



D5.2 Online survey report to outline the methodology and the results of the online survey

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Abstract	The purpose of this online survey is to gain insights into factors that are related with conspiratorial and extremist thinking and individuals' ability to think critically and discern misinformation or conspiratorial content online, with a focus on middle-aged adults. The findings indicate that demographic factors such as gender did not significantly influence discernment abilities, but ethnicity differences emerged. Political ideology was a key factor while educational background did not have a meaningful impact. Conservation values positively correlated with discernment ability. Personality attributes, such as narcissism (particularly collective	

	narcissism), revealed modest links to conspiratorial thinking. Cognitive traits like sophisticated epistemic thinking and strong argumentation skills were associated with superior ability to discern misinformation. Lastly, increased social media use was found to be negatively correlated with individuals' capacity to distinguish accurate from inaccurate content online. These findings can inform the development of interventions targeting conspiratorial thinking, particularly the need to account for topic-specific factors and leverage cognitive skills training.	
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Executive Summary

The purpose of this online survey is to gain insights into factors that are related with conspiratorial and extremist thinking and individuals' ability to think critically and discern misinformation or conspiratorial content online, with a focus on middle-aged adults. We investigate how demographic factors (gender, ethnicity), individual characteristics (political orientation, educational background), social characteristics (values), cognitive traits (reasoning skills, epistemic thinking), personality attributes and online media use are related with these outcomes.

Based on findings from previous work packages this SMIDGE survey explores how middle-aged individuals engage with online misinformation and conspiratorial content on various socio-scientific and political topics. This was investigated through series of open and closed questions and experimental tasks, that asked respondents to describe their use of social and online media; describe dimensions of their personality in terms of variables that have been associated with endorsement of conspiratorial and misinformation content in previous studies; evaluate the accuracy and describe their reasoning process concerning the evaluation of online media content on three social issues: immigration, vaccination safety and climate change, and to indicate their demographic variables.

635 middle-aged individuals (between 45 to 65) participated in the online survey. Participants were recruited through Prolific. Half of the participants were from the United Kingdom while the other half were from Italy (13%), Germany (12%), Greece (9%) and other European countries.

The findings indicate that demographic factors such as gender did not significantly influence discernment abilities, but ethnicity differences emerged, with those from certain Central/Eastern European countries and the UK demonstrating poorer discernment compared to Western European counterparts. Political ideology was a key factor, as those with left-wing orientations displayed stronger skills in verifying information validity relative to those with right-wing views. Educational background did not have a meaningful impact. Regarding social characteristics, conservation values positively correlated with discernment ability, while self-transcendence values showed negative associations. Personality attributes, such as narcissism (particularly collective narcissism), revealed modest links to conspiratorial thinking. Crucially, cognitive traits like sophisticated epistemic thinking and strong argumentation skills were associated with superior ability to discern misinformation. Lastly, increased social media use was found to be negatively correlated with individuals' capacity to distinguish accurate from inaccurate content online. These findings offer important insights to inform the development of interventions targeting conspiratorial thinking and online misinformation discernment, particularly the need to account for topic-specific factors and leverage cognitive skills training.

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Introduction

The purpose of this online survey is to gain insights into factors that are related with extremist thinking and individuals' ability to think critically and discern misinformation or conspiratorial content online, with a focus on middle-aged adults. We investigate how demographic factors (gender, ethnicity), individual characteristics (political orientation, educational background), social characteristics (values), cognitive traits (argumentation skills, epistemic thinking), personality attributes and online media use are related with these outcomes.

The survey was developed based on the preliminary outcomes of WP3 and WP4 and pilot tested in four languages (English, Italian, Greek, German) to ensure the clarity, reliability, and validity of the content and format. Upon commencement of data collection, the survey aimed to collect a minimum of 500 responses through crowdsourcing and snowballing recruitment methods aiming to recruit a diverse sample of middle-aged individuals. Survey responders represented a wide range of educational, employment, gender and nationality backgrounds.

The survey comprised both quantitative and qualitative questions. Its primary objective was to investigate how individuals evaluate the truthfulness of online media sources, with a specific focus on social topics identified in WP4. These topics are linked to the development of extremist ideologies and the dissemination of conspiratorial content. Survey respondents were randomly assigned to answer questions on one out of three social/socio-scientific topics (immigration, vaccination safety and climate change) and all responders answered questions on personality, values, reasoning, demographics, and online media use.

The SMIDGE survey aimed to address the following research questions:

How do demographic (e.g., occupation, gender, ethnicity), individual characteristics (political orientation, educational background), social (e.g. values, social disposition), personality (e.g. narcissism, collective narcissism), cognitive (reasoning skills, epistemic thinking) and online media use (i.e., online behaviours) factors relate to the endorsement of conspiracist ideation and ability to discern misinformation or conspiratorial content online?

This deliverable provides:

- An introduction presenting a brief literature review on how these relationships have been investigated in previous research
- A method section describing the survey development and data collection
- A results section presenting the survey findings
- A discussion section examining the findings and their implications for the SMIDGE project
- A task (T5.1) timeline

The concept of a **conspiracist ideation** is used to represent a monological belief system which harbours the idea of the presence of a 'vast ... conspiratorial network designed to perpetrate acts of the most fiendish character' (Hofstadter, 2016), which can support several conspiracy theories (Goertzel, 1994) and has been associated with extremism (van Prooijen et al., 2015). **Truthfulness** refers to an impression formation regarding the critical assessment of the credibility of online content and ability to identify bias (Ku et al., 2019). In the SMIDGE survey both participants' ability to assess the truthfulness of content (ability to discern misinformation) and conspiracist ideation were explored. To examine participants' assessment of the credibility of online content, the SMIDGE survey introduced genuine **online media content**. **Online media content** used in the survey included textual

and audiovisual material sourced from online media (e.g., websites, social media, video-sharing platforms) containing accurate and inaccurate claims (inaccurate claims may range from misinformation to conspiratorial or extremist content).

In the logic of the SMIDGE project, the online survey followed the work of WP3 and WP4 which provided classification of categories of digital extremist content to direct the survey topics. The online survey run between months M4 and M21 of the project, allowing it to contribute to the development of additional tasks within WP5 (T5.2 and T5.3) and to WP6 with the development of counter videos (T6.1) and micro-content (T6.2). The survey results are important for the continuation of the SMIDGE project as they provide insights into the reasoning and factors influencing the middle-age group whilst evaluating and endorsing online content. These findings are expected to inform the development of counter narratives and counter-videos in WP6.

Theoretical background

The spread of misinformation, conspiracy theories and extremist ideologies are phenomena that have found fertile ground on new digital and online social media (Hassan et al., 2018; Prooijen et al., 2022). Although these phenomena describe different types of information being shared on online platforms, nonetheless there is a link across these processes (Association for Artificial Intelligence et al., 2022; Roberts-Ingleson & McCann, 2023). Misinformation, described as the propagation of inaccurate information, may also carry or promote content of a conspiratorial or harmful nature - though not always (Carmi et al., 2020). Conspiratorial content alludes to a context whereupon a 'secret' or 'powerful' authority or group is manipulating situations or plotting to serve its own purposes (Douglas et al., 2019). Along these lines, it has been proposed that when conspiratorial content targets specific groups, then the process can trigger extremist beliefs and ideologies and lead to the gradual radicalisation of information consumers (Gadarian & Albertson, 2014; Roberts-Ingleson & McCann, 2023; Wollebæk et al., 2019). Although the connection between these processes is not direct and this pathway does not emerge in all types of online misinformation (e.g., misinformation may be innocuous), or in all types of conspiracies (e.g., some conspiracies may be benign) (Krekó, 2020), there exist several important arguments for studying factors associated with the emergence of these phenomena.

Misinformation can facilitate the spread of harmful conspiratorial content which can be damaging for individuals and societies (Jolley et al., 2015). Types of conspiracies can have consequences such as reduction of political interest and reduction of trust in governments (Butler et al., 1995; Einstein & Glick, 2015) and science (Jolley & Douglas, 2014). A mistrust in science was recently evidenced by reactions related to Covid-19 vaccination (Bierwiazek et al., 2020), mirroring similar tensions surrounding earlier medical developments (e.g., use of condoms after the emergence of HIV; Bogart & Thorburn, 2005). In fact, conspiracy beliefs have been associated with negative behavioural choices related to health (Grebe & Nattrass, 2012) and engagement with pseudoscientific content (Lobato et al., 2014). These types of theories can have harmful negative consequences for community wellbeing.

