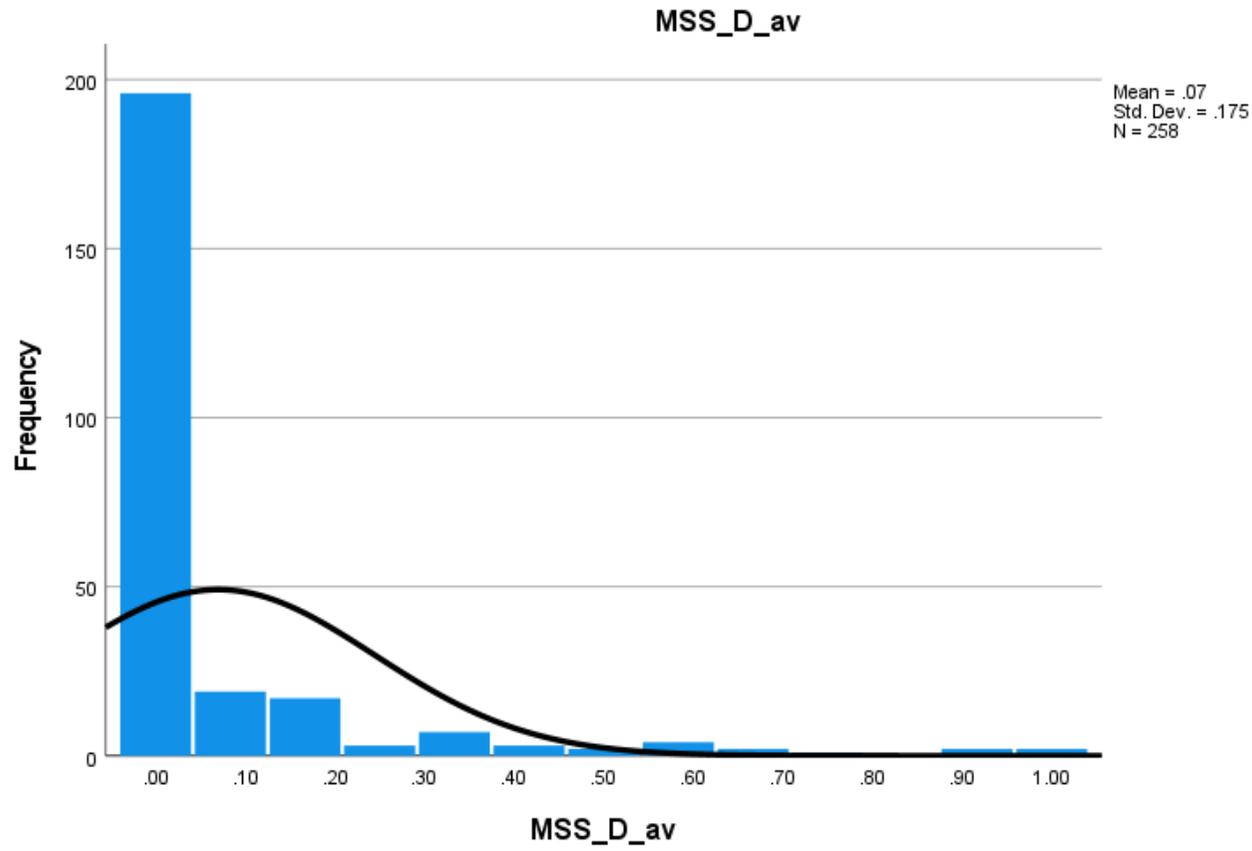


D) Histogram of political orientation

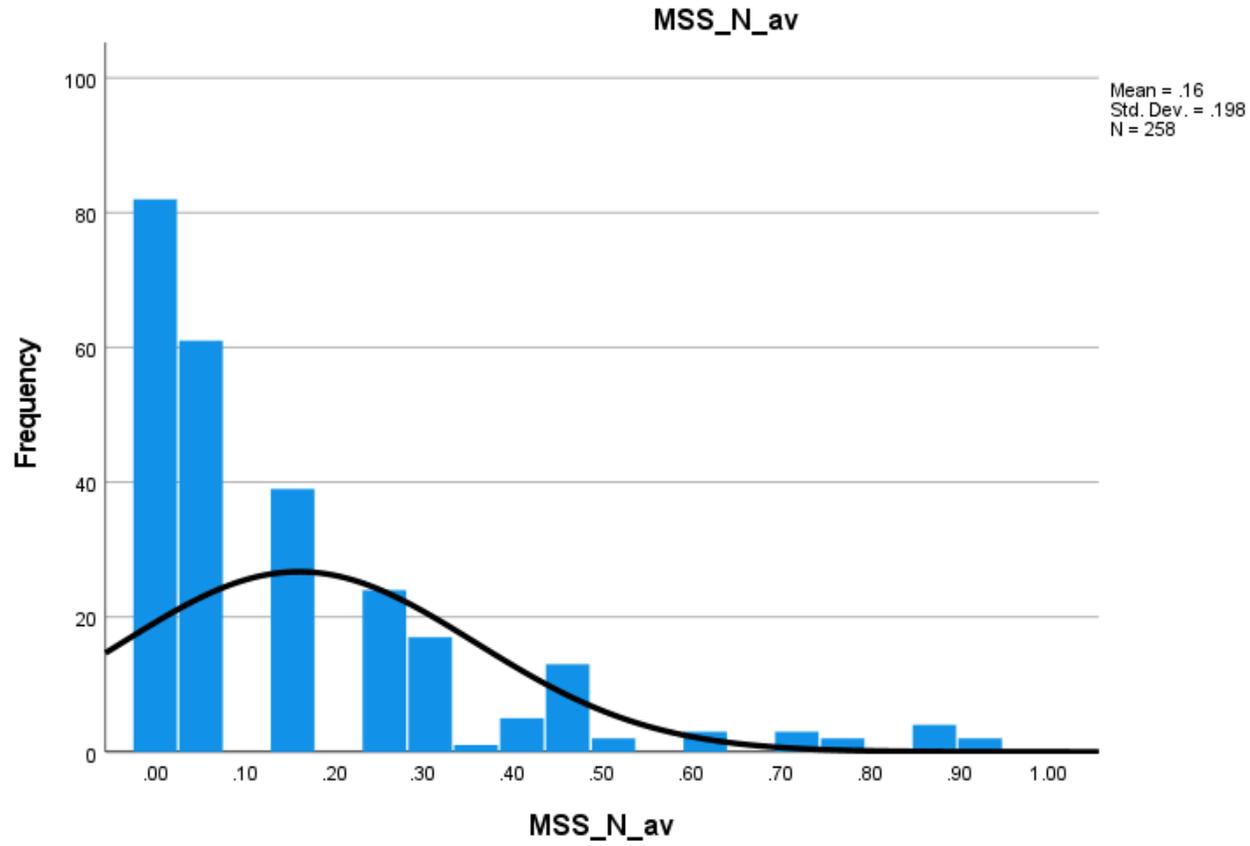
Figure Q3 - Histograms displaying the distribution of average scores on the 3 MSS-B sub-scales (Positive schizotypy, Disorganised schizotypy, and Negative schizotypy).



A) Distribution of average scores for the positive schizotypy sub-scale of the MSS-B

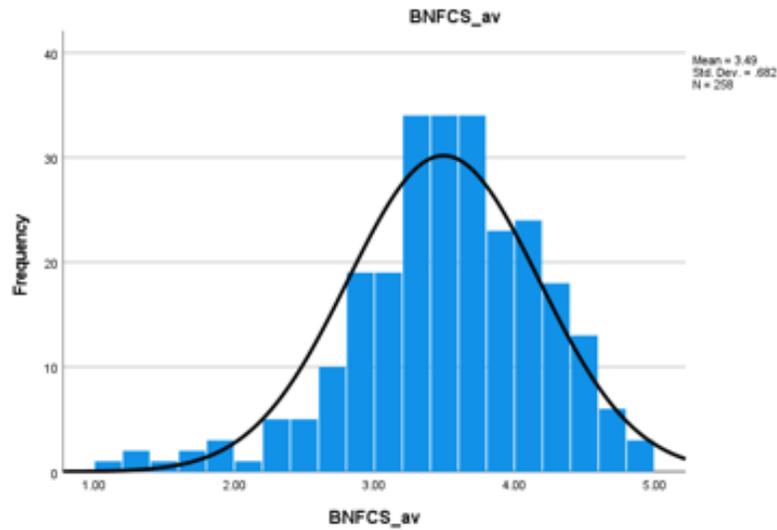


B) Distribution of average scores for the disorganised schizotypy sub-scale of the MSS-B

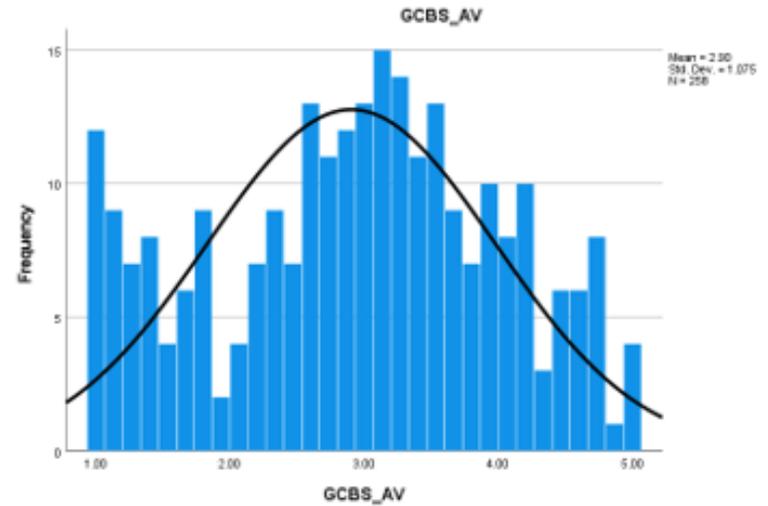


C) Distribution of average scores for the negative schizotypy sub-scale of the MSS-B

Figure Q4 - Histograms displaying the distribution of scores on the NFCS-15, and GCBS.



A) Distribution of average NFCS-15 scores



B) Distribution of average GCBS scores

Appendix R - Mediation analysis results (Study 3).

Total effect of positive schizotypy on belief in false headlines			Direct effect of positive schizotypy on belief in false headlines			Indirect effect of positive schizotypy on belief in false headlines			
<i>Effect</i>	<i>t</i>	<i>p</i>	<i>Effect</i>	<i>t</i>	<i>p</i>	<i>Effect</i>	<i>Bootstrap SE</i>	<i>Percentile bootstrap 95% confidence interval</i>	
								<i>Lower</i>	<i>Upper</i>
.85	3.13	.002	.29	1.07	.286	.56	.16	.299	.913

Appendix S - A comparison of the positive schizotypy subscale from the MSS-B with the cognitive-perceptual (CP) schizotypy subscale from the SPQ-BRU across studies 1-3.

	Study 1		Study 2		Study 3	
Schizotypy measure	CP Schizotypy (SPQ-BRU)		CP Schizotypy (SPQ-BRU)		Positive Schizotypy (MSS-B)	
Outcome measure	<i>RW Misinformation Engagement</i>	<i>RW Misinformation Belief</i>	<i>RW Misinformation Engagement</i>	<i>RW Misinformation Belief</i>	<i>RW Misinformation Engagement</i>	<i>RW Misinformation Belief</i>
Zero order correlation (<i>r</i>)	.27	.06	.15	.05	.33	.19
Semi-partial correlation	.14	.00	.11	.09	.17	-.06
Standardised Beta in regression model	.22	.00	.17	.14	.20	-.07
Adjusted R ² for regression model	.29	.14	.47	.39	.49	.40
Significant predictor in regression model?	Y	N	Y	Y	Y	N

Appendix T - Exploratory cluster analysis

T1 Rationale for the use of cluster analysis

The results of the project have identified several significant predictors of online misinformation vulnerability, namely schizotypy traits, partisanship, and political news sharing habits. However, in all analyses it was demonstrated that only a small proportion of the overall sample was scoring high on misinformation vulnerability measures, while most did not tend to believe or engage with misinformation at all. As we are particularly interested in the characteristics of this minority of individuals who demonstrate comparatively high levels of vulnerability to online misinformation, it would be sensible to explore methods for profiling the characteristics of this sub-group of participants. One such approach would be cluster analysis, as this would allow for the identification and profiling of sub-groups that exist within the larger participant sample (Yim & Ramdeen, 2015). Such an approach might help distinguish the psychological profiles of high vs low misinformation vulnerability individuals.

Furthermore, schizotypy is a multidimensional construct comprised of intercorrelated but distinct trait domains. Using cluster analysis, it may be possible to gain additional insight into the association of misinformation vulnerability with specific schizotypal profiles (as opposed to singular trait domains). Previous research has indicated that focusing of the relative co-expression of schizotypal traits (rather than the absolute measure of a single trait) can be an effective means of understanding the influence of schizotypy on an outcome of interest. For example, it has been demonstrated that individuals who express high levels of positive schizotypy in combination with comparatively low levels of negative schizotypy report higher quality of life (Tabak & Weisman De Mamani, 2013). This high positive/low negative schizotypal profile has also been associated with increased novelty seeking and lower levels of harm avoidance (Hori et al., 2014) which might be particularly relevant to misinformation vulnerability given the theorised role of novelty in promoting engagement with misinformation content.

The aim of this exploratory cluster analysis will be to explore data from Studies 1-3, as these studies include multidimensional schizotypy measures and engagement/belief measures for both accurate and misinformation news stimuli.

T2 Strengths and weaknesses of cluster analysis

Cluster analysis is an exploratory process that seeks to identify clusters of responses among participants, thereby identifying response patterns indicative of potential subgroups within the larger

participant sample (Bailey, 1994; Clatworthy et al., 2005; Yim & Ramdeen, 2015). This approach is very useful in classification tasks (such as identifying different sub-groups) and provides a helpful tool for exploratory analysis. However, cluster analysis can be a somewhat subjective process and is heavily reliant on the judgement of the analyst. Additionally, there is no single way to carry out a cluster analysis and there exists a large variety of sorting algorithms that can be utilised, each providing a different “answer” to the analysis. It is therefore important to keep in mind that the validity of findings from a cluster analysis should be held in question in the absence of further supporting evidence (e.g., finding consistent patterns across multiple studies or otherwise operationalizing the findings of the analysis into the design of confirmatory experiments).

T3 What variables will be included in the cluster analysis?

A cluster analysis requires input from a series of variables, the responses to which are then used to calculate the sub-groups (i.e., clusters) within the overall data set. The types of clusters formed are highly dependent on the variables included in the analysis and therefore the choice of included variables must stem from a clear rationale.

Perhaps the most important variables included in the current analysis will be the measures of misinformation vulnerability. These will include measures of belief and engagement with misinformation and accurate information. This will allow clusters to form around high vs low vulnerability groups, as well as compare sub-group profiles in terms of their “truth bias” (i.e., whether they show a specific bias toward endorsing misinformation over accurate information, or vice versa).

Schizotypy measures will also be included as we are particularly interested in the profile of individual schizotypy traits in relation to misinformation vulnerability. While Studies 1 & 2 utilise a different measure of schizotypy to Study 3 (i.e., Studies 1 & 2 used the SPQ-BRU, Study 3 used the MSS-B), these measures are roughly equivalent and shouldn't pose an issue in terms of comparison (the MSS-B subscales of positive, negative, and disorganised schizotypy align with the SPQ-BRU subscales of cognitive-perceptual, inter-personal/social anxiety, and disorganised traits; see Kwapil et al., 2018). Schizotypy traits did not show themselves to be the strongest predictors of misinformation vulnerability over the past three studies, however a consistent predictive relationship was demonstrated (especially with regard to misinformation engagement). Therefore, it is possible that the influence of schizotypy, while significant, perhaps accounts for the behaviour of a rather small proportion of the participant samples (which the cluster analysis will hopefully reveal).

Throughout the project political orientation has been shown to account for a large degree of variance when predicting political misinformation, implying that a significant degree of misinformation vulnerability is associated with politically influenced reasoning. This variable was among the strongest predictors for misinformation vulnerability and therefore will be included in the cluster analysis. It is hoped that by using a strong predictor of misinformation vulnerability that the relatively subtle relationship with schizotypy might be revealed.