Conspiracy theories associated with lack of trust of science on topics such as climate change may lead to disregard for environmental protection and negatively affect the wellbeing of life on planet earth (Douglas & Sutton, 2015). Conspiracies may also have a larger societal impact. People who appear to engage in a constellation of conspiracy beliefs may develop a general despondency and become less interested and engaged with pro-social behaviours (van der Linden, 2015). Moreover, engagement with conspiratorial content can lead to extremist views and behaviours. For example, (Bilewicz et al., 2013) found that conspiracy theories against people of Jewish decent predicted

extremist behavioural intentions towards them. Analysis of social media content showed that users that engage with and in the spread of misinformation and conspiracy theories, also use aggressive language against users outside of their respective echo-chambers, specifically targeting populations they perceive to be their opponents (Vellucci, 2023). Similarly, extremist intentions and prejudice have been found to be associated with conspiracy theories about people of Asian descent (van Mulukom et al., 2022). Moreover, conspiracy theories have largely been associated with populism, rejection of diversity and with extreme political ideologies (Imhoff et al., 2021; van Prooijen et al., 2022) as well as with violent activism (Imhoff et al., 2021; Jolley & Paterson, 2020; Levinsson et al., 2021; Rottweiler & Gill, 2022).

Attempting to understand the psychological, social, and behavioural processes that predict engagement with misinformation, conspiratorial and extremist content may eventually lead to more effective prevention and focused countermeasures. The motivations of this survey study can be summarised as intending to understand the shared contribution of psychological, social, and demographic factors as they predict conspiratorial thinking styles and endorsement of misinformation content on three important social issues: immigration, vaccination, and climate change. To focus this work, when this document refers to **misinformation**, this will directly relate to its subcategory disinformation, which is defined as the spread of inaccurate information with the intention to mislead (Lewandowsky et al., 2020), whereas misinformation commonly is regarded as the inaccurate information spread without intent (Lewandowsky et al., 2020).

Personality and cognitive factors

Among the many variables which were studied to reveal links to the emergence of conspiracist ideation, psychological factors can be summarised into personality and cognitive.

Personality Factors Personality factors have been well implicated in the endorsement of conspiracist ideation. Narcissism (i.e., the belief in one's specialness) and collective narcissism (i.e., belief in inner-group specialness) have been found to be associated with the endorsement of conspiracist ideation (Cichocka et al., 2016; Goreis & Voracek, 2019; Uscinski et al., 2022; Golec de Zavala et al., 2009). Whereas individual narcissism is a personality trait, collective narcissism encompasses beliefs about one's ingroup, an ingroup identity (often national or ethnic or a unifying ideology) that unites the members in their shared characteristics and specialness (Golec de Zavala, 2024). Although group members many vary in the level of intensity in which they believe in the specialness or differentiation of their group, several studies have shown that collective narcissism (with reference to national identity and ethnicity) was associated with prejudicial beliefs, intergroup aggression and even political violence (Zavala et al., 2009; Zavala & Lantos, 2020; Golec de Zavala & Keenan, 2023). It has been proposed that through collective narcissism, conspiracy theories offer a sense of social belongingness and a buffer experiencing on social threats (Federico et al., 2018). This perspective is consistent with the possibility of people engaging with online communities or groups with whom they identify propagating and reinforcing misinformation. Personality factors have been well implicated in the endorsement of conspiracist ideation. It has been proposed that through collective narcissism, conspiracy theories offer a sense of social belongingness and a buffer experiencing on social threats (Federico et al., 2018). This perspective is consistent with the possibility of people engaging with online communities or groups with whom they identify propagating and reinforcing misinformation.

Cognitive factors play a central role in shaping individuals' susceptibility to conspiratorial thinking. These factors include various cognitive biases, reasoning styles, and epistemic beliefs, all of which influence how information is processed and evaluated.

(a) Reasoning

Susceptibility to misinformation and conspiratorial thinking have been related to cognitive rigidity such as the inability to entertain or consider multiple viewpoints simultaneously (Kruglanski, 2004; Zmigrod et al., 2019). This biased thinking reduces the willingness to seek out evidence and hinders deep reasoning, rendering individuals more likely to endorse faulty content (Pennycook et al., 2020; Sebalo et al., 2023; Xiao et al., 2021). Analytical thinking, on the other hand, improves the ability to detect misinformation in online media (Pennycook et al., (2021a) by encouraging evidence-seeking behavior (Martire et al., 2023; Frederick, 2005), which then increases resistance to misleading information. People, however, often rely on intuitive, emotion-driven thinking rather than analytical thinking (Pennycook & Rand, 2019). Experimental studies support this, showing that analytical priming can reduce belief in misinformation (Bago et al., 2022; Swami et al., 2014), though these effects do not generalize to all content types. For example, Georgiou et al. (2022) found that analytical thinking alone does not reduce conspiratorial beliefs. Their study highlighted the importance of cognitive flexibility—the ability to switch between thinking about different concepts or to think about multiple concepts simultaneously—reasoning abilities, and individual traits in influencing belief in conspiracies. Therefore, a multifaceted approach that combines analytical thinking with cognitive flexibility and awareness of emotional and social influences is necessary to address conspiratorial beliefs effectively. Similarly, Bago et al., (2022) found that their intervention worked only for extreme conspiracies, and Spasovski et al. (2021) showed that illusory pattern perception though related to conspiratorial thinking, did not sufficiently explain complex and covid-19 related theories.

In recent years, there has been a growing interest in how scientific reasoning interacts with and can mitigate conspiracy beliefs. The extant literature on the relationship between scientific reasoning and conspiracy theories suggests that scientific reasoning skills safeguard against conspiratorial beliefs (Bao et al., 2022; Georgiou et al., 2021; Georgiou et al., 2022; Georgiou et al., 2023; O'Brien, 2023; O'Brien et al., 2025). This is the case because individuals with advanced scientific reasoning skills are adept at critically appraising information, resisting simplistic explanations that are unsubstantiated by evidence, and identifying flawed logic (Bao et al., 2022). By contrast, individuals with poor scientific reasoning skills are more likely to reject scientific evidence and accept unsupported explanations that alleviate uncertainty (Georgiou et al., 2021; Gjoneska, 2021; Marchlewska et al., 2018) in attempt to avoid the challenge of evaluating discrepancies in information (Lazer et al., 2018). Thereby, those with poor scientific reasoning skills tend to display greater receptivity to the causal explanations provided by CTs as a way of alleviating uncertainty, avoiding cognitive dissonance, and reaching cognitive closure (Georgiou et al., 2021; Gjoneska, 2021).

A variable that has garnered significant attention within the scientific reasoning literature is analytical thinking (Küçükaydın, & Ayaz, 2024), which involves skills such as analysis, evaluation, judgment, and comparison (Sternberg, 2021). Analytical thinking is intertwined with scientific reasoning (Pennycook et al., 2015), as it serves as a style of reasoning that enhances the scientific

method (Georgiou et al., 2021). Together, they form a cohesive framework for evaluating evidence and drawing conclusions. Analytical thinking constitutes a key component of problem-solving, the latter of which revolves around scientific thinking processes (Robbins, 2011).

Several studies have revealed a negative correlation between analytical thinking and belief in conspiracy theories (Georgiou et al., 2019; Pennycook & Rand, 2018; Ståhl & van Prooijen, 2018; Swami et al., 2014; van der Wal et al., 2018). Individuals with strong analytical thinking skills are less likely to endorse conspiratorial beliefs, as they tend to evaluate information more critically by questioning unsubstantiated claims and simplistic explanations, and by seeking out evidence and logical reasoning before making inferences (Swami et al. 2014).

Apart from acting as a preemptive defense against conspiracy beliefs, research suggests that analytical thinking also combats the existing acceptance of these beliefs. In this regard, Swami et al. (2014) conducted a series of four studies that examined the relationship between analytic thinking and conspiracy beliefs. All studies were conducted online, with participants completing the assessments via online platforms. Study 1 employed a correlational design and examined the relationship between participants' analytic thinking, as measured by the Rational/Experiential Multimodal Inventory (REIm; Norris & Epstein, 2011), and their beliefs in conspiracy theories, measured through the Belief in Conspiracy Theories Inventory (BCTI; Swami et al., 2010). It was observed that individuals with higher levels of analytic thinking are less likely to endorse CT beliefs and more likely to exhibit skepticism toward them. In Study 2, an experimental manipulation was introduced by assigning participants to either an analytical thinking condition, where they were encouraged to think critically and logically, or an intuitive thinking condition, where they relied on gut feelings. Participants completed the same measures as in Study 1. The results showed that those in the analytical condition endorsed significantly fewer conspiracy beliefs. Study 3 aimed to replicate these findings with a new sample, using the same measures. The results confirmed that greater analytic thinking was associated with weaker belief in conspiracy theories. Study 4 aimed to expand on these findings by incorporating an additional measure focused on a specific conspiracy theory (related to the July 7, 2005, bombings in London), as opposed to the previous experiments that focused on general beliefs in conspiracy theories rather than specific instances. Overall, the three experimental manipulations resulted in a reduction in the endorsement of conspiracy theories, thereby implicating a causal relationship. The authors argued that the mechanism underlying this causal relationship is that analytic thinking lends itself to a rigorous evaluation of information, enabling individuals to critically evaluate and dismiss conspiracy narratives. Thus, the study substantiates the idea that increased analytic thinking directly contributes to reduced acceptance of such beliefs.

Comparable results were obtained by a recent study that investigated whether an intervention with a scientific reasoning orientation could reduce conspiracy theory beliefs (Georgiou et al., 2023). A randomized controlled trial was employed, and the study was conducted online with a total of 700 individuals who were randomly assigned to either a control group or an intervention group. Participants in the intervention group received a four-week training program intended to promote the use of scientific reasoning skills against conspiracy theory beliefs and were assessed on their conspiracy theory beliefs and scientific reasoning abilities both before the intervention and after its completion. The results indicated that participants who underwent the intervention exhibited significantly lower conspiracy theory belief endorsement post intervention than the control group, indicating that enhancing scientific reasoning can combat conspiracy theory beliefs.

Pennycook and Rand (2019) focused on misinformation in examining the interplay between analytical thinking and conspiratorial beliefs. It was ascertained that analytic reasoning is negatively correlated with the perceived accuracy of misinformation and positively correlated with the ability to discern “fake news” from “real news”. In other words, the study findings suggested that an analytical thinking inclination renders individuals better able to distinguish between “fake” and fact-based news headlines. Interestingly, the increased susceptibility to belief in misinformation observed among those with a lower inclination toward analytic thinking held true regardless of whether the headlines aligned with one’s political views, downplaying the role of motivated reasoning in accounting for susceptibility to belief in fake news. Participants who were allocated to conditions that were cognitively engaging and thereby conducive to elaborative processing were more likely to reject partisan misinformation, whereas those who engaged in shallow processing, relying on cognitive shortcuts, are more susceptible to accepting partisan misinformation. These findings suggest that a lack of reasoning, i.e., inadequate cognitive effort, overrides biased reasoning in increasing susceptibility to belief in “fake news,” meaning that even individuals who are not motivated by bias may accept misinformation if they exert little cognitive effort when evaluating the information presented to them. Accordingly, the findings emphasize the importance of evoking active thinking and the deep evaluation of information as means of counteracting susceptibility to accepting misinformation.

Subsequent studies reinforced the idea of an inverse relationship between analytical thinking and COVID-19 conspiracy ideation (Erceg et al., 2022; Kantorowicz-Reznichenko et al., 2022; Pennycook et al., 2020; Stanley et al., 2021). The study by Pennycook et al. (2020) examined predictors of attitudes and misperceptions about COVID-19 in Canada, the UK, and the USA. Participants completed a battery of tests consisting of a 17-item basic science knowledge test (McPhetres & Pennycook, 2020; Miller, 2004), a 6-item Cognitive Reflection Test (Frederick, 2005) as a measure of analytic (versus intuitive) thinking, a 5-item Bullshit Receptivity test (Pennycook et al., 2015), and a 6-item numeracy test (Cokely et al., 2012; Lipkus et al., 2016). The results showed that cognitive reflection scores were a significant predictor of reduced susceptibility to misinformation, even after controlling for other variables like political ideology, media consumption habits, and demographics. Building on the regression analysis conducted by Pennycook et al. (2020), the correlation analysis by Erceg et al. (2022) provided additional confirmation that higher cognitive reflection scores are linked to reduced susceptibility to misinformation, strengthening the consistency of these findings across different analytical approaches. Specifically, Erceg et al. (2022) implemented a single intervention that was intended to assess whether enhancing analytical thinking could mitigate anxiety-related misbehavior during the pandemic. Participants who engaged in the intervention were prompted to reflect on opposing viewpoints and evidence against conspiracy theories. Cognitive reflection was measured with three Cognitive Reflection Test items taken from currently existing versions of the Cognitive Reflection Test (Erceg et al., 2020), which the authors revised so that their content was related to COVID-19. Each of the responses was coded as correct/incorrect, and the total score was calculated as the mean of correct responses on the three items. While a negative relationship was found between analytical thinking and conspiracy beliefs during the COVID-19 crisis, the intervention did not lead to the anticipated reduction in these beliefs among participants. This indicates that simply encouraging individuals to consider opposing viewpoints may not be sufficient to change deeply ingrained conspiracy beliefs or misinformation. Overall, these studies complement each other in highlighting the importance of cognitive reflection in minimizing susceptibility to misinformation.

However, the evidence regarding the direction of the association between analytical thinking and conspiratorial belief endorsement is inconsistent. One study that yielded contradictory evidence to the previously described studies is that by Georgiou et al. (2021), which examined the interrelationships between conspiratorial beliefs, scientific reasoning, and belief flexibility. While a negative correlation between scientific reasoning skills and the endorsement of conspiratorial beliefs was found, a positive correlation emerged between analytical thinking skills and conspiratorial belief endorsement. The latter association was explained as partly attributable to the behavioral tendencies that coincide with analytical thinking, namely rigorous information seeking behavior and specific information-seeking behavior, both of which positively correlate with conspiratorial belief acceptance. These findings imply that analytical thinking does not necessarily go hand in hand with the critical appraisal of information (Ståhl & van Prooijen, 2021) and avoidance of engagement with conspiratorial content (van Prooijen et al., 2018). Rather, individuals who possess strong analytical skills may exhibit partisan biases. This phenomenon is largely accounted for by the “analytical thinking paradox,” which holds that analytic inclination does not translate into superior critical evaluation ability; thus, those who are analytically inclined may apply selective reasoning to rationalize conspiratorial content instead of critically evaluating it (Georgiou et al., 2021). At the same time, cognitive dissonance may also underlie attempts to rationalize conspiratorial content. To be more precise, analytical thinking may lead to cognitive dissonance, a psychological state that arises when individuals struggle to reconcile conflicting information. However, it is worth noting that the sample in Georgiou et al.’s (2021) study consisted of individuals with varying levels of autistic traits, and there are known differences in cognitive processing, social reasoning, and analytical thinking between neurodivergent and neurotypical individuals; therefore, the findings may not be generalizable to neurotypical individuals. The notion that analytical thinking can inadvertently promote conspiracist ideation is also supported by other studies (Imhoff & Bruder, 2014; Stojanov & Halberstadt, 2020; van Prooijen et al., 2018).

While the prominent role of scientific reasoning in shaping vulnerability to conspiracy theories is evident, recent evidence suggests that the influence of psychological factors may supersede that of cognitive abilities like strong reasoning skills when it comes to accepting or embracing conspiracy narratives. For example, a study by O'Brien et al. (2025) ascertained that one’s level of ambiguity tolerance (i.e., the tendency to view uncertain situations as appealing) moderated the relationship between belief in a just world (i.e., a longing for fairness) and conspiracy theory endorsement. In other words, those with low ambiguity tolerance and strong belief in a just world seemed to be more likely to resist conspiracy theories. Conversely, scientific reasoning did not moderate this relationship in that the negative association between belief in a just world and conspiracy theory endorsement was not amplified by the ability to reason scientifically. Taken together, these findings point to the strong influence of psychological factors, namely how individuals manage uncertainty, on the endorsement of conspiracy beliefs, surpassing that of cognitive factors like scientific reasoning, and that the mere possession of scientific reasoning skills may not suffice to counter the influence of deeply ingrained beliefs or the comfort derived from conspiracy explanations.

In the present work, we examined the relationship between reasoning on one hand, and conspiratorial thinking and misinformation discernment on the other, with a particular focus on multivariable causal reasoning and argumentative reasoning. Multivariate causal reasoning refers to the ability to consider multiple causes and outcomes when evaluating complex situations. This type of reasoning is essential for understanding the interconnectedness of events and can help individuals avoid overly simplistic explanations, such as those often found in conspiracy theories. Kuhn and Modrek (2018) identified two limitations in reasoning that constrain critical thinking: (a) using

explanation as a replacement for evidence and (b) neglecting multiple causes contributing to an outcome. This single cause thinking aligns with other findings in the literature (e.g., Kuhn & Lordanou, 2022), and shows an inclination of individuals to think simplistically, rather than appreciate and deal with the complexity that characterizes most issues in real life.

Argumentative reasoning refers to the ability to construct and evaluate arguments (Lordanou et al., 2016). It encompasses the ability to construct evidence-based arguments, taking multiple considerations into account (Lordanou & Rapanta, 2021). Argumentative reasoning is closely related to critical thinking (Kuhn, 2019); therefore, we expect it to be related to both conspiratorial thinking and the ability to discern online misinformation.