Similarly, self-reported online news sharing behaviour was also a powerful predictor of misinformation vulnerability throughout the project and will also be included in the analysis. This variable has demonstrated significant predictive power, even after accounting for the shared influence of related predictor variables and is therefore worth including in the cluster formation. Furthermore, this variable can give an indication of any discrepancies between self-reported sharing and the behaviour observed in the misinformation task.

T4 Procedure

Based on guidance for social science researchers (Clatworthy et al., 2005) a cluster analysis usually involves a 2-step process: 1) conducting a hierarchical agglomerative cluster analysis and, 2) conducting a k-means cluster analysis.

A hierarchical cluster analysis seeks to establish the optimal number of clusters used to break down the analysed data set. There are several approaches to hierarchical cluster analysis, but based on the guidelines from Clatworthy et al. (2005) it was decided to utilise Ward's method and squared Euclidian distances as the means of establishing clusters in each analysis. Variables will first be transformed into z-scores prior to their inclusion in the analysis in order to facilitate better comparison of measures utilising different scoring structures. The results of the hierarchical cluster analysis produce a dendrogram, which is then inspected visually and interpreted to determine the number of clusters that will be defined in the k-means analysis.

After determining the target number of clusters, a k-means cluster analysis is used to split the data into the specified number of clusters outlined by the researcher. This analysis serves to form clusters within the data based on maximising similarity within sub-groups and minimising similarities across sub-groups. The result of this process allows for the comparison of the pattern of cluster centres across cluster groups, thereby facilitating the profiling of characteristics between groups.

This process will be repeated using the data acquired across Studies 1-3, the results of which will be compared for consistent patterns across studies. Please note, to improve the validity of these

comparisons the vulnerability measures from Study 2 will be limited to those for right-leaning news stimuli (as Study 1 & 3 included only right-leaning news stimuli in their design).

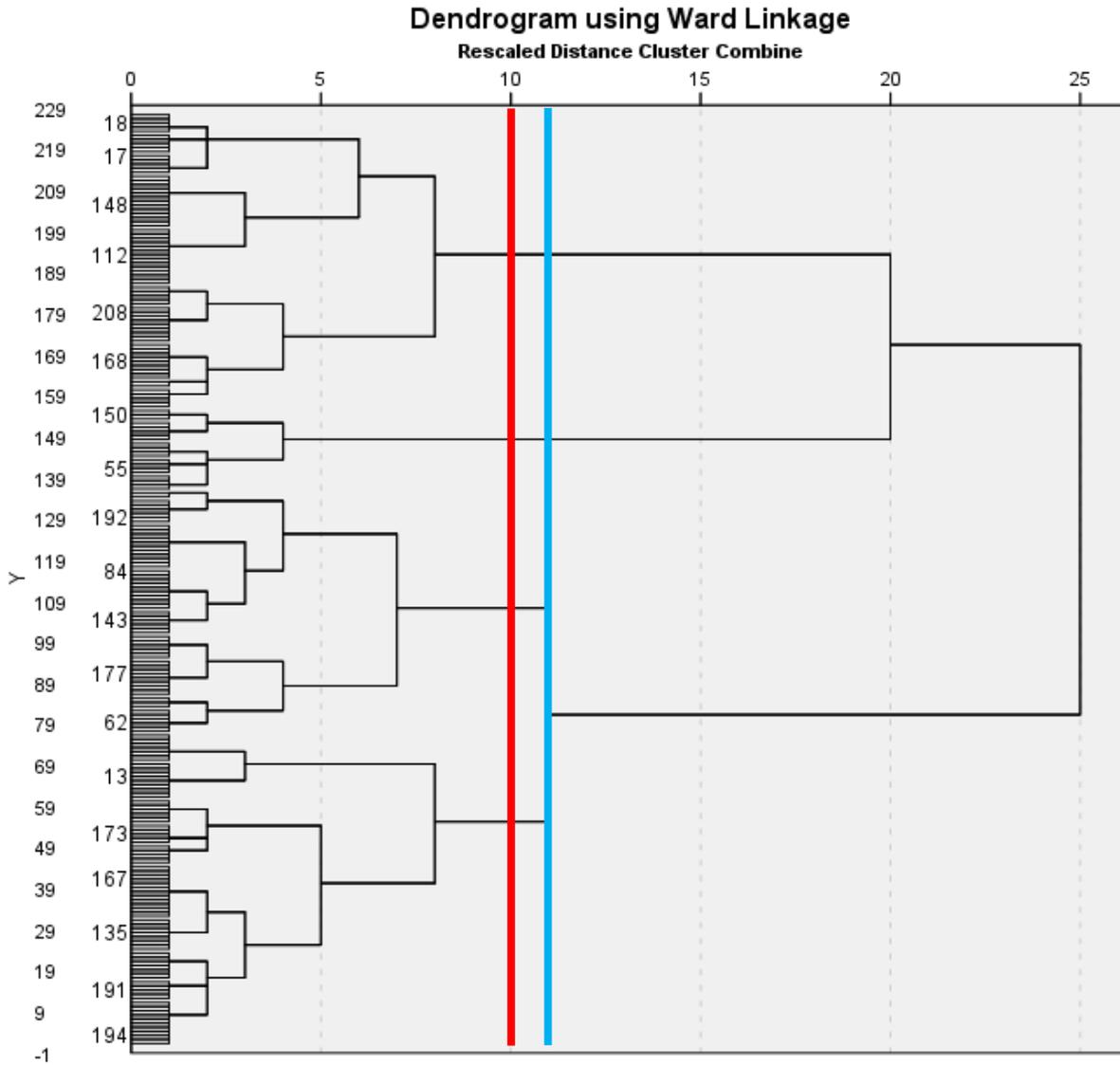
T5 Results

Aldenderfer & Blashfield (1984) recommend the following details be reported when providing the results of a cluster analysis:

1) The computer program	The computer program was SPSS v28.
2) The similarity measure	The similarity measure used was squared Euclidian distances.
3) The cluster method	The cluster method used a hierarchical agglomerative approach (Ward's method) followed by a K-means cluster analysis.
4) Procedure to determine number of clusters	The procedure to determine the number of clusters was a visual inspection of the dendrogram. If, after clusters are formed, any of the cluster groups are shown to contain less than 10% of the overall sample (a criterion suggested by Hair et al., 2010), reduce the number of predetermined clusters in the K-means analysis by 1.
5) Evidence for validity	Evidence for validity will be acquired by comparing results across the three studies.

See below for copies of dendrograms, bar charts demonstrating final cluster centres, and brief summaries of cluster characteristics for Studies 1-3.

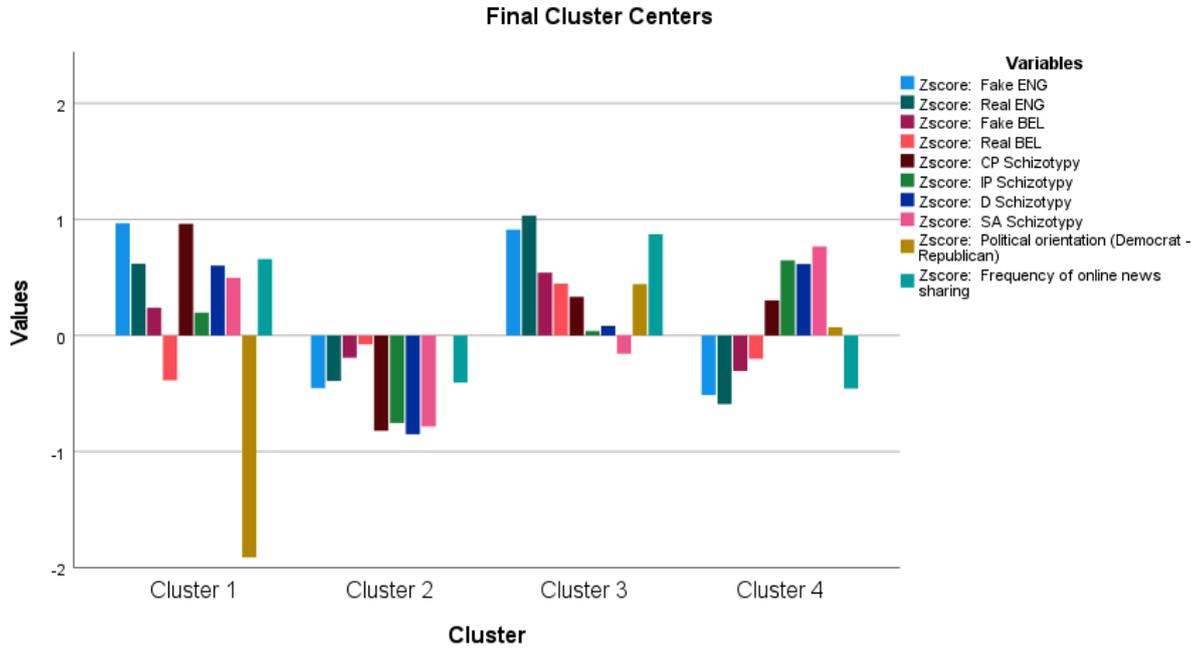
Figure T1: Study 1 – Dendrogram generated from hierarchical cluster analysis.



Note:

- Red line indicates the original choice for establishing cluster numbers in k-means analysis (i.e., k=4).
- However, after running the k-means cluster analysis with k=4 one of the cluster groups was shown to contain less than 10% of the total sample.
- Therefore, k was reduced by 1 (k=3), corresponding to the blue line on the dendrogram.

Figure T2: Study 1 – Bar chart demonstrating final cluster centres (K-means cluster analysis, K=4) and table showing number of cluster cases.



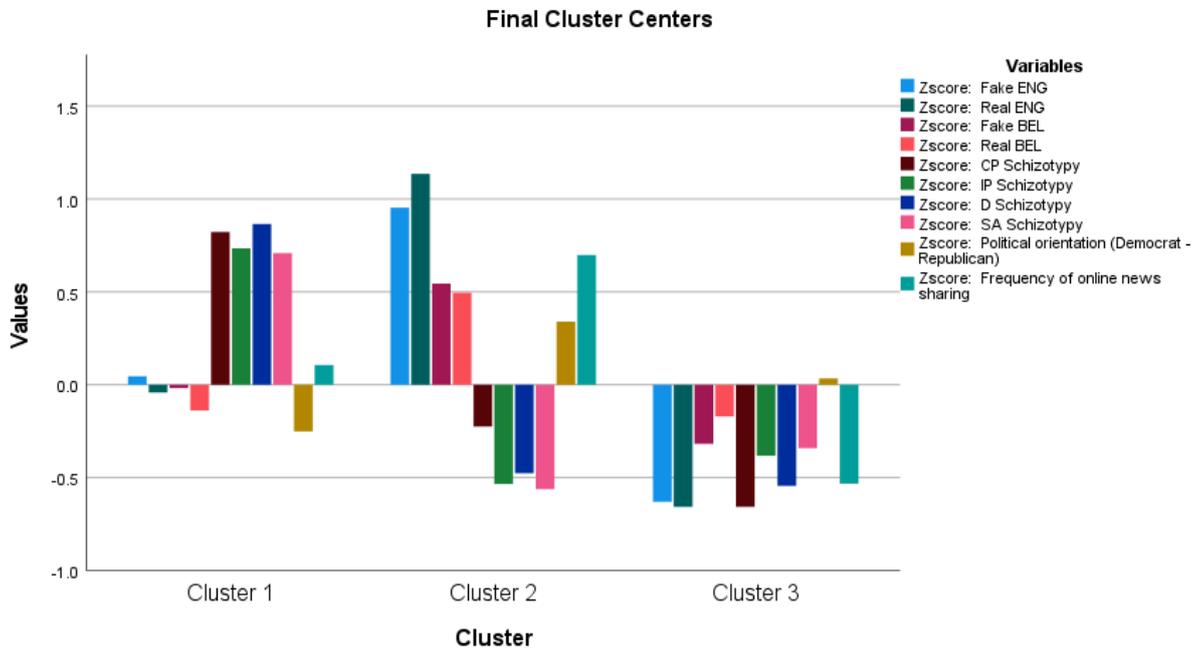
Number of Cases in each Cluster

Cluster	1	17.000
	2	73.000
	3	61.000
	4	76.000
Valid		227.000
Missing		.000

Note:

- Cluster 1 was below 10% of sample, therefore clusters were recalculated using k=3.

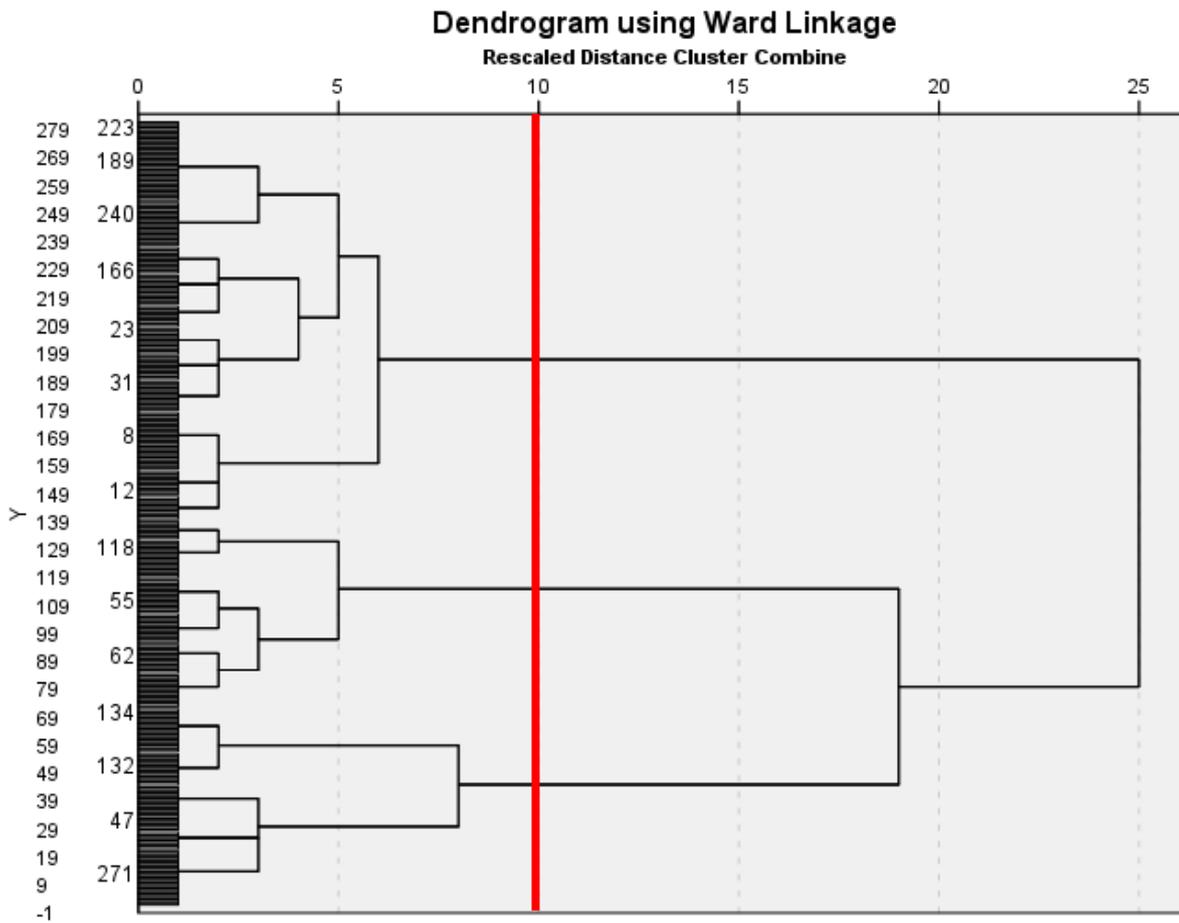
Figure T3: Study 1 – Bar chart demonstrating final cluster centres (K-means cluster analysis, K=3) and table showing number of cluster cases.