(b) Epistemic Beliefs

Epistemic beliefs, which can be defined as individuals' beliefs about the nature of knowledge and knowing, might play a critical role in shaping reasoning and susceptibility to conspiracies (Garrett & Weeks, 2017). Those with sophisticated Epistemic beliefs exhibit advanced reasoning and critical thinking skills. For example, individuals with advanced epistemic beliefs constructed arguments of greater quantity, better quality, and higher diversity (social, ethical, economic, scientific, ecological) (Baytelman, Lordanou, & Constantinou, 2020); used the epistemic standard of scientific research to evaluate information when reading (Lordanou, Muis, Kendeou, 2019) and wrote a two-sided report after reading controversial historical accounts (Lordanou, Kendeou, Zembylas, 2020).

Individuals with more rigid epistemic beliefs, who see knowledge as fixed or unquestionable, may be more susceptible to adopting false beliefs or rejecting contradictory evidence. Although consensus in the literature remains limited on the exact impact of cognitive styles and thinking on conspiratorial beliefs (Gjoneska, 2021). Binnendyk and Pennycook (2022) showed that an overreliance on intuition (vs. analytic thinking) is associated with conspiracy beliefs. Binnendyk and Pennycook (2022) review evidence showing that conspiracy beliefs are associated with cognitive biases such as the conjunction fallacy (believing a combination of characteristics is more probable than any one characteristic alone) and pattern perception (the tendency to perceive patterns in random noise), suggesting these relationships may be explained by an overreliance on intuitive rather than analytical thinking processes.

Ability to discern the accuracy of audiovisual content

Amid growing concerns over misinformation spread through digital media, research has sought to identify several key criteria that people use to determine whether a video is credible or reliable. This line of research is highly relevant given the widespread use of audiovisual content on social media platforms. This body of work is essential for understanding how individuals assess the accuracy of video content. Abed and Barzilai (2023) contribute to this line of research by examining how students evaluate the credibility of scientific YouTube videos, comparing their evaluation strategies with those used for scientific webpages, particularly in the context of climate change content. Several strategies that students used when assessing how good a scientific video/webpage is were identified, including *evaluating the content*, *evaluating the source*, *evaluating popularity*, *corroborating*, and *searching for more information*. These strategies reflect an amalgamation of critical thinking and media literacy skills that students used to determine the reliability and validity of YouTube videos, especially those that dealt with complex and scientifically oriented topics like

climate change. Like Abed and Barzilai (2023), other studies have highlighted source credibility as playing a significant role in how videos are perceived and rated by audiences. Indeed, a study by Hargittai et al. (2016) found that users are more likely to trust videos that come from credible or well-known sources, such as educational institutions or established experts. Another common finding across studies on video evaluations is that the clarity and understandability of videos are key factors relied upon in making assessments (Guo et al., 2014; Sweller et al., 2019). For instance, Guo et al. (2014) found that users tend to rate videos more positively – in terms of their effectiveness – when they are clear, easy to follow, and well-organized, valuing simplicity and organization over high production quality.

Demographic and individual characteristics

Several **demographic and individual characteristics** have been identified and investigated in relation to individual engagement with misinformation online content. Areas of focus in previous studies related to individuals **age, gender, and educational level**.

Age was considered in a small number of studies examining Covid-19 and reporting that older age was associated with less engagement with conspiracy theories due to an increased risk perception associated with Covid-19 consequences (Eberhardt & Ling, 2021; Lin et al., 2023). Although certain studies did not report an association with age (Patterson, 2019; Sebaló et al., 2023), no study specifically focused on the middle-age period and no study considered the interaction of age on different types of misinformation, despite evidence that different theories may affect different demographics in a different way. Studying this demographic further is important in that this age-group has not had the opportunity to engage with formal education regarding media literacy, despite being active on digital media (Rožukalne, 2020; Vrabec & Petranova, 2016).

Gender has also been investigated with regards to conspiracist ideation although the findings are conflicting. In an online study (no country restriction) Popoli and Longus (2021) found a difference between male and female gender with females scoring higher than males on all facets of conspiracist thinking. Contrarily in a study by Galliford and Furnham (2017), males were more likely to believe in political conspiracy theories. None of these studies focused on middle-aged individuals, however.

Education was also included as a variable of interest in previous studies with contradictory findings. Specifically, several studies indicated that higher levels of education buffer one's engagement with misinformation (Imhoff et al., 2022; Prooijen, 2017). One study found evidence for an education-base gap in misinformation acceptance, with those with lower education being more likely to accept misinformation (Hwang & Jeong, 2022). Other studies did not replicate this connection (Enders, Adam et al., 2021; Sebaló et al., 2023).

Ethnicity/Cultural factors. Walter and Drochon (2020) indicated that European countries (Sweden, Germany, Poland, Italy, UK and Hungary) tend to have lower levels of endorsement in conspiracy thinking compared to United States. Portugal and France had similar levels of conspiracy thinking to United States. A study in Europe indicated that Central and Eastern Europe (CEE) and the Balkans, such as Bulgaria and North Macedonia, had the highest prevalence of conspiratorial endorsement, compared to Northern European countries who have lower levels (Jabkowski et al., 2023).

Political Beliefs. A repeated finding has been that people with higher levels of right-wing authoritarianism and populism appear to be more likely to endorse conspiratorial content (Bruder et al., 2013; Krouwel et al., 2017; van der Linden et al., 2020). Compared to a study indicated that

individuals with left-wing ideologies are more prone to conspiratorial thinking than centre or right-wing individuals (Patterson, 2019). Individuals with left-wing ideologies are more prone to follow anti-vaccination beliefs, thus, to be reluctant to vaccination (Berezow & Campbell, 2012). However, the correlation between conspiracy endorsement and political identity is complex and culturally dependent. In a study exploring vaccination hesitancy and political identity in the US it was found that Trump voters were more concerned about vaccines than other US-Americans (Hornsey, 2020), whereas a European study found that political orientations were not strongly linked to vaccine hesitancy but rather related to culturally closed and anti-elite world views (Stoeckel et al., 2022). Therefore, the way in which different socio-scientific topics relate to the endorsement of conspiratorial content and their link to political identity in Europe may yet require further exploration. Another related dimension, which however has not been consistently replicated, was that political participation on social media (e.g., signing a petition) predicted more spread of misinformation (Valenzuela et al., 2019). To summarise, although political identity and ethnicity is discussed in the literature, most studies have not considered this question in the specific age group studied by SMIDGE and have not considered how current and widely consumed theories are differentially related to these factors.

Values

Another variable that has received very little attention are **Human values**. In fact, Jost et al. (2018) and Marietta and Barker (2019) suggested that human values may be even more influential than political identity in choosing which information to pay attention and may be at the root of engagement with misinformation. They suggested that human values may filter the types of information that people select and pay attention to in their environments and by extension on social media. **Human values** defined as “the criteria that people use to select and justify actions, to evaluate people (including self) and events” (Schwartz, 1992; Schwartz, 2012). Value dimensions such as universalism, hedonism, stimulation, conformity, tradition, security, and power may be ranked on different levels of importance by people and affect the relative importance people place on actions and information (Schwartz, 2012). In a preliminary study, examining the role of values on perception of misinformation and deciding what to share online, Farrell et al., (2019) found that ‘closed’ values rendered people more vulnerable to misinformation.

Online social media use

Social media use and online engagement with news has indicated a strong association with endorsement of conspiracy theories and misinformation (Hall Jamieson & Albarracín, 2020; Lazer et al., 2018; Schwartz, 2012). Although this relationship is correlational, studies have shown that people who use social media to get their news and who use social media more frequently tend to endorse more conspiratorial beliefs (Enders et al., 2021; Enders. et al., 2023). The spread of misinformation and conspiratorial content on social media also relates to the development of online groups and communities of shared interests, where content is shared in an unchecked and unfiltered manner, creating an echo-chamber of misinformation (Bessi et al., 2015; Del Vicario et al., 2016). The possibility of people finding themselves in contact with these communities or content is highly increased through the virality and ease of spreading online information. Although not many studies have focused on the evaluation of the trustworthiness of online content, Xiao et al. (2021) indicated that this factor (trust in social media) moderated the relationship between using online news content and conspiratorial beliefs. Consistent with this finding, exploring individuals’ methods of critically evaluating and fact-checking online content (e.g., how do they attend to the accuracy of the post? Pennycook et al., 2021b) may be an important area of scientific enquiry.

The relationship between individual differences in the middle-aged individuals and their engagement with misinformation and conspiracy theories on social media has not been widely explored. Previous studies have indicated that older and middle-aged adults use social media to connect with others (Sims et al., 2017). In this vein, it has been proposed that middle-aged and older adults may be more interested in conveying messages to a new generation, placing more emphasis on the attractiveness of the story and its consistency to their prior beliefs than to its accuracy (Barber & Mather, 2014). Indeed, comparing this age group to others, Klaczynski and Robinson (2000) found that biased reasoning was more common in the middle-age than for younger adults, although other studies indicated an increase in analytical thinking with age (Pennycook & Rand, 2019). To investigate this further, during the Covid-19 pandemic studies explored this group's susceptibility to health misinformation with findings indicating a lower tendency to engage with misinformation (for a review see Nan et al., 2022). This finding may be indicative of this demographic's more careful engagement with online information or could also point to a higher sensitivity on health topics, given the process of aging (Eberhardt & Ling, 2021; Lin et al., 2023). Moreover, these findings were not cross-culturally consistent (Chia et al., 2023; Guan, 2019; Li et al., 2021; Wu et al., 2022) with other studies indicating that middle-aged people tended to rely more on intuitive information processing (Tang et al., 2023; Yuxin, 2019).