Number of Cases in each Cluster

Cluster	1	85.000
	2	54.000
	3	88.000
Valid		227.000
Missing		.000

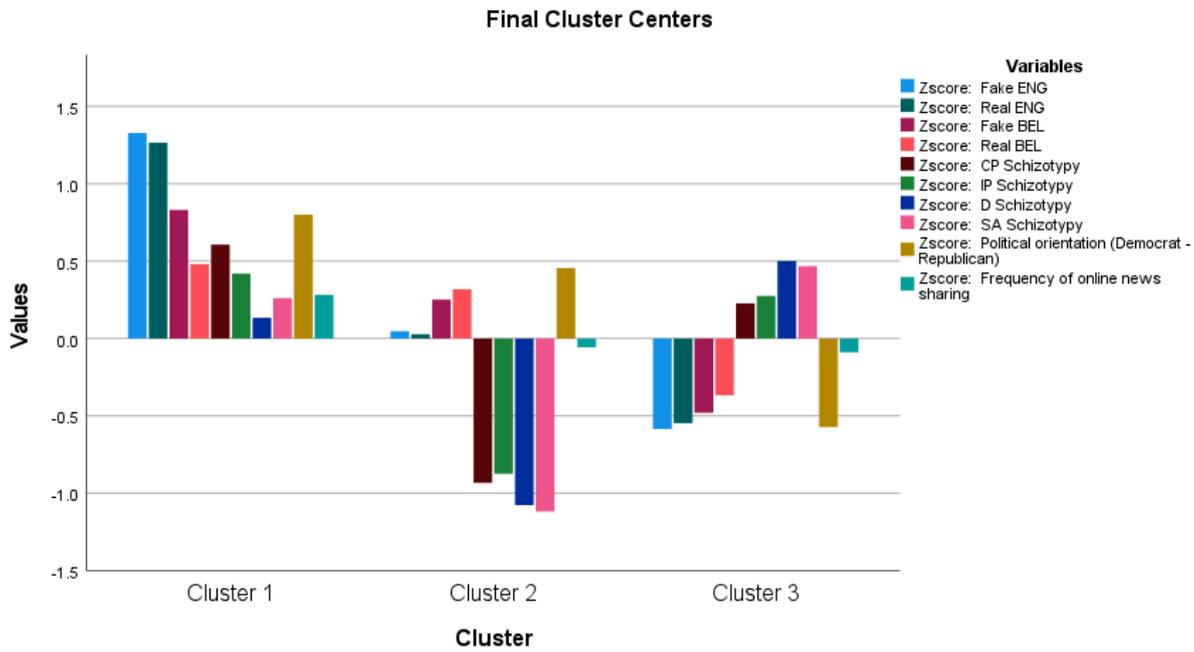
Figure T4: Study 2 - Dendrogram generated from hierarchical cluster analysis (RW stimuli only).



Note:

- Red line indicates the choice for establishing cluster numbers in k-means analysis (i.e., $k=3$).

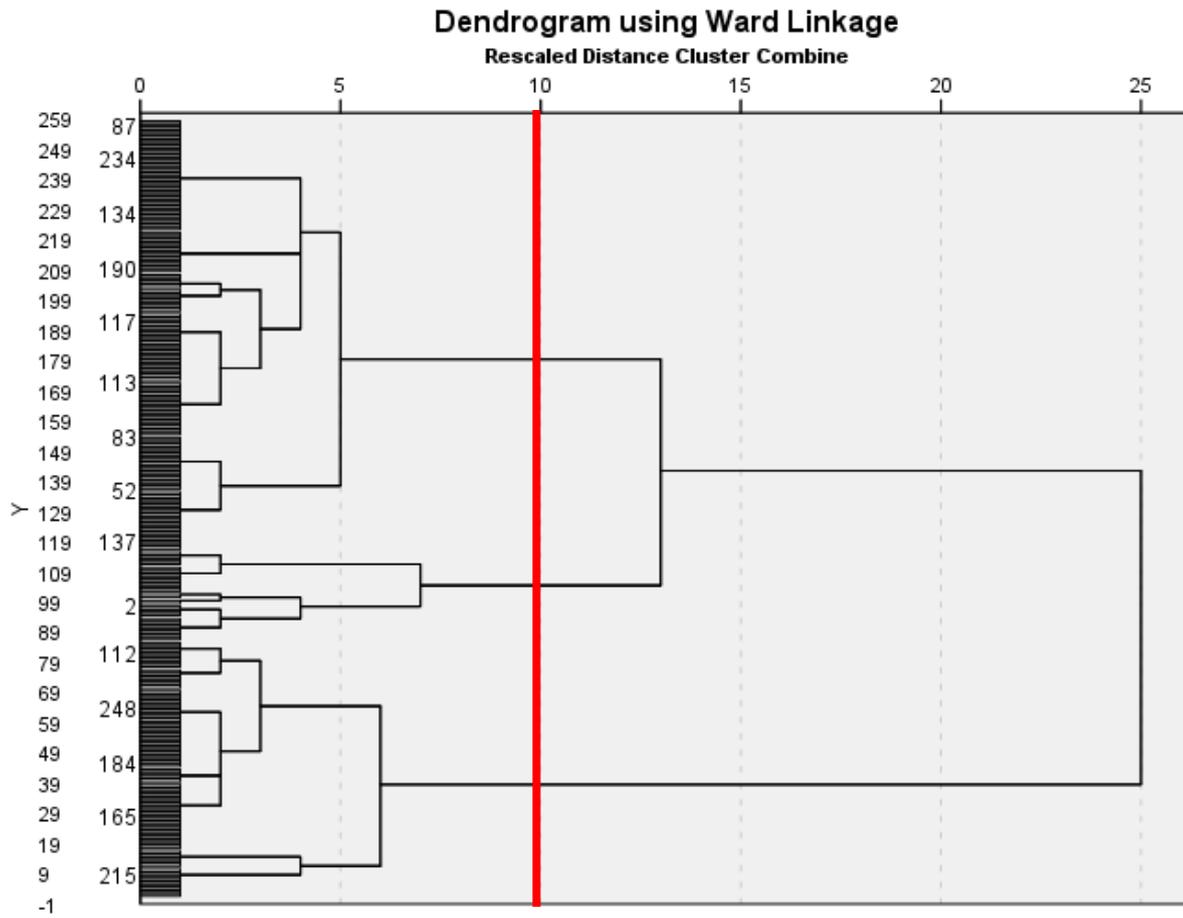
Figure T5: Study 2 - Bar chart demonstrating final cluster centres (K-means cluster analysis, K=3) and table showing number of cluster cases.



Number of Cases in each Cluster

Cluster	1	61.000
	2	75.000
	3	145.000
Valid		281.000
Missing		.000

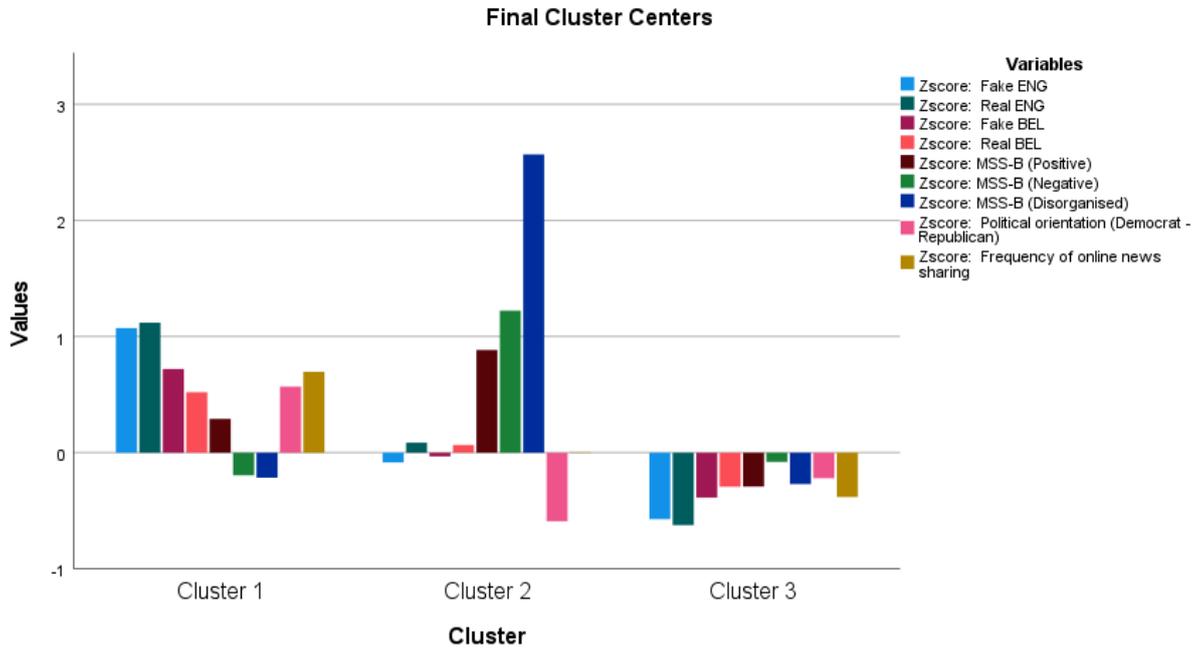
Figure T6: Study 3 – Dendrogram generated from hierarchical cluster analysis.



Note:

- Red line indicates the choice for establishing cluster numbers in k-means analysis (i.e., k=3).

Figure J7: Study 3 - Bar chart demonstrating final cluster centres (K-means cluster analysis, K=3) and table showing number of cluster cases.



Number of Cases in each Cluster

Cluster	1	83.000
	2	23.000
	3	152.000
Valid		258.000
Missing		.000

T5.1 Summary of cluster characteristics

T5.1.1 Clusters in Study 1 (see Figures T1-T3)

Clusters were initially identified using a k-means cluster analysis ($k=4$), however since one cluster was shown to contain only 17 cases (i.e., less than 10% of the 227 cases) they were replaced with a second set of clusters were created using a smaller predefined number of clusters ($k=3$).

Cluster 1 was characterised by high overall levels of schizotypy, with a schizotypal profile consisting of high positive and disorganised traits relative to negative traits. This cluster did not demonstrate particularly elevated vulnerability measures, with engagement and belief scores being shown to be close to the mean (although there was a very slight bias displayed in favour of misinformation stimuli). This cluster also demonstrated the lowest levels of political partisanship. Overall, this cluster can be described as consisting of the least politically polarised participants who were receptive to news stimuli at typical levels.

Cluster 2 was characterised by low overall levels of schizotypy, with a schizotypal profile consisting of high positive traits relative to negative and disorganised traits. This cluster also displayed the highest levels of engagement and belief, with a slight preference for engaging with accurate stimuli and believing misinformation stimuli. Cluster 2 also demonstrated the highest levels of political partisanship and political news sharing habits. Overall, this cluster can be described as consisting of politically polarised individuals who were particularly prone to engaging and believing online news content.

Cluster 3 was characterised by low overall levels of schizotypy, with a schizotypal profile consisting of high negative traits relative to positive and disorganised traits. This cluster also displayed the lowest levels of engagement and belief with new stimuli, showing a slight preference for accurate stimuli overall. This cluster was also noteworthy for including those that habitually shared online political news the least. Overall, this cluster can be described as consisting of individuals who were generally sceptical of online content and refrained from engaging with it.

T5.1.2 Clusters in Study 2 (see Figures T5 & T6)

Cluster 1 was characterised by high levels of schizotypy, with a schizotypal profile consisting of high positive traits relative to disorganised and negative traits. This cluster also demonstrated the highest levels of engagement and belief, with a bias in favour of misinformation stimuli. It was also shown that Cluster 1 demonstrated the highest levels of partisanship and habitual online news

sharing. Overall, this cluster can be described as consisting of partisans who displayed elevated vulnerability to online misinformation content.

Cluster 2 was characterised by low levels of schizotypy, with a schizotypal profile consisting of high levels of positive and negative traits relative to disorganised traits. This cluster also demonstrated relatively elevated levels of partisanship combined with elevated rates of belief in the presented stimuli (with a slight bias towards accurate stimuli). Engagement levels were typical. Overall, this cluster can be described as consisting of partisans who were more prone to believe content than they were to engage with it.

Cluster 3 was characterised by high levels of schizotypy, with a schizotypal profile consisting of high levels of disorganised and negative traits relative to positive traits. This cluster was the least likely to engage or believe, while also demonstrating the lowest levels of partisanship and news sharing. Overall, this cluster can be described as consisting of individuals who were the least politically polarised who demonstrated general scepticism and lack a of engagement with online news content.

T5.1.3 Clusters in Study 3 (see Figures T6 & T7)

Cluster 1 was characterised a schizotypal profile consisting of high levels of positive schizotypy relative to low levels of negative and disorganised schizotypy. This cluster demonstrated the highest levels of engagement and belief, with a slight bias toward accurate engagement and misinformation belief. This cluster also demonstrated the highest levels of partisanship and habitual online political news sharing. Overall, this cluster can be described as consisting of partisan individuals who display heightened receptivity to online news content (regardless of accuracy).

Cluster 2 was characterised by high overall levels of schizotypy, with a schizotypal profile comprised of high levels of disorganised schizotypy relative to negative and positive schizotypy. This group was shown to believe and engage with news stimuli at levels close the mean, with a slight bias in favour of accurate stimuli. This cluster was also shown to be the least partisan, while displaying typical levels of online news sharing. Overall, this cluster can be described as consisting of participants who were the least politically polarised and engaged/believed news stimuli at average levels.

Cluster 3 was characterised by low levels of schizotypy, with a schizotypal profile consisting of high levels of negative traits relative to disorganised and positive traits. This cluster displayed the

lowest levels of engagement and belief in news stimuli, with a slight bias in favour of accurate engagement and misinformation belief. This cluster also demonstrated the lowest levels of habitual news sharing. Overall, this cluster can be described as consisting of participants who tended not to share online political news and were reluctant to believe or engage with any of the presented news stimuli.

T6 Interpretation of findings

The emerging pattern of results appears to imply that schizotypal profiles characterised by elevated positive traits relative to negative traits were associated with increased receptivity to news stimuli (regardless of accuracy). This was observed to be the case for cluster 2 in Study 1 and cluster 1 for Studies 2 & 3.

In contrast, schizotypal profiles characterised by elevated negative traits relative to positive traits were associated with lower levels of belief and engagement with news stimuli in general. This pattern was observed in cluster 3 for Studies 1-3.

These findings therefore suggest that the strength of one's schizotypal traits might not be as important as their relative expression to other traits (e.g., having high levels of positive schizotypy may not result in increased vulnerability to misinformation if that same individual has even higher levels of negative schizotypy).

As these findings were exploratory and utilised secondary data from studies that were not optimally designed for this type of analysis, they must be interpreted with caution. However, this opportunistic analysis does seem to indicate that shifting focus from the role of individual schizotypy traits to overall schizotypal profiles might prove to be a fruitful avenue of future research.

T7 References

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<https://doi.org/10.1016/j.psychres.2013.08.006>

Yim, O., & Ramdeen, K. T. (2015). Hierarchical Cluster Analysis: Comparison of Three Linkage Measures and Application to Psychological Data. *The Quantitative Methods for Psychology*, *11*(1), 8–21. <https://doi.org/10.20982/tqmp.11.1.p008>

Appendix U – Example of the experimental intervention flags utilised in Moravec et al. (2020)



System 1 Intervention



System 2 Intervention



Combination Intervention

Appendix V - A copy of the preregistration document (Study 4).

1) Data collection. Have any data been collected for this study already?

- Yes, we already collected the data.
- No, no data have been collected for this study yet.
- It's complicated. We have already collected some data but explain in Question 8 why readers may consider this a valid **pre**-registration nevertheless.
(Note: "Yes" is not an accepted answer.)

2) Hypothesis. What's the main question being asked or hypothesis being tested in this study?

In a partial replication of Moravec et al. (2020), three online misinformation intervention techniques will be tested: one that targets automatic/system-1 cognition, one that targets effortful/system-2 cognition, and one that targets both system-1 and system-2 cognition simultaneously. It is predicted that the intervention techniques will reduce belief and engagement with online misinformation as previously demonstrated in Moravec et al. (2020). Therefore:

H1 - All intervention techniques will reduce misinformation engagement (H1a) and belief (H1b) compared to the control condition.

H2 - The combined system-1 & system-2 intervention will be more effective than the separate system-1 and system-2 interventions at reducing misinformation engagement (H2a) and belief (H2b).