SMIDGE Survey: Aims and objectives

Falling victim to misinformation, conspiratorial and extreme content online, has been not only a young person's problem; middle-aged individuals may also be at risk of being drawn into extremist content. This middle-aged population has not been previously researched systematically and it is conceivable that this age group may take different routes to conspiracy and extremism than younger people given that social media were introduced later in their lives, they haven't received any formal media literacy education, and they might use a mixed of traditional routes of information (e.g. newspapers) and exposure to new online media (Reich et al., 2021). This age group's interaction with new online media may be different to that of their younger counterparts, maybe topic dependent (e.g., health versus climate change), while middle-aged individuals may have less or different tools or skills to identify the differences between truth and misinformation online (Yun Yang et al., 2016). Understanding the way this demographic engages with online content may be particularly important as individuals in this age group may be bearers of societal influence, political power, or may even consist of a vulnerable and marginalized group. Indeed, the middle age demographic is particularly hard to reach, under-researched, and their specific characteristics, drivers and rationale rarely explored.

In view of this literature gap, SMIDGE survey **firstly**, aimed to consider how key demographic, individual, personality, social and social media factors interact with conspiracist ideation in middle age. SMIDGE survey goes beyond the exploration of a general conspiracist ideation by researching participants interaction with three important socio-scientific and political topics: namely, immigration, vaccination safety and climate change. The **objective** is to explore whether prior findings regarding factors increasing conspiracist ideation on these specific issues can be replicated in the middle age demographic and elaborate on a predictive model for this phenomenon specifically for this demographic group.

A **second aim** of SMIDGE survey is to study the process of multivariate and argumentative reasoning while participants of the middle age demographic deliberate on the three controversial socio-scientific issues (vaccination safety, immigration, climate change). The project employs a contemporary research practice by utilising materials drawn from real online media content such as online posts and short videos. In this way the survey is attempting to replicate participants'

reasoning process in a research environment that simulates the content one would encounter in real digital media. Previous surveys have employed similar methodologies, albeit the extent to which these findings were correlated to other predictive factors of conspiratorial thinking was limited and especially in the middle-age demographic (Bruns Hendrik et al., 2023; Pennycook et al., 2020). The **objective** is to examine the relation between reasoning skills and conspiratorial thinking / endorsement of misinformation online.

A **third aim** of SMIDGE survey is to explore the role of under searched factors related with engagement with extremist content online. Specifically, personal values are beliefs about desirable types of behaviour by which individuals choose and evaluate their actions (Rokeach, 1973; Schwartz, 1992). According to van der Weide et al. (2009) values can also play an important role in reasoning and specifically in decision making. In one of the few studies considering the role of values on analytical reasoning (Pennycook et al., 2014), values predicted individual differences in willingness to engage in analytical reasoning that were independent of demographics and political ideology. Therefore, an additional **objective** will be to understand the role of personal values in the constellation of factors affecting the endorsement of online misinformation content.

Fourth, it is unclear how individuals of this middle-age demographic engage with social and online media. For example, questions remain regarding the purpose of social media use, frequency of use and factchecking behaviours. An **objective** embedded in this survey study is therefore to describe the characteristics of online and social media use of the middle age demographic.

To summarise, in SMIDGE, a large cross-European survey study has been designed focusing on the middle-aged demographic which will examine the impact of demographic factors, individual characteristics, personality, cognitive, social factors and social media use on the endorsement of conspiratorial thinking and of specific social media content on three important societal topics: immigration, vaccination safety and climate change.

Method

Survey Design

Procedure

The survey focused on exploration of participants' reasoning on common social topics which were found to be associated with misinformation, conspiracy, and extreme ideology in WP4 but without introducing directly extremist content. The selection of the specific socio-scientific topics happened with the support of consortium partners studying online dissemination of conspiratorial material under WP4 (FAS, DMU, UCPH). Vaccine safety, migration and climate change emerged as key topics under which conspiratorial and misinformation content existed on online media. The fact that the range of content on these topics varied from misinformation to conspiratorial to extreme, meant that they were suitable for exploring the process of radicalisation of the middle age demographic.

The consortium also agreed on the languages in which the survey would be developed and the recruitment procedures. The consortium agreed on the value of developing the survey in more than one of the consortium languages to be able to consider cultural differences among the European countries. The agreed languages were English, German, Italian, and Greek. The language selection was suited to the consortium cultural and language profile but also within the remit of the leading organisations (UCLan Cyprus, FVM) in terms of translating the survey content.

In terms of recruitment, the consortium team agreed that an optimal process for efficient and quality data collection would include snowballing techniques and use of crowdsourcing software (Prolific; the nominal fee for such services was used for participant compensation) across European countries with proficiency in the selected languages. The total recruitment goal of participants for the survey was a minimum of 500 across the different languages and cultures and within the age range of 45-65. For the survey participation, it was also important to ensure a gender balance and diversity in terms of participants' educational level, ethnic background, and occupation. The rationale for introducing measures on specific personality, cognitive and social factors was also discussed among the consortium with exchange of ideas and modifications. The final survey was disseminated among the consortium partners with expressed agreement and satisfaction among the consortium partners.

An invitational flyer was disseminated by UCLan Cyprus to all partners and in all languages. The flyer contained general information about the SMIDGE project, specific information about the purpose and the form of the survey study, and information on how to access the survey. Organisers could send, post, or disseminate this flyer on social media or e-mail it to candidate participants inviting them to take part in the survey. The flyer and links to the survey were also added to the project website. Partners could share the survey flyer by sending email invitations to potential participants with whom they had connections, and by approaching CSO's and other organisations which could provide access to the public, as well as to individuals in marginalised groups who might have been interested in participating in the survey. The completion of the survey could occur at any time at the convenience of the participant given its online availability.

Final design

Survey instrument

The finalised survey instrument consisted of four parts. The third and fourth parts of the survey were common to all participants, while during the first and second part of the survey participants were

randomly allocated to answer questions on one of the three social issues: immigration, vaccination safety, or climate change.

The first part of the survey focused on studying the cognitive processing and reasoning of participants with regards to one of the three topics of focus of the study: immigration, vaccination safety, and climate change. Participants were randomised to one of three conditions and were exposed to several tasks designed to evaluate the way that they analyse online content in terms of its trustworthiness and accuracy. Table 2 presents the series of tasks in the first part of the SMIDGE Survey.

Part 1

SMIDGE Survey	Variable	Assessment Instrument
Area of enquiry	Reasoning: Multivariate Reasoning	Multivariate reasoning task (Kuhn & Modrek, 2018)
Area of enquiry	Reasoning: Argumentative reasoning	Open-ended question on one of three topics (reasoning task)
Area of enquiry	Ability to discern true/false content	Video evaluation task on one of three topics
Area of enquiry	Ability to discern true/false content	Online post evaluation task on one of three topics

Firstly, a multivariate reasoning test was administered to all participants to evaluate participants' analytical thinking (Kuhn & Modrek, 2018). Participants then engaged with topic-specific tasks depending on random allocation. Participants in all conditions engaged with the same experimental tasks although the content of the material they were asked to evaluate was different. Specifically, in the **second task**, participants were asked to answer an open question on one of the three topics of interest (immigration, vaccination safety, climate change) and to explain the reasoning underpinning their position on this topic. For example, on the topic of immigration the question was *"Some people were brought to the European Union (EU) as children and now live in the EU illegally. Some policy makers suggest that the EU should allow them to stay and live in the EU. Some other policy makers suggest that they should be sent back to their home countries. What should happen? Should the EU allow them to stay or be sent back? Explain the thinking underlying your choice as fully as possible."* The **third task** consisted of a video-based activity. Participants were asked to rate their confidence and expertise on the topic (depending on their random allocation) and then watch two videos; one accurate scientific video on the topic and one that had been previously labelled as containing misinformation from an official source (e.g., factcheck.org; snopes.com; apnews.com; theconversation.com; reuters.com/fact-check). Videos were presented in a counterbalanced order. All videos were between 1 minute and 15 to 1 minute and 30 seconds long and were similar in style (presenters and speech only, no infographics or animations). After watching each video, participants answered an attention check question and were asked to evaluate the video's trustworthiness, before elaborating on their answer in an open-ended question. The last question related to the

videos asked participants to state which of the two videos was the most trustworthy. In the **fourth task**, participants were presented 20 headlines from online sources, on their assigned topic. The headlines were presented in a similar format to a Facebook post, inspired by the design detailed in research by Pennycook and Rand (2019); a picture accompanied by a headline, byline, an author, and a date. Half of the posts were confirmed to contain misinformation according to two well-known fact-checking websites, snopes.com and FactCheck.org, while the other half contained factually accurate information confirmed by either the same fact-checking sources or by empirical research cited in the original article and verified by the researchers. The misinformation headlines were created by taking screenshots of the cited articles/posts in the fact-checking articles. If the original post was missing or only referenced a single social media post, the researchers would re-phrase the fact-checking title. For instance, one snopes.com article on the vaccine topic read “*Has Vaccine mRNA Entered the Food Supply via GMO Plants or Vaccinated Livestock?*” which was re-written to sound assertive; “Vaccine mRNA Has Entered the Food Supply via GMO Plants and Vaccinated Livestock”. The factually accurate posts were taken either from the same fact-checking websites or from other reputable sources, i.e., theconversation.com, APnews.com, and reuters.com/fact-check. In this task, participants were asked to evaluate the accuracy of the online post (“To the best of my knowledge, the claim in the above headline is accurate”) and whether they would share this post with their network (“I would share this post with people in my social network”).

The second part of the survey consisted of questions designed to collect information on participants’ online media use. Table 1 presents the key areas of enquiry as covered in the first part of the Survey Study.

Part 2

SMIDGE Survey	Variable	Assessment Instrument
Area of enquiry	Time of social media use	Time spent on specific websites or social media
Area of enquiry	Purpose	Purpose of using social media
Area of enquiry	Primary sources	Primary sources of learning the new or current affairs
Area of enquiry	Primary sources per topic	Primary sources of learning information on: Environmental issues (e.g. climate change, Health issues (e.g., vaccination), Social Issues (e.g., Immigration)
Area of enquiry	Rating of Trustworthiness	Trustworthiness of social media (and why)
Area of enquiry	Ways of participating	Ways of participating in online content

The third part of the survey focused on the dependent variable (conspiracist ideation), personality factors, and other social and cognitive variables of interest. Table 3 presents the questionnaires included in this part of the survey study.

Part 3

SMIDGE Survey	Variable	Assessment Instrument
Area of enquiry	Conspiracist ideation	Beliefs about the world scale (Brotherton, Robert et al., 2013)
Area of enquiry	Narcissism	Narcissism scale (SD3) (Jones & Paulhus, 2014)

Area of enquiry	Collective narcissism	Collective narcissism scale focused on ethnic identity (de Zavala et al., 2009b)
Area of enquiry	Values	Personal values scale (Lindeman & Verkasalo, 2005)
Area of enquiry	Evaluation tactics	Tactics to evaluate online content (developed for SMIDGE based on a study by Swart (2023b))
Area of enquiry	Discussion tactics	Tactics on discussing online content with social group (developed for SMIDGE)
Area of enquiry	Political Orientation	Left-Right self-placement scale (Breyer, 2015)
Area of enquiry	Epistemic Beliefs	Epistemic Beliefs (Garrett & Weeks, 2017)

The fourth part of the survey consisted of demographic factors and specifically of: age, gender, educational qualifications, employment status and occupation, income level, religion and language, country of residence, ethnic background, and nationality.

A copy of the final survey flow in English is available at the following links:

EN https://uclan.eu.qualtrics.com/jfe/form/SV_8Hu4ccgtJlW4gaa

GR https://uclan.eu.qualtrics.com/jfe/form/SV_6ytI3HDHxNstsyO

GER https://uclan.eu.qualtrics.com/jfe/form/SV_8lhZnfUGu1Uz7a6

ITA https://uclan.eu.qualtrics.com/jfe/form/SV_4VkJRthqljhlqSma

were completed by all the participants.

Inclusion and exclusion criteria

- Participants outside of the age frame of 45 to 65 years old were excluded.
- Participants who had completed the pilot study for the survey were excluded from participating in the final survey.
- Participants who had not consented to the information letter conditions of the survey study were automatically excluded from participating in the survey study.
- Participants who did not have a good level of understanding on any of the four survey languages, as based on their self-assessment of language skills, were excluded.
- No other demographic criteria were applied for participant exclusion from the survey study.

Pilot testing

A survey pilot study was initiated in January 2024 and in advance of launching the survey collection to examine the functionality of the survey flow, structure, questionnaire translations, reactions to survey content, and validity of measures. The survey pilot study collected 12 responses from the demographic group of interest in the various survey languages. The pilot survey provided responders with a feedback comment box where they were invited to add any observations related to the survey design, functionality, ease of completion, clarity, and length. Feedback from the pilot participants had been studied, and a series of changes had been implemented on the survey design. Specifically, wording and instruction problems had been resolved in all the languages, while the survey flow had been improved so that the reasoning tasks which were more cognitively taxing were presented in part 1 and other questionnaires in parts 2 and 3. In terms of survey presentation, we

adjusted the survey so that it was visually attractive on different types of devices (e.g., computer or phone), and we enlarged the social media posts so that they were clearly readable and visible to the participant. Feedback also indicated that the survey was too long for some participants to remain focused. In response to this observation all video content was reduced from 90s to 60s maximum, and two questionnaires were removed (one questionnaire on religiosity was removed and another questionnaire on social media behaviour which was however covered through other measures). Additional changes included enabling metadata controls to ascertain whether responders spend time with audiovisual content and placing character restrictions/requirements on open questions to ascertain data collection. One challenge included the cultural adaptation of the questionnaires and translations since some demographic information is represented differently in the four European languages. Effort was made to keep the questionnaires similar across languages while staying within a meaningful question format.

Design and analysis

After the completion of the data collection on the Qualtrics survey platform all data were locally downloaded at UCLan Cyprus servers for analysis. Support from the partners was required to ascertain correct coding of translated materials into a single dataset.

The analysis followed four steps:

- Data preparation, aggregation and cleaning (missing data analysis, variable correlations, factor analysis of questionnaire structure, internal consistency reliability of scale)
- Coding and analysis of open-ended questions on reasoning and argumentation (Manual textual coding, interrater agreement)
- Analyses to ascertain primary hypotheses about factor intercorrelation (factor analysis, correlation analysis, linear regression)
- Report writing

Ethical clearance was secured by UCLan Cyprus (**Appendix 2**) via the Cyprus National Bioethics Committee. The clearance was disseminated to all involved partners by UCLan. Partners collecting data locally were encouraged to check whether further ethical clearance was required from their local ethical bodies. DMU also pursued a local ethical clearance. DMU ethics advisory committee had responded with valuable comments regarding the structure and flow of the survey design, which were also addressed. Study pre-registration was completed prior to data collection with OSF Registries.

SMIDGE Survey Data Lifecycle

This section summarises the five steps – creation, storage, usage, archiving, deletion – in the cycle of the data to be used for the purposes of this task:

Creation: Data would be created when consent for participation is obtained. Data would be in anonymous form and will be collected by the online survey software (Qualtrics) in real time.

Storage: All data would be anonymously collected and stored in the internal password protected drive of UCLan Cyprus after downloading from the survey platform. No identifying personal information would be contained in this process except for participants' email address, should they choose to provide one (in case they are interested in participating in a focus group in the future). This information would be directly stored on SIF (Sensitive Information Facility), hosted by

Copenhagen University, and deleted from the online survey environment. Such personal data would be deleted immediately upon completion of the project.

Usage: Personal contact information of the participants would be used only for recruitment purposes (e.g., for sending out invitations about the focus group).

Archiving: Data containing personal information of the participants, and which may be used for recruitment of focus groups would be deleted within 3 months after the completion of recruitment for the focus groups. Fully anonymised data would be deleted 3 years after completion of the project.

Deletion: All data would be permanently deleted at each designated date, as outlined above.

Results

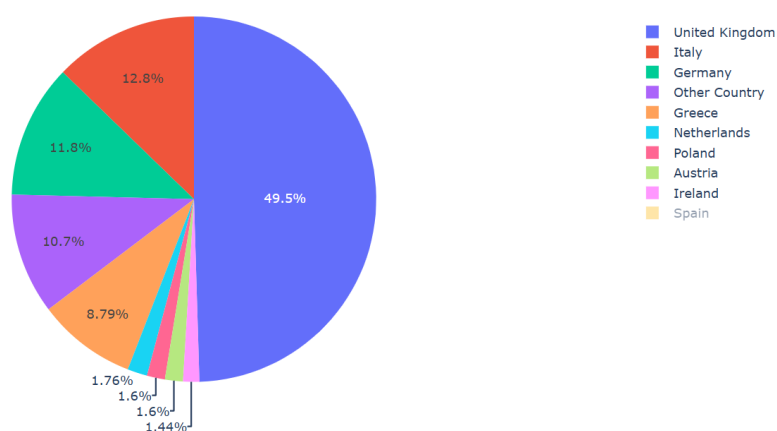
Demographic Characteristics of the sample

Country of Origin Distribution

The largest portion of participants were from United Kingdom (49.5%), followed by Italy (12.8%), Germany (11.8%). 10.7% of the participants were from other countries (ex. X) and 8.79% were from Greece. Participants from the Netherlands were the 1.76% of the sample followed by participants from Poland, Austria and Ireland.