It is also hypothesised that the efficacy of the intervention techniques will be moderated by individual differences in Positive schizotypy, as measured by the Multidimensional Schizotypy Scale – Brief (MSS-B; Gross et al., 2018). It is hypothesised that increased levels of Positive schizotypy will be associated with reduced efficacy of the intervention targeting system-2, and increased efficacy of the intervention targeting system-1 (there is no formal hypothesis for the influence of Positive schizotypy on the combined intervention, but this will be explored). Therefore:

H3 – Increased levels of Positive schizotypy will be associated with reduced efficacy of the system 2 intervention for misinformation engagement (H3a) and belief (H3b).

H4 – Increased levels of Positive schizotypy will be associated with an increased efficacy of the system 1 intervention for misinformation engagement (H4a) and belief (H4b).

3) Dependent variable. Describe the key dependent variable(s) specifying how they will be measured.

One key outcome variable for all hypotheses will be a *false news engagement* score indicating the self-reported likelihood of the participant either “liking”, responding with an emoji, sharing, or

commenting on the presented false news article if it were to be encountered on a social media platform. This score will be calculated for each participant by combining the scores of all the engagement measures (comment, sharing, etc.).

The second key outcome variable for all hypotheses is a *false news belief* score, indicating the extent to which participants believe in the accuracy of a presented false news article. This score will be calculated by averaging individual belief scores from each false news stimuli presented.

All news stimuli presented to the participants will be false. All stimuli are derived from a public library of true and false news articles collected and pre-tested by Pennycook et al. (2021). The news stories are presented in a “Social media” format (i.e., looking as though it has appeared on a social media news feed) and edited to adhere to one of the 4 experimental conditions: 1) no warning flag (control), 2) warning flag targeting system-1, 3) warning flag targeting system-2, 4) warning flag targeting both system-1 and system-2.

All news stimuli included in the study were selected to appeal to right-wing participants, with stimuli selected to create roughly comparable levels of partisan appeal.

The Positive schizotypy scale of MSS-B will be used to measure schizotypal personality traits.

Individual differences in the endorsement of conspiratorial beliefs will be measured using the Generic Conspiracy Beliefs Scale (GCBS; Brotherton et al., 2013).

Standard demographic information (age, sex, education level) will be collected via self-report. In addition, measures of political orientation and online news sharing will also be collected. Political orientation will be measured by using an 11-point scale (ranging from “strongly Democrat” to “strongly Republican”) while online news sharing behaviour will be measured using a 5-point scale (indicating the frequency of online news sharing).

4) Conditions. How many and which conditions will participants be assigned to?

Participants will be randomly assigned to one of four experimental conditions (control group, system-1 intervention, system-2 intervention, combined system-1 and system-2 intervention).

5) Analyses. Specify exactly which analyses you will conduct to examine the main question/hypothesis.

Hypotheses H1a, H1b, H2a, and H2b will be tested using a series of 2 x 2 ANCOVAs.

Two IVs, representative of the type of experimental condition the participant is exposed to, will be used in the ANCOVA analyses. The first IV represents the use of system-1 targeting (2 levels - Yes/No) while the second IV represents the use of system-2 targeting (2 levels – Yes/No).

The Covariate used in the analyses will be MSS-B Positive schizotypy scores. This will facilitate the exploration of the efficacy of each intervention type while controlling for the influence of Positive schizotypy traits.

The DV of the first ANCOVA will be *misinformation engagement* scores (addressing H1a and H2a). The DV of the second ANCOVA will be *misinformation belief* scores (addressing H1b and H2b).

Hypotheses H3a, H3b, H4a, and H4b will be tested using four moderation analyses.

The moderation analyses will explore the relationship between IVs and DVs while accounting for the moderating role of Positive schizotypy. IVs will consist of dummy variables representative of the experimental treatment condition, and DVs will consist of either *misinformation engagement* scores or *misinformation belief* scores.

All moderation analyses will also include covariates in the form of demographic variables (age, sex, education level), measures of political orientation, and online news sharing behaviour. *Misinformation belief* scores will also be included as a covariate when utilising *misinformation engagement* as a DV, while *misinformation engagement* will be used as a covariate when utilising *misinformation belief* as a DV.

A summary of the planned moderation analyses can be found below:

Model 1a – Addresses H3a

IV = System-1 intervention

Mod = Positive schizotypy

DV = misinformation engagement

COV= demographics, political orientation, news sharing, misinformation belief

Model 1b - Addresses H4a

IV = System-2 intervention

Mod = P schizotypy

DV = misinformation engagement

COV= demographics, political orientation, news sharing, misinformation belief

Model 2a - Addresses H3b

IV = S1 intervention vs control

Mod = P schizotypy

DV = misinformation belief

COV= demographics, political orientation, news sharing, misinformation engagement

Model 2b - Addresses H4b

IV = S2 intervention vs control

Mod = P schizotypy

DV = misinformation belief

COV= demographics, political orientation, news sharing, misinformation engagement

6) Outliers and Exclusions. Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Upon collection data will be screened and problematic responses will be deleted prior to analysis. Criteria for exclusion will be: 1) declining consent for the use of collected data, 2) zero variance in the item responses to measures of schizotypy, 3) reporting an age below 20, 4) answering “no” to the question “Do you live in the United States?”, 5) implausibly fast completion time (more than 2SD below mean completion time), 6) responding to a hidden question that will only be observable to automated bots.

If the number of valid participant data sets falls below 352 (or 88 per experimental condition) due to participant exclusion and/or attrition, further recruitment will take place in order to meet the predefined power threshold.

Participants who report gender as other than Male or Female will be excluded from the analysis, as a binary gender variable will be used as a control variable.

The study will be conducted using the Qualtrics platform which provides two measures of fraud: RelevantID and Google's invisible reCAPTCHA (Qualtrics, 2021). These tools provide metrics which indicate the likelihood of a participant trying to take a survey multiple times (in the case of the RelevantID duplicate score), as well as the use of automated bots (in the case of the invisible reCAPTCHA and RelevantID fraud score). Participants will therefore be excluded from the analysis if: 1) a participant's RelevantID fraud score is shown to be greater than or equal to 30 (indicative of bot activity), 2) a participant's RelevantID duplicate score was shown to be greater than or equal to 75 (indicative of a duplicate response), 3) a participant's invisible reCAPTCHA score was shown to be below 0.5 (indicative of bot activity).

The frequency and distribution of missing data will be subjected to analysis to determine how missing values are to be dealt with (e.g., if missing values are shown to be missing completely at random then a pairwise deletion approach will be utilised).

7) Sample Size. How many observations will be collected or what will determine sample size?

No need to justify decision, but be precise about exactly how the number will be determined.

Sample size has been determined via an a priori power analysis conducted in G*power 3.1.9.4 on the basis of providing adequate power ($\alpha = 0.05$, power = 80%) for a 2 x 2 ANCOVA. With a total of 4 experimental groups and one covariate, along with an anticipated effect size over .15(*f*), a minimum sample size of 352 participants is required (88 per experimental condition). An additional 10% will be collected to account for participant attrition, totalling 388 (rounded up to 390) participants. 15 additional participants will also be recruited for pilot testing. Therefore, a total sample of 405 (participants will be sought for the main testing phase of the study).

8) Other. Anything else you would like to pre-register?

(e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

Additional exploratory analyses will be conducted using moderation analyses in order to explore the potential moderating role of Positive schizotypy on the combined system-1 & system-2 intervention approach.

Key references:

Brotherton, R., French, C. C., & Pickering, A. D. (2013). Measuring Belief in Conspiracy Theories: The Generic Conspiracist Beliefs Scale. *Frontiers in Psychology*, 4.

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9) Name. Give a title for this AsPredicted pre-registration

Suggestion: use the name of the project, followed by study description.

The moderating role of positive schizotypy on the efficacy of online misinformation interventions.

Finally. For record keeping purposes, please tell us the type of study you are pre-registering.

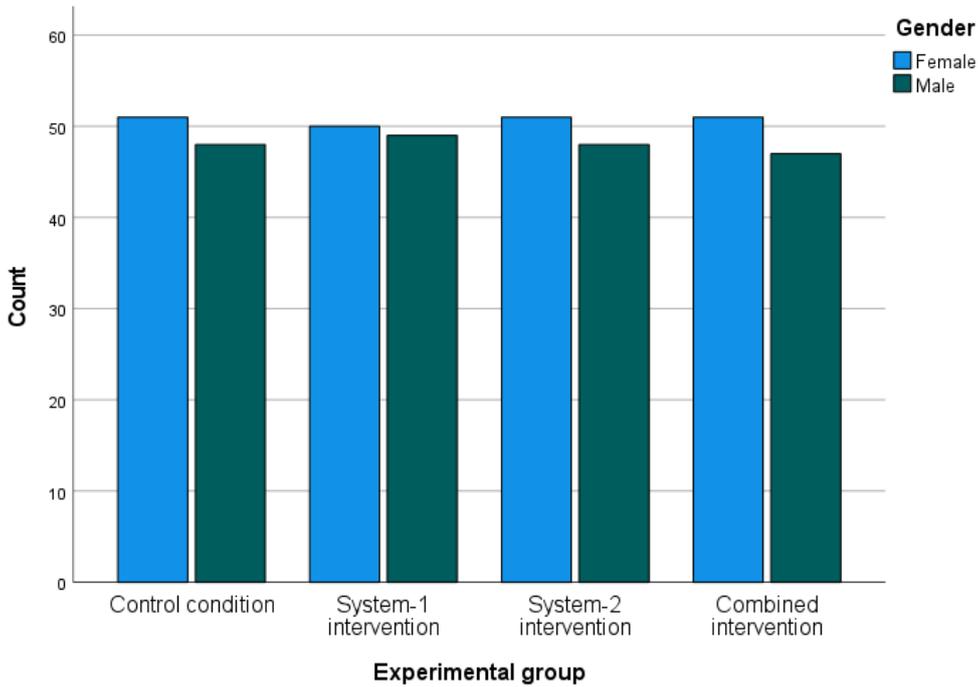
- Class project or assignment
- Experiment
- Survey
- Observational/archival study
- Other:

Appendix W – Distribution of gender across experimental groups (Study 4).

Experimental group * Gender Crosstabulation

Count

		Gender		Total
		Female	Male	
Experimental group	Control condition	51	48	99
	System-1 intervention	50	49	99
	System-2 intervention	51	48	99
	Combined intervention	51	47	98
Total		203	192	395



Appendix X - Scale questions and embedded attention checks.

Measure	Questions	Attention check
MSS-B Positive Schizotypy Subscale	<ol style="list-style-type: none"> 1. I have sometimes felt that strangers were reading my mind. 2. I often think that I hear people talking only to discover that there was no one there. 3. I have felt that there were messages for me in the way things were arranged, like furniture in a room. 4. I believe that dreams have magical properties. 5. I sometimes wonder if there is a small group of people who can control everyone else's behavior. 6. I have had the momentary feeling that someone's place has been taken by a look-alike. 7. There are times when it feels like someone is touching me when no one is actually there. 8. I have had experiences with seeing the future, ESP or a sixth sense. 9. I often worry that other people are out to get me. 10. Some people can make me aware of them just by thinking about me. 11. I believe that there are secret signs in the world if you just know how to look for them. 12. I often worry that someone or something is controlling my behavior. 13. At times I have wondered if my body was really my own. 	<p>People have different types of personality. This is an attention check, please answer "yes" to this question.</p>
GCBS	<ol style="list-style-type: none"> 1. The government is involved in the murder of innocent citizens and/or well-known public figures and keeps this a secret. 2. The power held by heads of state is second to that of small unknown groups who really control world politics. 3. Secret organisations communicate with extraterrestrials, but keep this fact from the public. 4. The spread of certain viruses and/or diseases is the result of the deliberate, concealed efforts of some organisation. 5. Groups of scientists manipulate, fabricate, or suppress evidence in order to deceive the public. 6. The government permits or perpetrates acts of terrorism on its own soil, disguising its involvement. 7. A small, secret group of people is responsible for making all major world decisions, such as going to war. 8. Evidence of alien contact is being concealed from the public. 9. Technology with mind-control capacities is used on people without their knowledge. 10. New and advanced technology which would harm current industry is being suppressed. 11. The government uses people as patsies to hide its involvement in criminal activity. 12. Certain significant events have been the result of the activity of a small group who secretly manipulate world events. 13. Some UFO sightings and rumors are planned or staged in order to distract the public from real alien contact. 14. Experiments involving new drugs or technologies are routinely carried out on the public without their knowledge or consent. 15. A lot of important information is deliberately concealed from the public out of self-interest. 	<p>Life can be confusing sometimes. This question is an attention check, please answer "definitely true".</p>

Appendix Y- Misinformation stimuli used in the *Online Misinformation Engagement and Belief Task (Study 4)*.



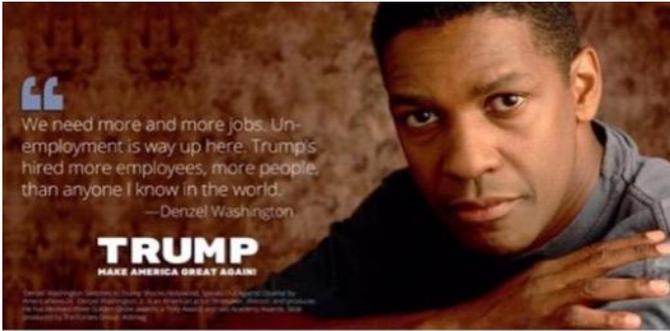
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CORONER'S REPORT: Woman Found On Clinton Estate Was Dead 15 Years, Suffered Torture And Malnutrition



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Appendix Z – Histograms and Violin plots for all variables used in analyses (Study 4)

Figure Z1 – Age

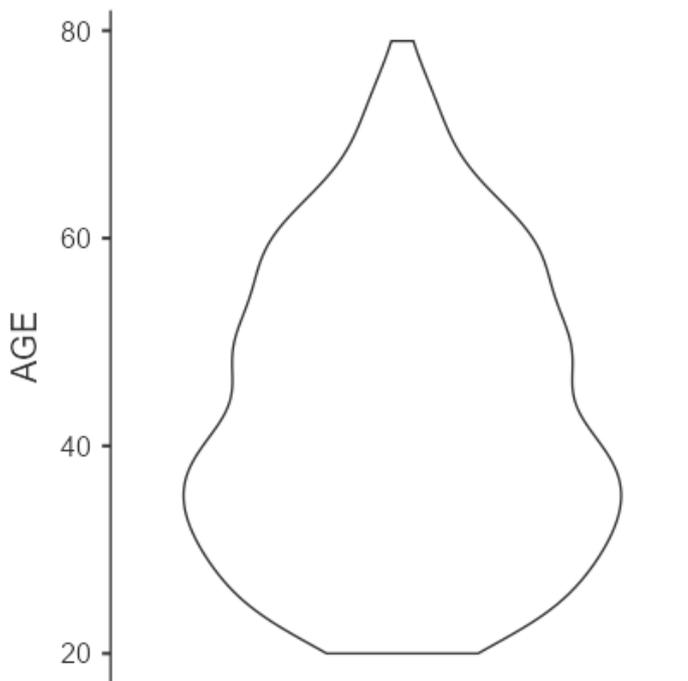
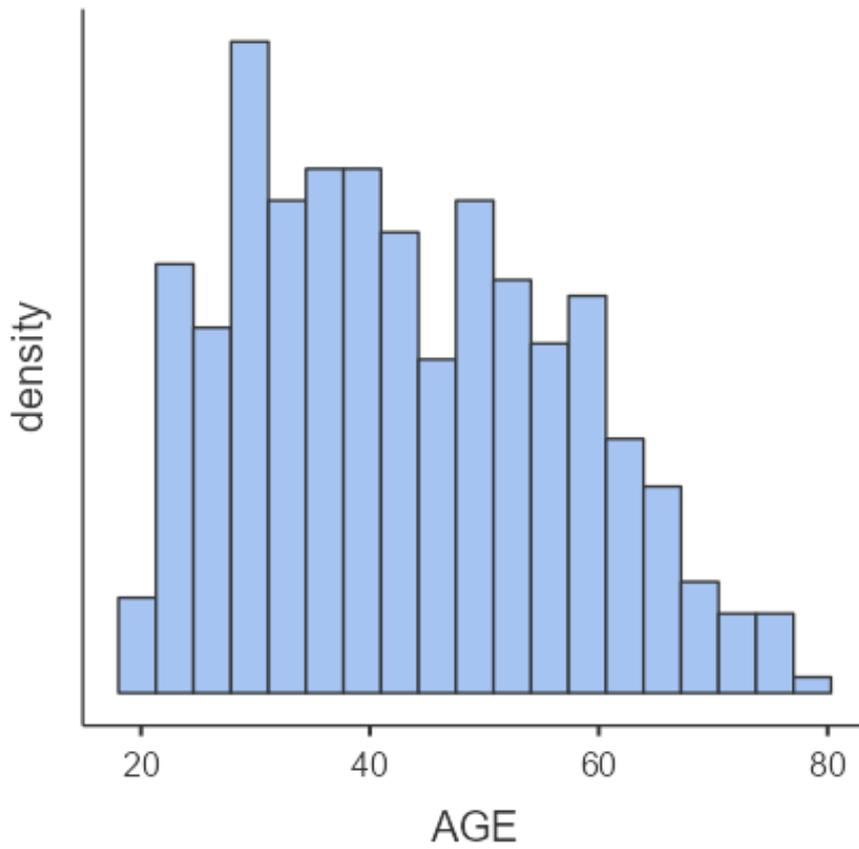