Figure 1. Distribution of Participant Country of Origin.

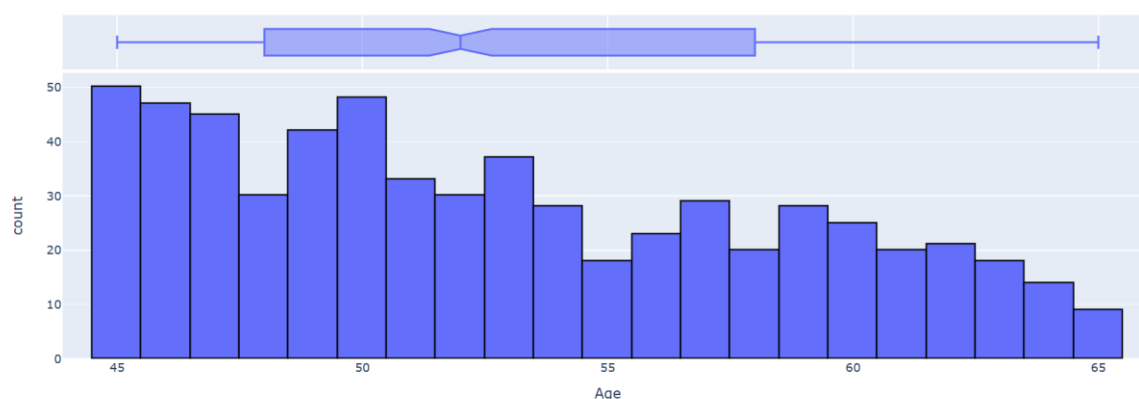
Country of Origin Distribution



The age of the sample was right-skewed, with a median age of 53 years and a range of 45 to 65 years.

Figure 2. Distribution of Participant Age.

Age Distribution

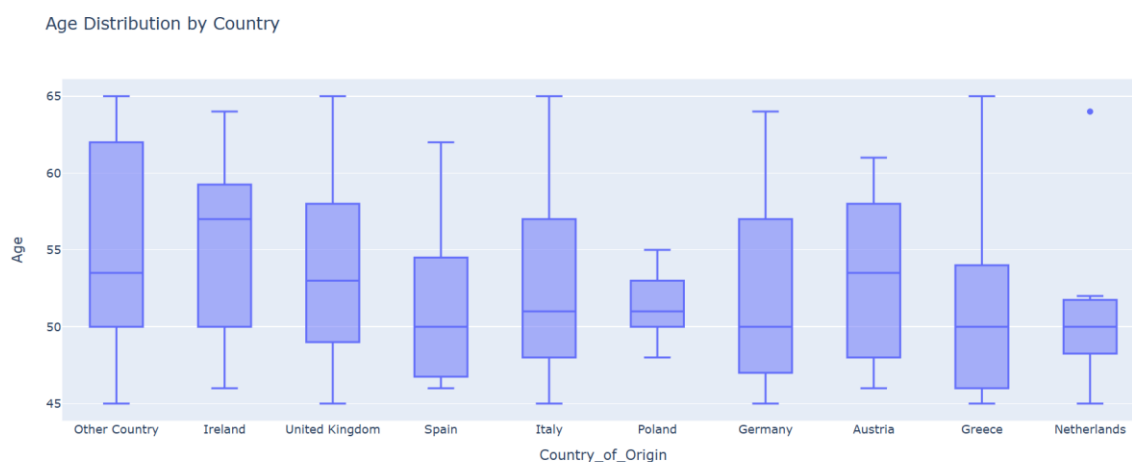


Age Distribution by Country

The graph presents the age distribution of the participants in each country. The boxplot for Ireland is right skewed with median age of 57 and age range of 46 – 64. For the United Kingdom, the distribution is right skewed with age range is 46 - 65 with median age of 53. The participants from Spain had median age of 50 with range 46 – 62. The age distribution for Italy is right skewed with

median age of 51 and range 45 – 65. Poland distribution had median age of 51 and extends from 48 to 55. Germany age distribution is right skewed with median age of 50 and range 45 – 64. Participants of Austria had median age of 53 and range 46 – 61. The age distribution for Greece is right skewed with median age of 50 and range 45 - 65. The participants from the Netherlands had median age of 50 and the age range spans from 45 to 52. The boxplot for the participants from other countries is left skewed with median age 53. The age range spans between 45 – 65.

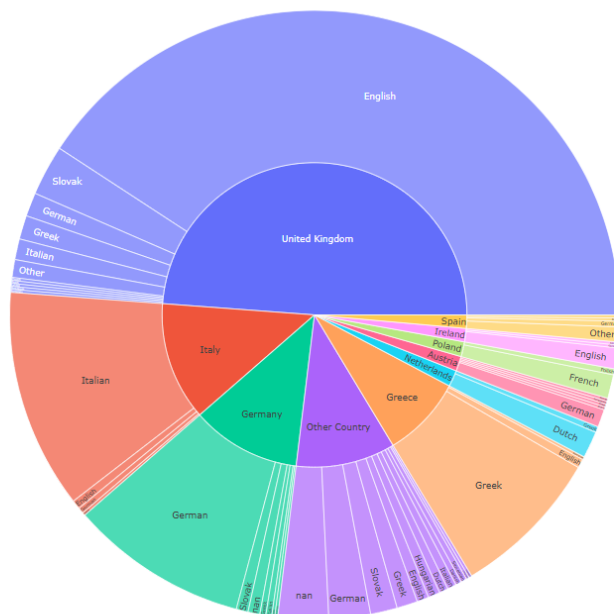
Figure 3. Distribution of Age by Country



Languages per country

Participants from the United Kingdom were predominantly English speakers, followed by Slovak, German, Greek, Italian and other. Most of the participants in Italy were Italian speakers and most of the participants in Germany were speaking German. High portion of Greece were speaking Greek. Most of the individuals from other countries were speaking German, Slovak, Greek, English. Participants in the Netherlands were speaking Dutch, most of individuals in Poland were speaking French. Most participants in Austria were speaking German and most participants in Ireland were English speakers.

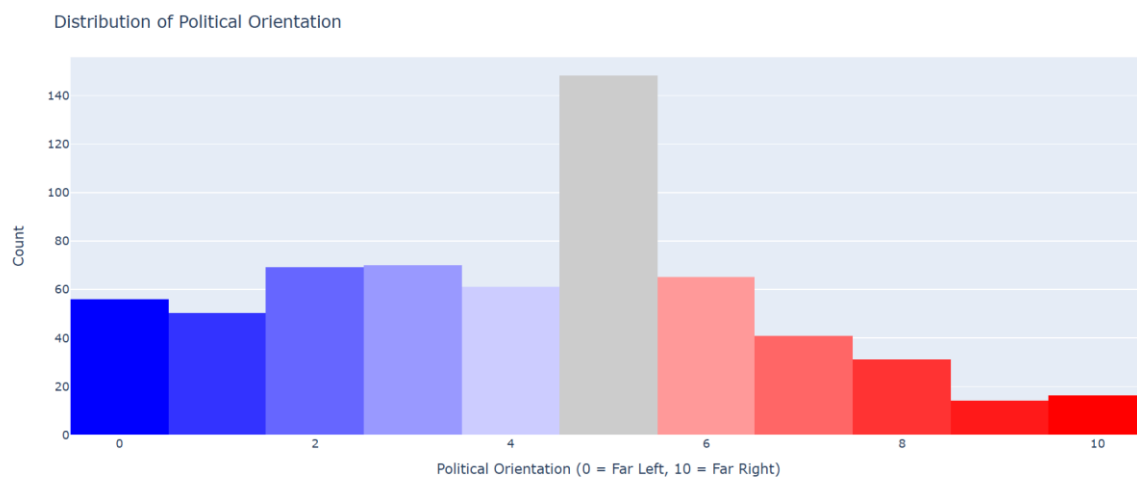
Figure 4. Languages Spoken by Country.



Distribution of Political Orientation

Most of the participants identified as centrist. Participants who identified with far-left ideologies were more than participants who identified with far-right positions. Similarly, participants who had leftish positions were the largest group compared to the participants who had right positions.