Figure Z2 – Education level

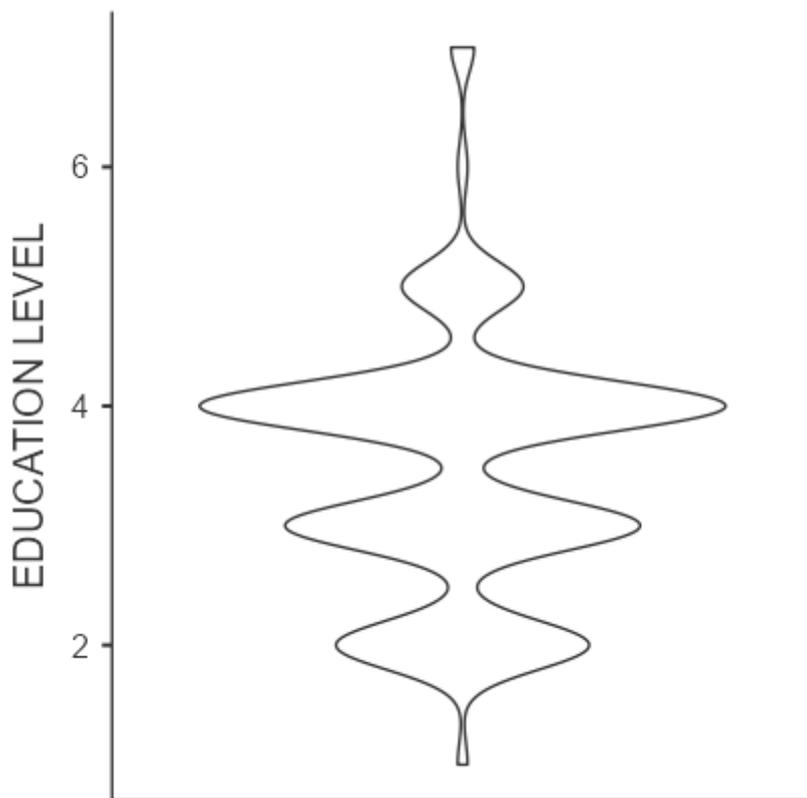
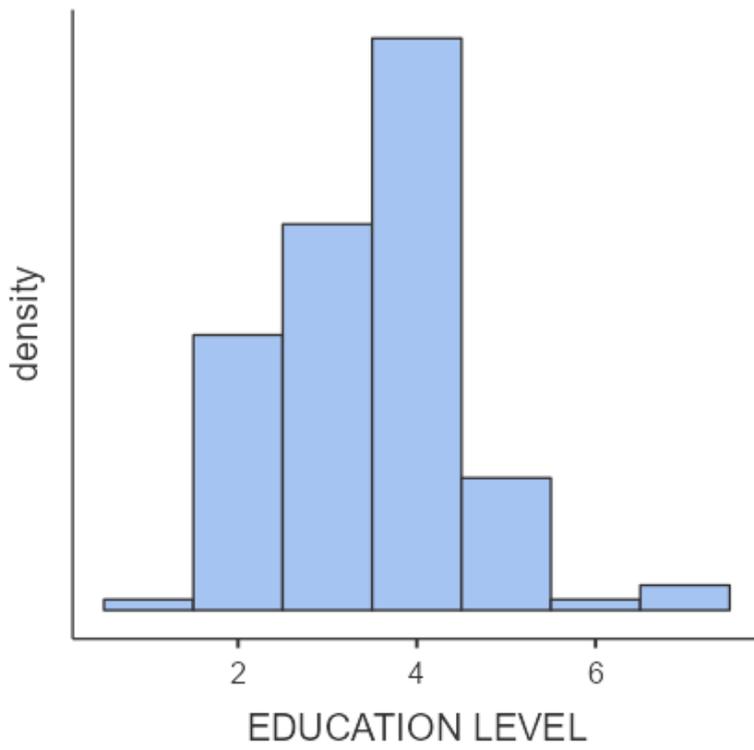


Figure Z3 – Online news sharing frequency

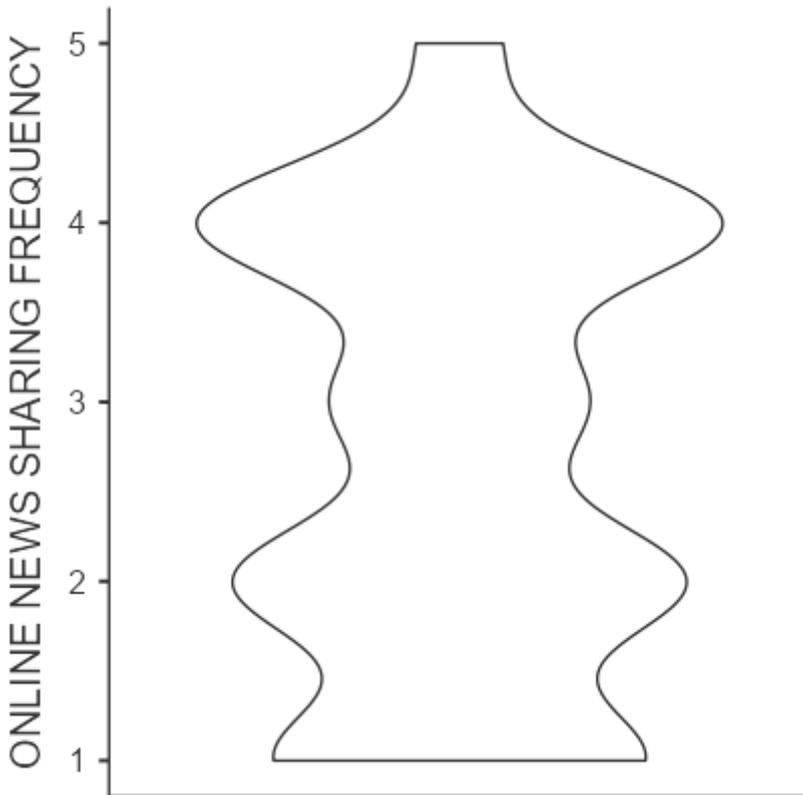
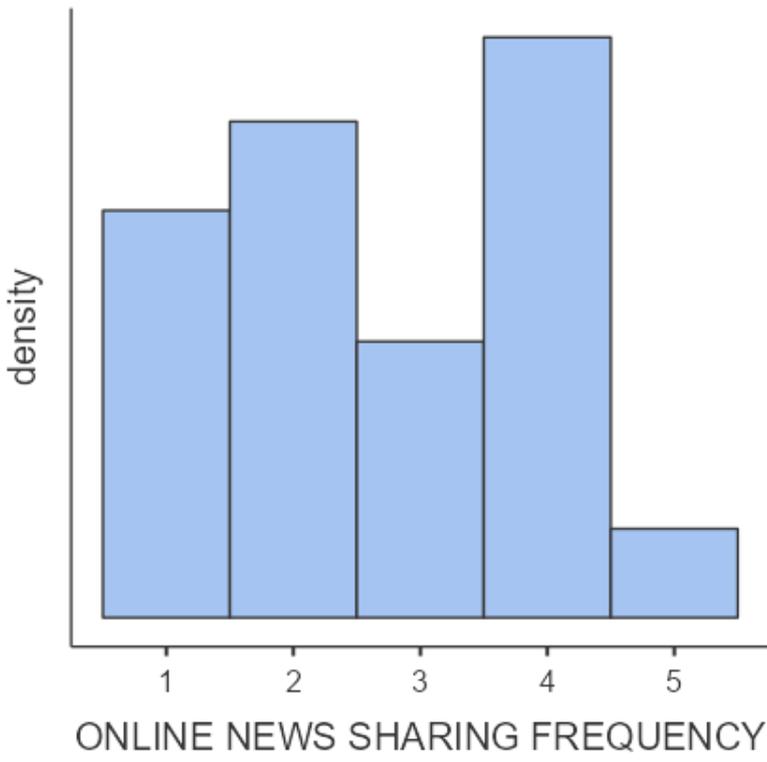


Figure Z4 – Political orientation

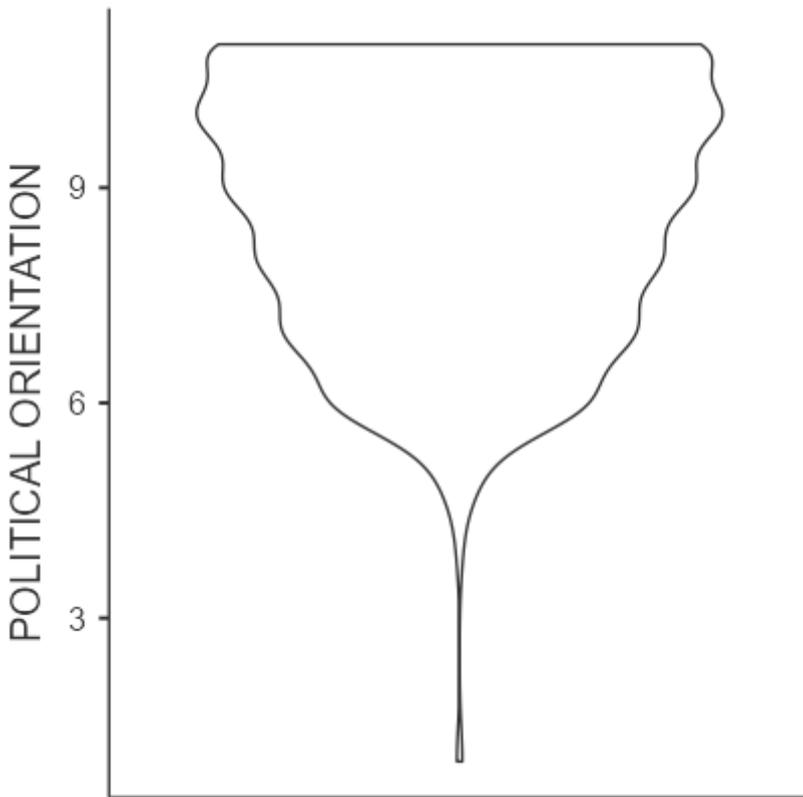
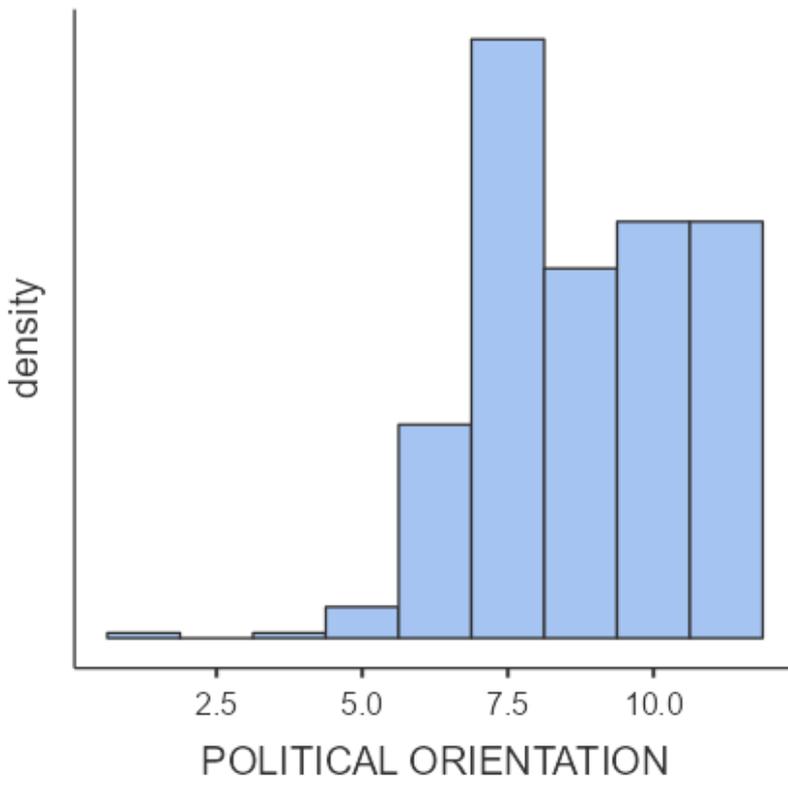


Figure Z5 – Misinformation engagement

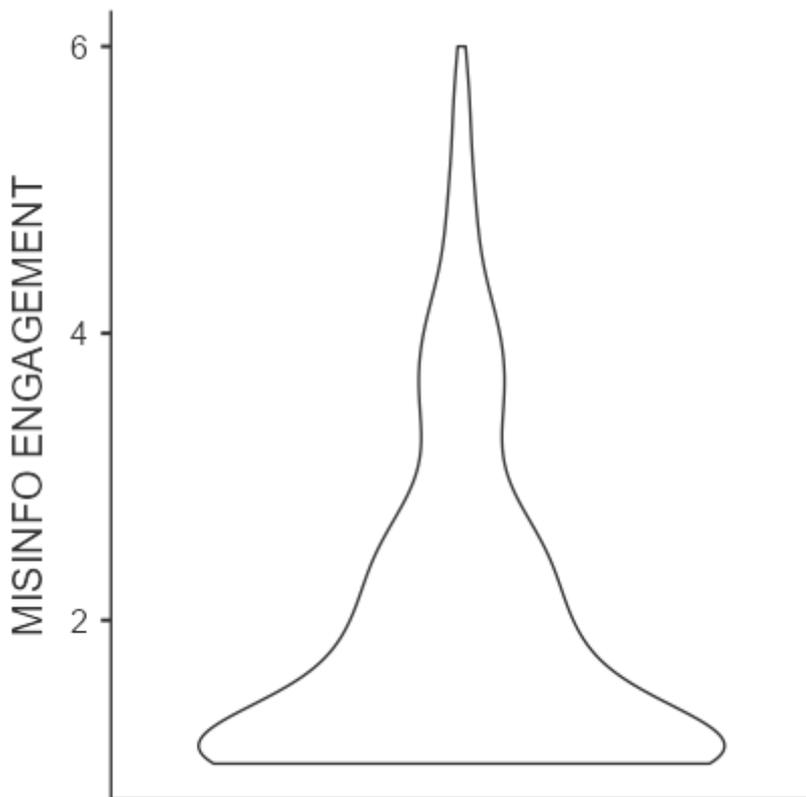
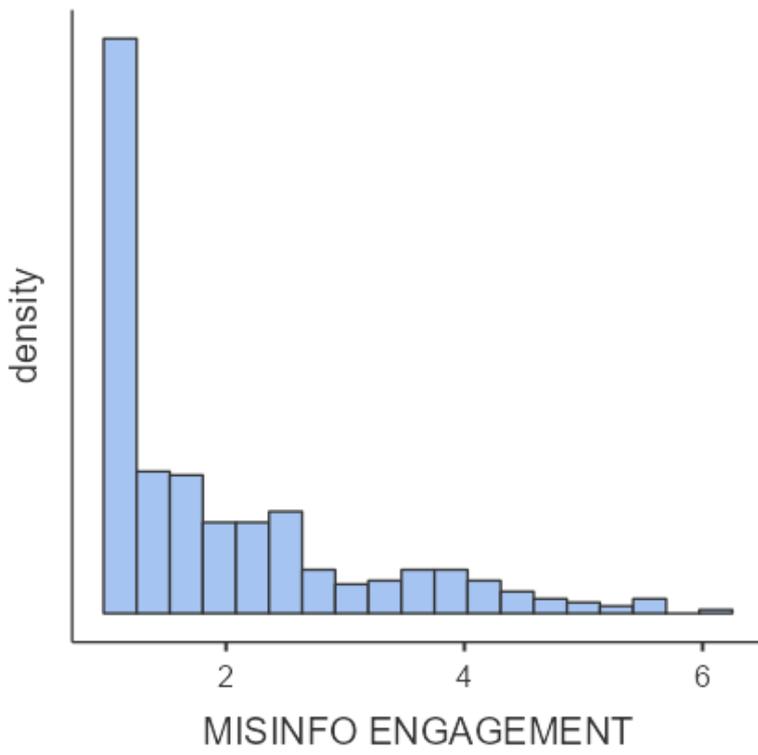


Figure Z6 – Misinformation belief

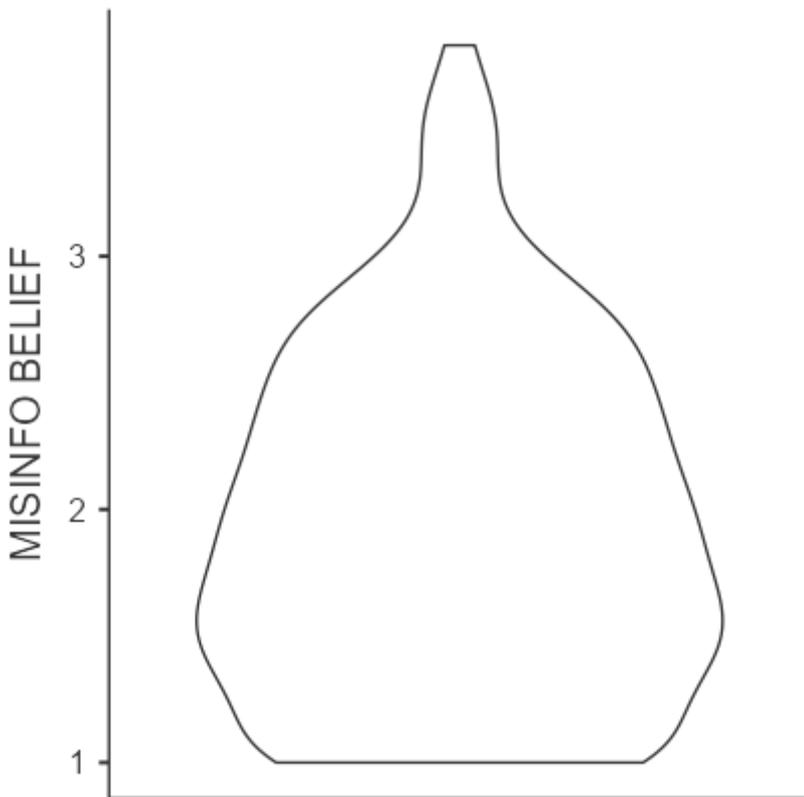
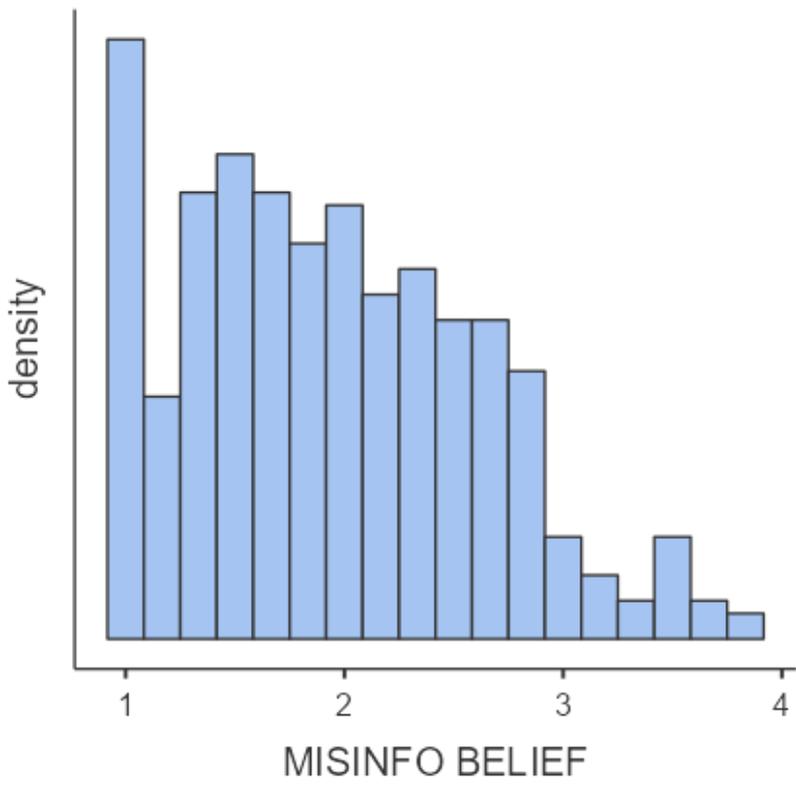


Figure Z7 – Gender

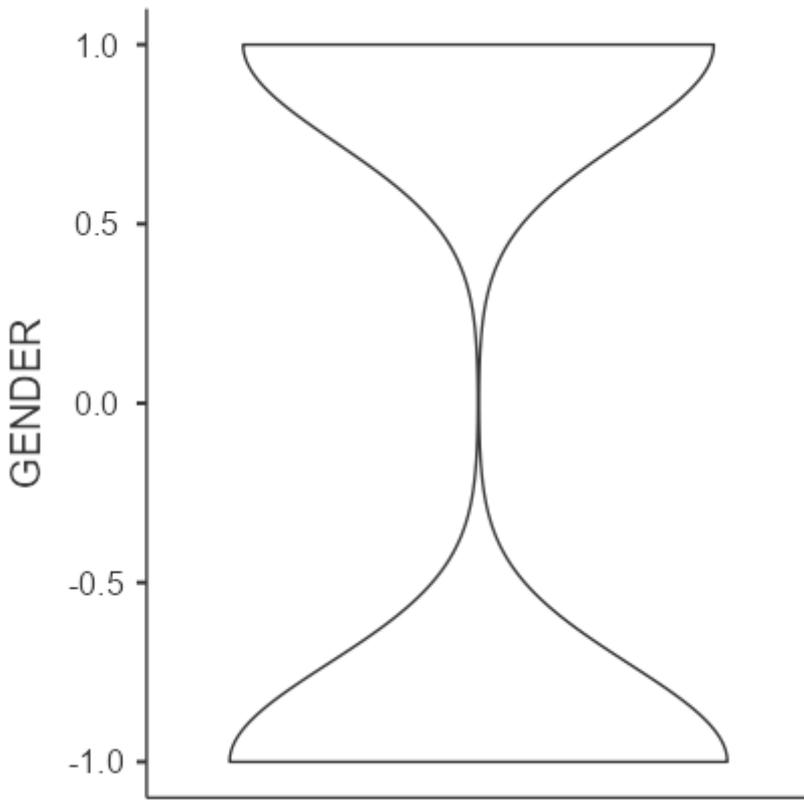


Figure Z8 – Experimental group allocation

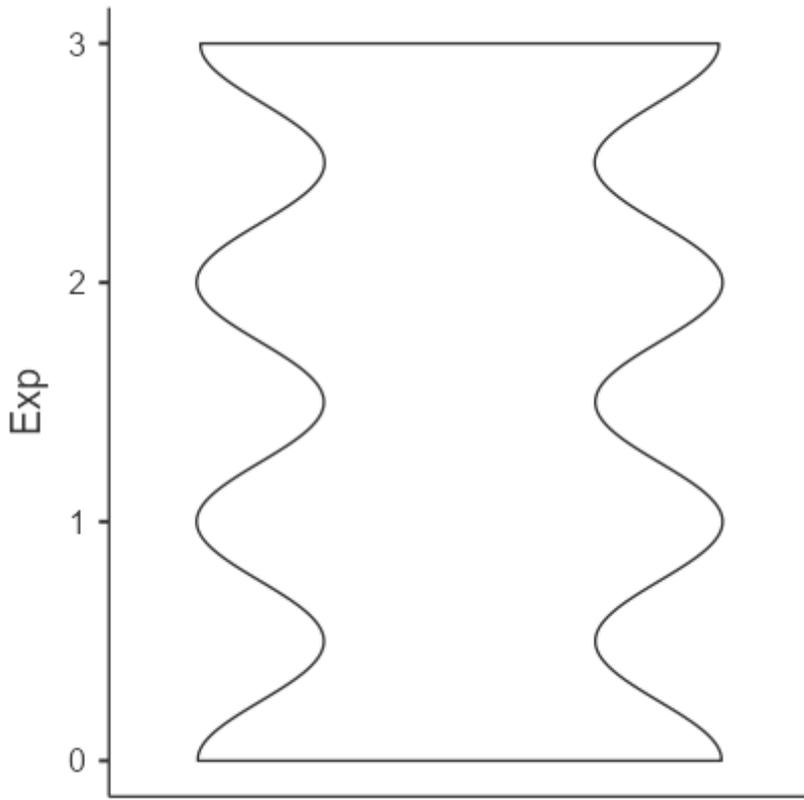


Figure Z9 – MSS-B Positive Schizotypy scores

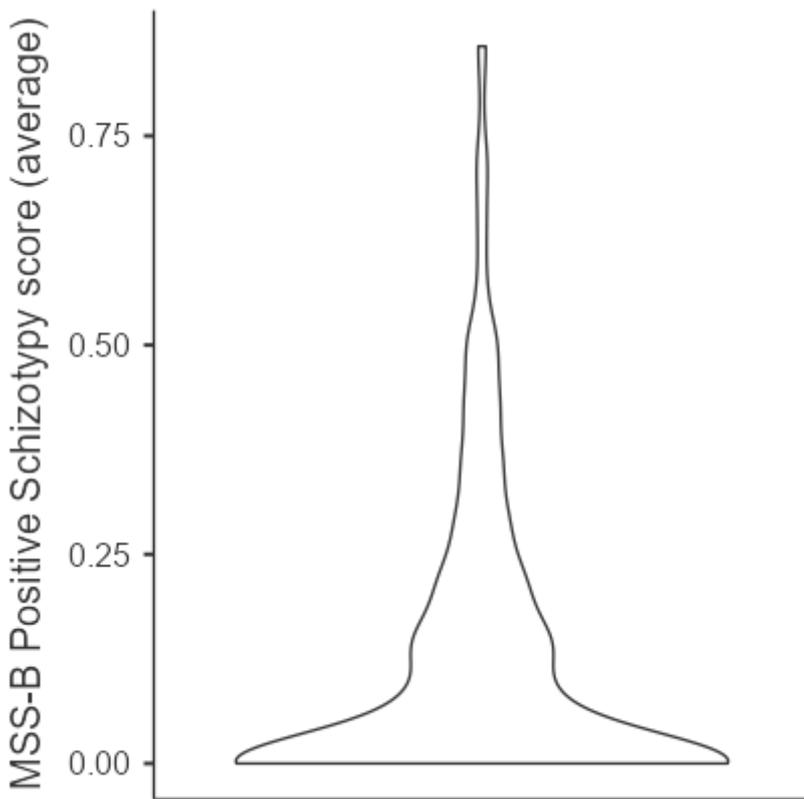
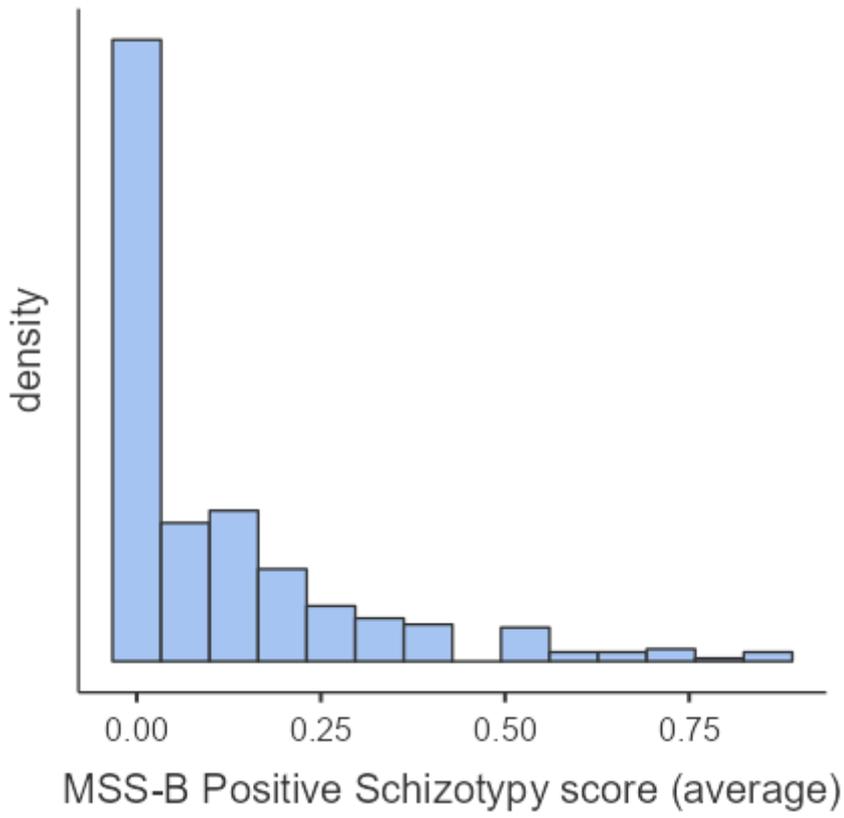
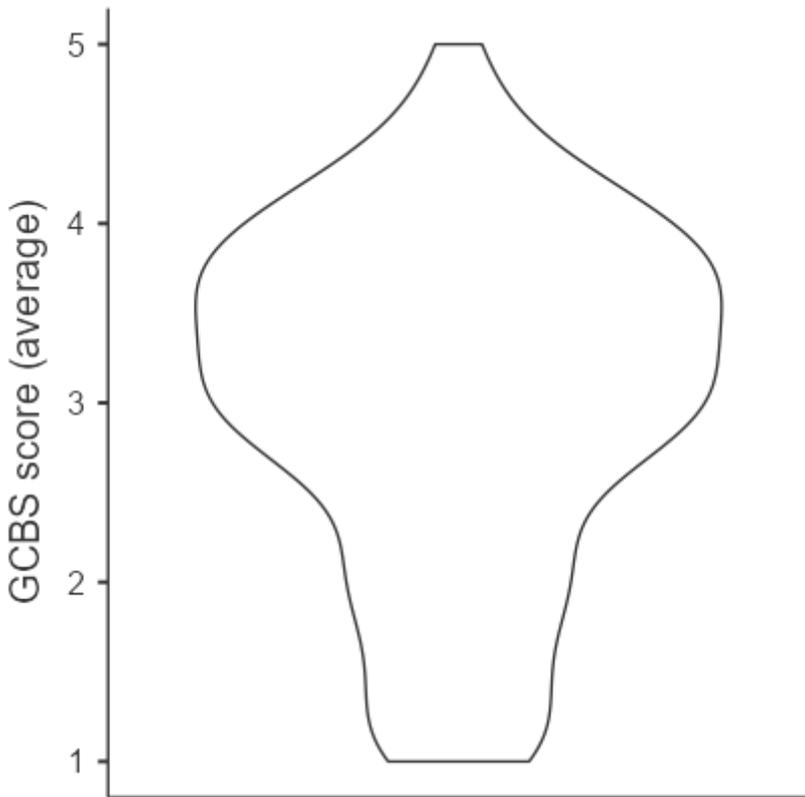
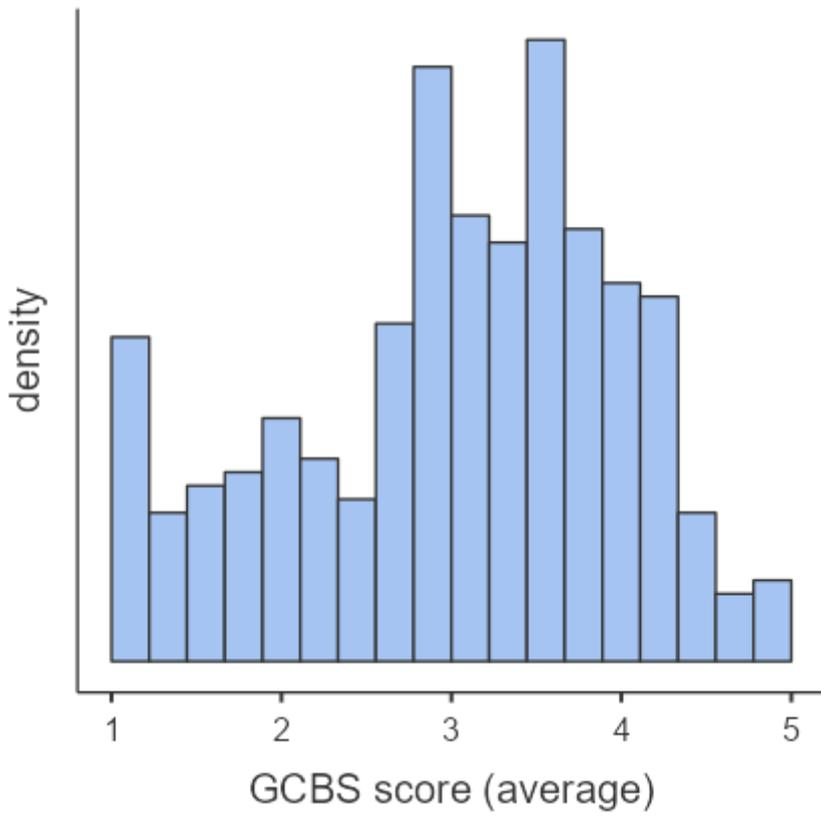


Figure Z10 – GCBS scores



Appendix AA – Misinformation Engagement and Misinformation Belief across intervention groups (Histograms, Violin plots, and Bar plots for Study 4)

Figure AA1 – Distribution of misinformation engagement scores across intervention groups

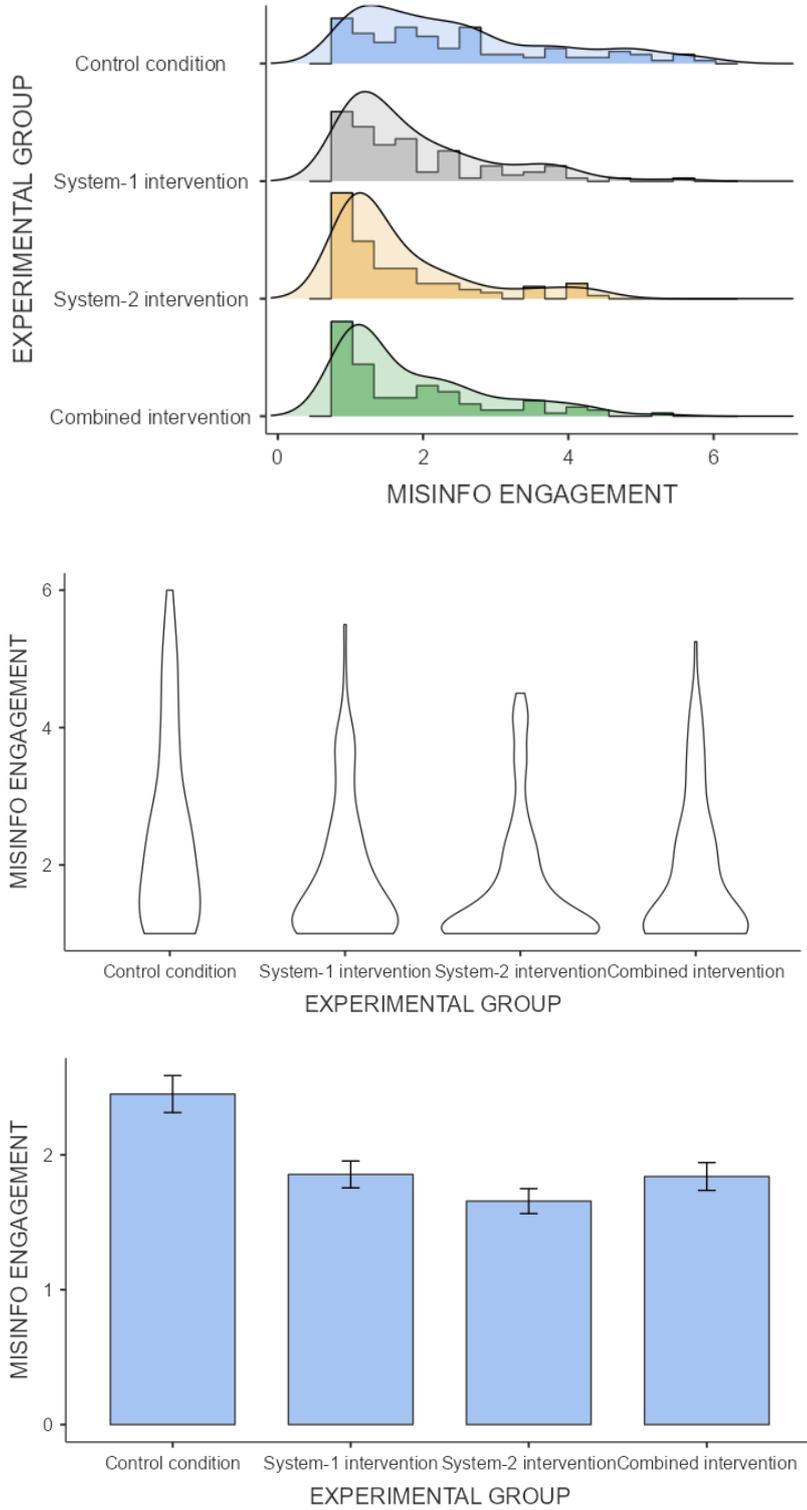
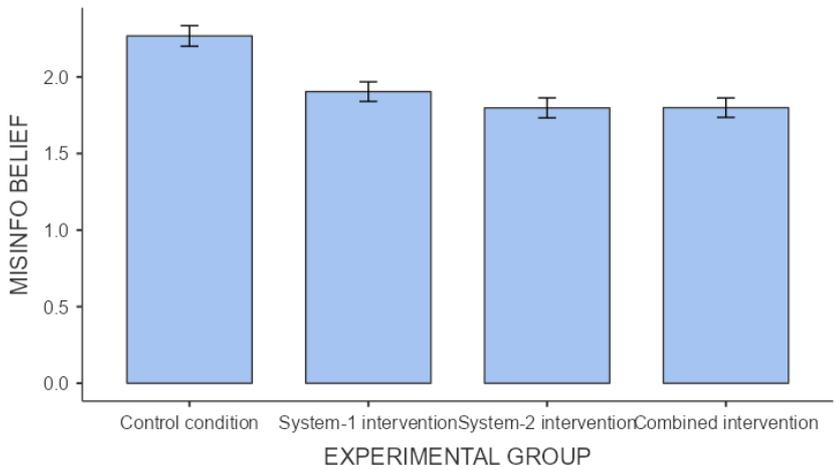
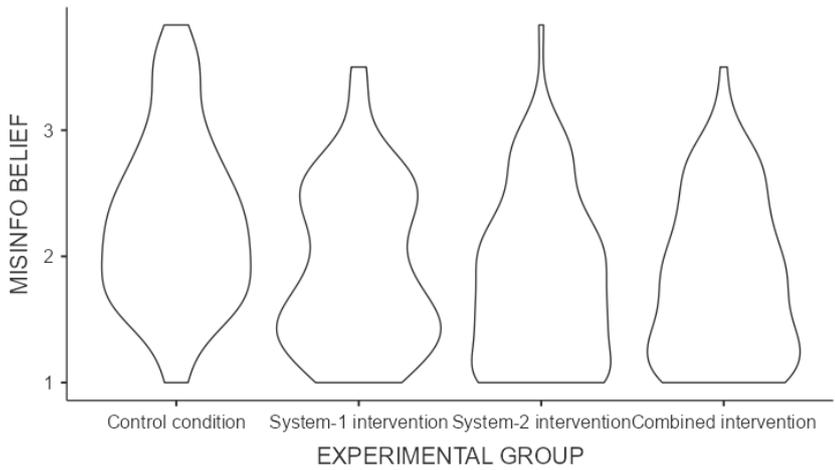
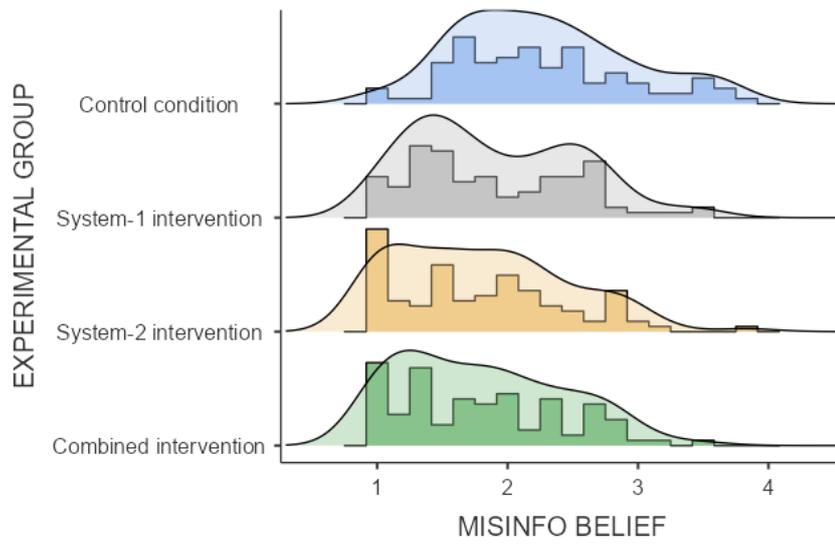


Figure AA2 – Distribution of misinformation belief scores across intervention groups



Appendix BB – Non-parametric correlation matrix (Study 4).

		Correlations																				
		Age	Gender	Education level	Online political news sharing	Political orientation	ENG average score (1-6)	MeanEngagem ent_Control	MeanEngagem ent_S1	MeanEngagem ent_S2	MeanEngagem ent_S1S2	BEL average score (1-4)	MeanBelief_Co ntr ol	MeanBelief_S1	MeanBelief_S2	MeanBelief_S1 S2	MSS-B P av - Mean score of MSS-B P scale	GCBS av - Mean score of GCBS	Experimental group	Ex_S1		
Spearman's rho	Gender	Correlation Coefficient	-.154**																			
		Sig. (2-tailed)	.002																			
		N	395																			
Education level		Correlation Coefficient	-.030	.109*																		
		Sig. (2-tailed)	.555	.031																		
		N	395	395																		
Online political news sharing		Correlation Coefficient	-.030	.066	-.029																	
		Sig. (2-tailed)	.552	.192	.562																	
		N	395	395	395																	
Political orientation		Correlation Coefficient	.216**	-.045	.035	.132**																
		Sig. (2-tailed)	<.001	.375	.491	.009																
		N	395	395	395	395																
ENG average score (1-6)		Correlation Coefficient	-.058	.059	-.037	.508**	.167**															
		Sig. (2-tailed)	.250	.241	.466	<.001	<.001															
		N	395	395	395	395	395															
MeanEngagement_Control		Correlation Coefficient	-.067	.062	-.067	.644**	.263**	1.000**														
		Sig. (2-tailed)	.509	.540	.510	<.001	.008	.000														
		N	99	99	99	99	99	99														
MeanEngagement_S1		Correlation Coefficient	.010	.136	-.047	.567**	.312**	1.000**														
		Sig. (2-tailed)	.925	.181	.644	<.001	.002	.000														
		N	99	99	99	99	99	0														
MeanEngagement_S2		Correlation Coefficient	-.110	.034	.156**	.311**	.104	1.000**														
		Sig. (2-tailed)	.279	.741	.124	.002	.305	.000														
		N	99	99	99	99	99	0	0													
MeanEngagement_S1S2		Correlation Coefficient	-.062	.062	-.127	.565**	-.001	1.000**														
		Sig. (2-tailed)	.541	.542	.214	<.001	.993	.000														
		N	98	98	98	98	98	0	0	0												
BEL average score (1-4)		Correlation Coefficient	.001	-.027	-.138**	.257**	.190**	.608**	.560**	.462**	.679**	.598**										
		Sig. (2-tailed)	.991	.593	.006	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001									
		N	395	395	395	395	395	395	99	99	99	98										
MeanBelief_Control		Correlation Coefficient	.150	-.028	-.251**	.317**	.197	.560**	.560**	.462**	.679**	.598**	1.000**									
		Sig. (2-tailed)	.138	.783	.012	.001	.051	<.001	<.001				.000									
		N	99	99	99	99	99	99	99	0	0	0	0									
MeanBelief_S1		Correlation Coefficient	.056	-.007	-.188**	.176**	.343**	.462**	.462**	.462**	.462**	.462**	1.000**									
		Sig. (2-tailed)	.584	.942	<.001	.082	<.001	<.001	<.001	<.001	<.001	<.001	.000									
		N	99	99	99	99	99	99	0	99	0	0	99	0								
MeanBelief_S2		Correlation Coefficient	-.127	-.019	-.039	.205**	.107	.679**	.679**	.679**	.679**	1.000**										
		Sig. (2-tailed)	.211	.856	.704	.042	.294	<.001			<.001	.000										
		N	99	99	99	99	99	99	0	0	99	0	0									
MeanBelief_S1S2		Correlation Coefficient	-.090	-.056	-.046	.337**	.123	.598**	.598**	.598**	.598**	1.000**										
		Sig. (2-tailed)	.376	.594	.652	<.001	.226	<.001			<.001	.000										
		N	98	98	98	98	98	98	0	0	0	98	0	0	0							
MSS-B P av - Mean score of MSS-B P scale		Correlation Coefficient	-.218**	.111*	-.151**	.188**	-.120*	.353**	.323**	.205**	.331**	.552**	.271**	.180	.213	.313**	.339**					
		Sig. (2-tailed)	<.001	.027	.003	<.001	.017	<.001	.001	.042	<.001	<.001	<.001	<.001	.075	.034	.002	<.001				
		N	395	395	395	395	395	395	99	99	99	98	395	99	99	99	98					
GCBS av - Mean score of GCBS		Correlation Coefficient	-.116*	.113*	-.211**	.243**	.025	.392**	.354**	.274**	.417**	.547**	.419*	.408**	.479**	.364**	.477**	.495**				
		Sig. (2-tailed)	.021	.025	<.001	<.001	.615	<.001	<.001	.006	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001				
		N	395	395	395	395	395	395	99	99	99	98	395	99	99	99	98	395				
Experimental group		Correlation Coefficient	-.063	-.006	.086	-.008	-.027	-.201**				-.244**										
		Sig. (2-tailed)	.215	.908	.086	.880	.591	<.001				<.001										
		N	395	395	395	395	395	395	99	99	99	98	395	99	99	99	98					
Ex_S1		Correlation Coefficient	.021	.002	-.001	-.049	.016	-.066				-.127*									.445**	
		Sig. (2-tailed)	.679	.961	.988	.333	.753	.190				.011									.638	<.001
		N	395	395	395	395	395	395	99	99	99	98	395	99	99	99	98				395	395
Ex_S2		Correlation Coefficient	-.080	-.008	.097	.016	-.038	-.191**				-.209**										
		Sig. (2-tailed)	.111	.879	.054	.753	.449	<.001														
		N	395	395	395	395	395	395	99	99	99	98	395	99	99	99	98				.637	<.001

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Small effect size ($r > .15$) highlighted in green. **Medium** effect size ($r > .25$) highlighted in yellow. **Large** effect size ($r > .35$) highlighted in red. Effect size guidelines derived from Gignac & Szodorai, 2016

Appendix CC – Comparison of uncorrected and estimated marginal means for the DV variable in each experimental group condition from Model 7.1 and Model 7.2.

Mean Type	Experimental group	Model 7.1 DV= Engagement with false headlines				Model 7.2 DV=Belief in false headlines			
		M	SE	95% Confidence Interval		M	SE	95% Confidence Interval	
				Lower bound	Upper bound			Lower bound	Upper bound
<i>Uncorrected Means</i>	Control group	2.45	0.11	2.24	2.67	2.27	0.06	2.14	2.40
	System 1 intervention	1.86	0.11	1.64	2.07	1.90	0.06	1.78	2.03
	System 2 intervention	1.66	0.11	1.44	1.87	1.80	0.06	1.67	1.93
	Combined intervention	1.84	0.11	1.62	2.06	1.80	0.07	1.67	1.93
<i>Estimated Marginal Means</i>	Control group	2.41	0.10	2.21	2.60	2.25	0.06	2.13	2.37
	System 1 intervention	1.90	0.10	1.70	2.09	1.92	0.06	1.80	2.05
	System 2 intervention	1.67	0.10	1.47	1.86	1.80	0.06	1.68	1.92
	Combined intervention	1.83	0.10	1.63	2.03	1.80	0.06	1.67	1.92

Appendix DD – WLRS2 Robust ANOVA results.

Table DD1 - WLRS2 Robust ANOVA (DV = Engagement with false headlines)

Robust ANOVA		
	Q	p
System 1 intervention	2.94	0.089
System 2 intervention	13.45	<.001
System 1 intervention * System 2 intervention	11.51	<.001

Note. Method of trimmed means, trim level 0.2

Table DD2 - WLRS2 Robust ANOVA (DV = Belief in false headlines)

Robust ANOVA		
	Q	p
System 1 intervention	4.77	0.030
System 2 intervention	13.62	<.001
System 1 intervention * System 2 intervention	5.15	0.025

Note. Method of trimmed means, trim level 0.2

Appendix EE – Moderation analyses (Study 4)

Table EE1 – Moderation analysis results for Model 7.3, Model 7.4, and Model 7.5.

Model details	Model summary	Variables	Coefficients					
			Unstandardised B	SE(HC 3)	t	p	CI	
							LL	UL
Model 7.3 DV: <ul style="list-style-type: none"> Engagement with false headlines IV: <ul style="list-style-type: none"> S1 v Control Moderator (W): <ul style="list-style-type: none"> MSS-B positive schizotypy Covariates: <ul style="list-style-type: none"> Age Gender Education Political news sharing Political orientation GCBS Belief in false headlines 	$F(10,384) = 36.20$, $p < .001$, Adjusted $R^2 = .51$	Constant	-0.98	0.30	-3.3	.001	-1.57	-0.40
		S1 v Control	0.07	0.11	0.66	.507	-0.14	0.29
		MSS-B positive schizotypy	1.47	0.34	4.32	<.001	0.80	2.14
		S1 v Control * MSS-B positive schizotypy	-0.86	0.70	-1.23	.220	-2.22	0.51
		Age	0.00	0.00	-0.99	.325	-0.01	0.00
		Gender	0.09	0.04	2.22	.027	0.01	0.17
		Education	0.07	0.04	1.63	.103	-0.01	0.15
		Political news sharing	0.26	0.03	7.96	<.001	0.19	0.32
		Political orientation	0.05	0.03	1.79	.074	0.00	0.1
		GCBS	0.01	0.05	0.24	.813	-0.09	0.11
		Belief in false headlines	0.78	0.08	10.09	<.001	0.63	0.93
		Model 7.4 DV: <ul style="list-style-type: none"> Engagement with false headlines IV: <ul style="list-style-type: none"> S2 v Control Moderator (W): <ul style="list-style-type: none"> MSS-B positive schizotypy Covariates: <ul style="list-style-type: none"> Age Gender Education Political news sharing Political orientation GCBS Belief in false headlines 	$F(10,384) = 38.98$, $p < .001$, Adjusted $R^2 = .52$	Constant	-0.88	0.31	-2.86	.004
S2 v Control	-0.17			0.09	-1.89	.060	-0.35	0.01
MSS-B positive schizotypy	1.47			0.35	4.14	<.001	0.77	2.16
S2 v Control * MSS-B positive schizotypy	-0.85			0.51	-1.68	.094	-1.85	0.14
Age	0.00			0.00	-1.08	.280	-0.01	0.00
Gender	0.09			0.04	2.13	.034	0.01	0.17
Education	0.08			0.04	1.77	.077	-0.01	0.16
Political news sharing	0.26			0.03	8.26	<.001	0.20	0.33
Political orientation	0.04			0.03	1.46	.146	-0.01	0.09
GCBS	0.02			0.05	0.41	.681	-0.08	0.12
Belief in false headlines	0.76			0.08	9.71	<.001	0.61	0.92
Model 7.5 DV: <ul style="list-style-type: none"> Engagement with false headlines IV: <ul style="list-style-type: none"> S1+S2 v Control Moderator (W): <ul style="list-style-type: none"> MSS-B positive schizotypy Covariates: <ul style="list-style-type: none"> Age Gender Education Political news sharing Political orientation GCBS Belief in false headlines 	$F(10,384) = 35.19$, $p < .001$, Adjusted $R^2 = .43$			Constant	-0.95	0.30	-3.22	.001
		S1+S2 v Control	-0.05	0.10	-0.48	.634	-0.25	0.15
		MSS-B positive schizotypy	1.20	0.38	3.13	.002	0.45	1.95
		S1+S2 v Control * MSS-B positive schizotypy	0.35	0.53	0.66	.508	-0.68	1.38
		Age	0.00	0.00	-1.00	.316	-0.01	0.00
		Gender	0.09	0.04	2.25	.025	0.01	0.17
		Education	0.07	0.04	1.68	.094	-0.01	0.15
		Political news sharing	0.25	0.03	7.97	<.001	0.19	0.32
		Political orientation	0.05	0.03	1.66	.098	-0.01	0.10
		GCBS	0.02	0.05	0.33	.745	-0.08	0.12
		Belief in false headlines	0.78	0.08	9.85	<.001	0.63	0.94

Significant variables are reported in **bold**

Table EE2 – Moderation analysis results for Model 7.6, Model 7.7, and Model 7.8.

Model details	Model summary	Variables	Coefficients					
			Unstandardised B	SE(HC3)	t	p	CI	
							LL	UL
Model 7.6 DV: <ul style="list-style-type: none"> Belief in false headlines IV: <ul style="list-style-type: none"> S1 v Control Moderator (W): <ul style="list-style-type: none"> MSS-B positive schizotypy Covariates: <ul style="list-style-type: none"> Age Gender Education Political news sharing Political orientation GCBS Engagement with false headlines 	$F(10,384) = 34.96$, $p < .001$, Adjusted $R^2 = .43$	Constant	0.76	0.19	3.97	<.001	0.38	1.13
		S1 v Control	-0.06	0.07	-0.89	.372	-0.21	0.08
		MSS-B positive schizotypy	0.02	0.20	0.08	.937	-0.38	0.41
		S1 v Control * MSS-B positive schizotypy	0.29	0.34	0.85	.393	-0.38	0.96
		Age	0.00	0.00	1.03	.304	0.00	0.01
		Gender	-0.06	0.03	-2.35	.019	-0.12	-0.01
		Education	-0.06	0.02	-2.47	.014	-0.11	-0.01
		Political news sharing	-0.03	0.03	-1.00	.318	-0.08	0.02
		Political orientation	0.03	0.02	2.19	.029	0.00	0.07
		GCBS	0.15	0.04	4.23	<.001	0.08	0.22
		Engagement with false headlines	0.33	0.04	9.00	<.001	0.25	0.40
		Model 7.7 DV: <ul style="list-style-type: none"> Belief in false headlines IV: <ul style="list-style-type: none"> S2 v Control Moderator (W): <ul style="list-style-type: none"> MSS-B positive schizotypy Covariates: <ul style="list-style-type: none"> Age Gender Education Political news sharing Political orientation GCBS Engagement with false headlines 	$F(10,384) = 36.13$, $p < .001$, Adjusted $R^2 = .43$	Constant	0.76	0.19	4.07	<.001
S2 v Control	-0.10			0.07	-1.48	.140	-0.24	0.03
MSS-B positive schizotypy	-0.04			0.19	-0.23	.817	-0.42	0.33
S2 v Control * MSS-B positive schizotypy	0.63			0.36	1.74	.083	-0.08	1.35
Age	0.00			0.00	0.99	.324	0	0.01
Gender	-0.06			0.03	-2.31	.021	-0.12	-0.01
Education	-0.06			0.02	-2.43	.016	-0.11	-0.01
Political news sharing	-0.03			0.03	-0.99	.321	-0.08	0.02
Political orientation	0.04			0.02	2.45	.015	0.01	0.07
GCBS	0.14			0.04	3.95	<.001	0.07	0.21
Engagement with false headlines	0.32			0.04	8.88	<.001	0.25	0.40
Model 7.8 DV: <ul style="list-style-type: none"> Belief in false headlines IV: <ul style="list-style-type: none"> S1+S2 v Control Moderator (W): <ul style="list-style-type: none"> MSS-B positive schizotypy Covariates: <ul style="list-style-type: none"> Age Gender Education Political news sharing Political orientation GCBS Engagement with false headlines 	$F(10,384) = 35.19$, $p < .001$, Adjusted $R^2 = .44$			Constant	0.77	0.19	4.14	<.001
		S1+S2 v Control	-0.12	0.07	-1.82	.070	-0.25	0.01
		MSS-B positive schizotypy	0.14	0.19	0.73	.466	-0.24	0.52
		S1+S2 v Control * MSS-B positive schizotypy	-0.19	0.35	-0.55	.586	-0.89	0.5
		Age	0.00	0.00	0.77	.443	0.00	0.01
		Gender	-0.07	0.03	-2.47	.014	-0.12	-0.01
		Education	-0.06	0.02	-2.42	.016	-0.11	-0.01
		Political news sharing	-0.02	0.03	-0.95	.341	-0.07	0.03
		Political orientation	0.04	0.02	2.38	.018	0.01	0.07
		GCBS	0.15	0.04	4.15	<.001	0.08	0.22
		Engagement with false headlines	0.32	0.04	8.93	<.001	0.25	0.39

Significant variables are reported in **bold**

Appendix FF – Hierarchical regression analyses (Study 4)

Table FF1 – Model 7.9 (DV=Engagement with false headlines).

Variables	Block											
	1			2			3			4		
	<i>B</i>	<i>SEB</i>	β									
S1 v Control	-0.60	0.16	-0.23**	-0.54	0.14	-0.21**	-0.50	0.12	-0.19***	-0.26	0.11	-0.10*
S2 v Control	-0.79	0.16	-0.31***	-0.73	0.14	-0.28***	-0.74	0.12	-0.29***	-0.45	0.11	-0.17***
S1+S2 v Control	-0.61	0.16	-0.24**	-0.59	0.14	-0.23**	-0.57	0.12	-0.22***	-0.26	0.12	-0.10*
MSS-B positive schizotypy	-	-	-	1.81	0.31	0.28***	1.72	0.29	0.27***	1.29	0.26	0.20***
GCBS	-	-	-	0.28	0.06	0.24***	0.18	0.05	0.15***	0.03	0.05	0.03
Age	-	-	-	-	-	-	0.00	0.00	-0.03	0.00	0.00	-0.04
Gender †	-	-	-	-	-	-	0.05	0.04	0.05	0.09	0.04	0.08*
Education	-	-	-	-	-	-	0.05	0.04	0.05	0.08	0.04	0.07*
Political news sharing	-	-	-	-	-	-	0.32	0.04	0.36***	0.27	0.03	0.30***
Political orientation	-	-	-	-	-	-	0.09	0.03	0.14***	0.04	0.02	0.07
Belief in false headlines	-	-	-	-	-	-	-	-	-	0.71	0.07	0.42***
Adjusted R²	.06			.26			.41			.53		
Change in F for R²	9.98***			51.97***			20.89***			100.68***		
ANOVA (p)	< .001			< .001			< .001			< .001		

Significant predictor variables in **bold**.

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

†Gender was coded as -1 = women, 1 = men

Table FF2 – Model 7.10 (DV=Belief in false headlines).

Variables	Block											
	1			2			3			4		
	<i>B</i>	<i>SE B</i>	β									
S1 v Control	-0.36	0.09	-0.24**	-0.35	0.08	-0.23*	-0.34	0.08	-0.22*	-0.19	0.07	-0.12**
S2 v Control	-0.47	0.09	-0.30***	-0.44	0.08	-0.28***	-0.41	0.08	-0.27***	-0.20	0.07	-0.13**
S1+S2 v Control	-0.47	0.09	-0.30***	-0.46	0.08	-0.30***	-0.44	0.08	-0.28***	-0.27	0.07	-0.18***
MSS-B positive schizotypy	-	-	-	0.52	0.19	0.14*	0.61	0.18	0.16***	0.11	0.17	0.03
GCBS	-	-	-	0.24	0.03	0.35***	0.21	0.03	0.30***	0.15	0.03	0.22***
Age	-	-	-	-	-	-	0.00	0.00	0.02	0.00	0.00	0.03
Gender †	-	-	-	-	-	-	-0.05	0.03	-0.07	-0.06	0.03	-0.10**
Education	-	-	-	-	-	-	-0.04	0.03	-0.06	-0.05	0.02	-0.08*
Political news sharing	-	-	-	-	-	-	0.08	0.02	0.14**	-0.02	0.02	-0.03
Political orientation	-	-	-	-	-	-	0.06	0.02	0.17***	0.04	0.01	0.10**
Engagement with false headlines	-	-	-	-	-	-	-	-	-	0.29	0.03	0.49***
Adjusted R²	.08			.26			.31			.45		
Change in F for R²	11.73***			48.48***			7.13***			100.68***		
ANOVA (<i>p</i>)	< .001			< .001			< .001			< .001		

Significant predictor variables in **bold**.

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

†Gender was coded as -1 = women, 1 = men

Appendix GG - A comparison of significant regression variables across Studies 1-3.

Stage of research project	Political orientation of headline stimuli	Significant predictors of:					
		Engagement			Belief		
		Misinformation stimuli only	Accurate stimuli only	Both misinformation and accurate stimuli	Misinformation stimuli only	Accurate stimuli only	Both misinformation and accurate stimuli
Study 1	Right-wing		<ul style="list-style-type: none"> Social communication ASD traits 	<ul style="list-style-type: none"> Belief in accuracy of stimuli Cognitive-perceptual (positive) schizotypy Online news sharing habits 	<ul style="list-style-type: none"> CRT/CRT2 score 		<ul style="list-style-type: none"> Engagement with stimuli
Study 2	Right-wing	<ul style="list-style-type: none"> Social Anxiety (negative) schizotypy 	<ul style="list-style-type: none"> CRT/CRT2 score 	<ul style="list-style-type: none"> Belief in accuracy of stimuli Cognitive-perceptual (positive) schizotypy Gender (Men) Online news sharing habits Strength of political orientation 	<ul style="list-style-type: none"> Age Cognitive-Perceptual (positive) schizotypy Disorganised schizotypy Gender (Women) Online news sharing habits Strength of political orientation 	<ul style="list-style-type: none"> Attention to detail ASD traits 	<ul style="list-style-type: none"> Engagement with stimuli
	Left-wing	<ul style="list-style-type: none"> Belief in accuracy of stimuli Education level 	<ul style="list-style-type: none"> Gender (Men) 	<ul style="list-style-type: none"> Online news sharing habits Strength of political orientation 	<ul style="list-style-type: none"> Age Engagement with stimuli 	<ul style="list-style-type: none"> Gender (Men) Social Anxiety (negative) schizotypy Social communication ASD traits 	<ul style="list-style-type: none"> Cognitive-perceptual (positive) schizotypy Strength of political orientation
Study 3	Right-wing			<ul style="list-style-type: none"> Belief in accuracy of stimuli Online news sharing habits Positive schizotypy Strength of political orientation 	<ul style="list-style-type: none"> Conspiratorial worldview Need for cognitive closure Online news sharing habits 		<ul style="list-style-type: none"> Disorganised schizotypy Engagement with stimuli Negative schizotypy

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