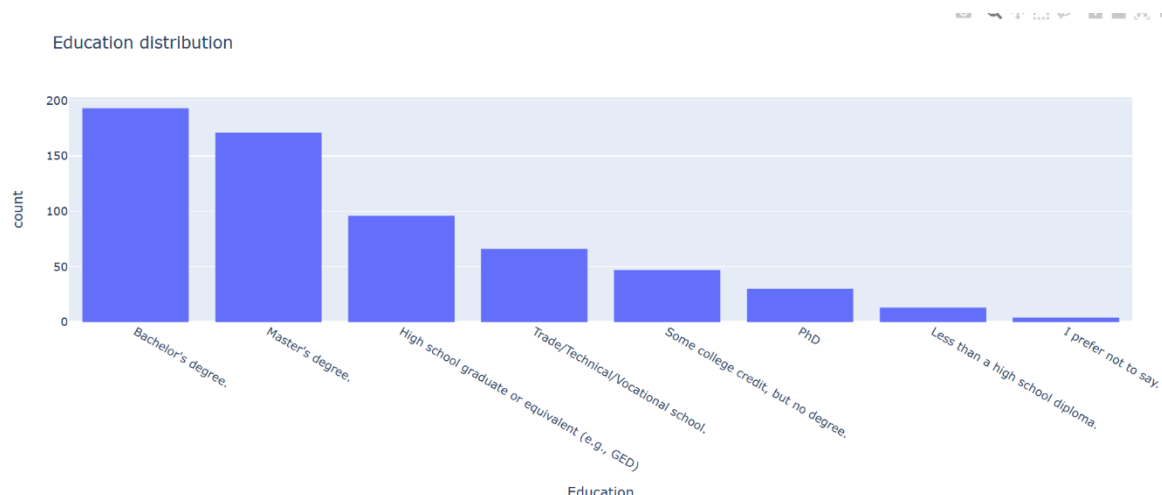
Figure 5. Distribution of Participant Political Orientation.



Education Distribution

Most of the participants held a bachelor's degree. The second largest group were participants who completed master's degree. Less than 100 participants were high school graduates, while others were in Trade/Technical/Vocational school. The remaining participants included those with some college credit, but no degree, PhD, participants with less than a high school diploma and few preferred not to say.

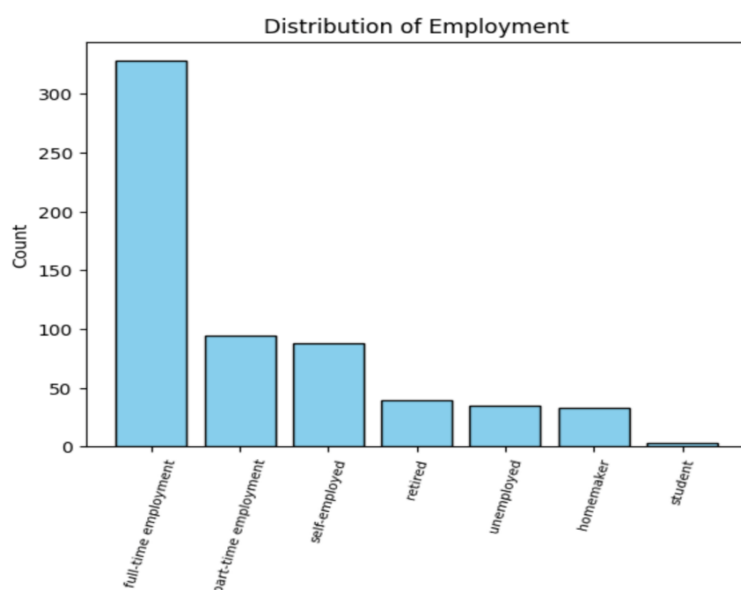
Figure 6. Histogram of Participant Level of Education.



Distribution of Employment

Most of the participants were employed full – time. Followed by the participants who were employed as part time, self – employed and retired. Few participants were unemployed, homemakers or students.

Figure 7. Histogram of Participant Employment Status.



Participant Gender

Out of the 620 participants who responded to the survey, 301 identified as male, 313 as female, 1 as non-binary, and 5 did not wish to respond.

Cognitive factors - Reasoning

Coding of Open-Ended Questions

The coding scheme used to code the responses to the open-ended essay questions was adapted from Iordanou et al., (2019) and Kuhn & Modrek (2021) and expanded based on the data. Following this adaptation, the responses were coded according to the number of idea units, presence of evidence, functionality of evidence (functional vs. non-functional), prior knowledge, given evidence,

however clauses, reference to both positions, and the following coding categories: support own – one-sided, support own – two-sided, support other, weakening other, weakening own. An additional coding category, named evidence type, was created along with six data-driven subcategories that reflected themes emerging from the participants' responses: environmental, social, and sociocultural, scientific knowledge, human rights protection, and refugee law, socioeconomic and financial, based on a case study.

Coding categories, descriptions, and examples are presented in Table 1.

Table 1. Coding Scheme for Reasoning Question Responses.

Coding categories	Description	Example
Number of idea units	Number of statements/ideas	"I believe that the risk of not vaccinating children against diseases such as polio and measles is much greater than the likelihood of a vaccine causing learning difficulties. We know polio and measles can cause severe problems, and in some cases can be fatal. There is no evidence that vaccines cause learning difficulties, indeed scientific research suggests that they are not linked." Idea units: 3
Presence of evidence	Number of idea units containing evidence. If the idea unit is just a claim/statement/wish with no evidence, then the idea unit is not regarded as containing evidence.	"They should be allowed to stay. At this stage they would have integrated into the society in the EU and probably are making good progress to belong and be economically viable as well. They should try and become citizens and promise to do their best in the Eu. It makes no sense to send them back as there is a large deportation cost." Pieces of evidence: 3
Functional	Use of evidence that serves a function (e.g., support own – one-sided). When the evidence is functional , it is assigned to either the Given Evidence or the Prior Knowledge category.	"Children are now settled with great opportunities for their future. Sending them back would be inhumane as children must be protected and cared for in a stable environment. The children have suffered so much and should not be traumatized again." Functional: 3
Non-functional	If the connection between the cited evidence and the claim is not made adequately enough to be identifiable	"People should be sent back to their original countries. It's the luck of the draw where we are born, some are Kings, and some are paupers."

		Non-functional: 1
Prior knowledge evidence	When the evidence used is based on the participant's prior knowledge	"People who contribute to the community and country and have lived in that country for a long time I think should be allowed to stay in that country"
Given evidence	Anything that was provided to the participants in the form of Questions and Answers and any information given in the text provided to them	"There is actual, published, data to show that vaccines do not cause learning disabilities."
However, clauses	When "however" (or similar conjunctions like "but," "although," or "even though") is used to connect two opposing assertions in the same sentence. If there is at least one however-clause, by definition there's reference to both positions. The opposite does not hold.	"There are lots of mitigating factors surrounding people who reside illegally in a country that is either not their birth country or official residence. However, if they have proven to integrate into society and prove a worth to both the country and the community then i would always advocate that they are allowed to stay and contribute to airer diverse societal community... "
Reference to both positions	When the participant makes a reference to the other position either by weakening it or by supporting it in some way. When the participant states that they are unsure, and they support both positions (with support own two-sided arguments) this is also considered to entail Reference to both positions.	"People need to be educated about the damage being done to the environment on a daily basis and businesses must find better ways to do less damage. Tax them extra to find alternatives"
Support own – one-sided	A statement serving to support one's own position	"I think that they should be allowed to stay in the EU as they will have integrated there - and think of the EU as their home."
Support own – two-sided	When the participant states that they are unsure and/or they <i>clearly</i> refer to both positions in a way that implies that they are unsure. In all other cases, where there may be reference to both positions (e.g., the participant is not unsure, but they use an argument to weaken the other position), then any support-own arguments ARE NOT TWO-SIDED.	"As these people were brought up in and have likely led a substantial and key part of their lives growing up in the EU, and have contributed to the EU economy as though they were citizens on an equal par with their compatriots, they absolutely ought to have the right to remain in the country that they likely consider home. [If they wish to leave, that is of course fine too - if the destination they wish to move to accepts them. If they have not contributed to the economy and have no reason for not having done so (eg ill-health preventing their ability to work), then perhaps they ought to be sent back to their home countries or have their case reviewed fairly for staying.]"
Support other	A statement serving to acknowledge strengths of the opposing position	Participant position: education "While taxing more may help fund things and systems that would be of

		help , education is likely to help much more and for future generations”
Weakening other	A statement serving to weaken the other position.	Participant position: for vaccines “There is no causal link between these vaccines and learning disability or autism.”
Weakening own	A statement serving to acknowledge weaknesses of one’s own position	Participant position: for vaccines: “The diseases being prevented by the vaccines can be fatal and although vaccines always carry a small amount of risk of adverse side effects , they are less severe than contracting the disease itself.”
Position	The participant’s stance on the topic to which they were assigned	“High taxes will just annoy people and cause cost of living crisis as the tax increase will be pushed on to us, the businesses QUA won’t absorb them.” Position: education
Evidence type	The nature of the evidence	Social & sociocultural; socioeconomic & financial; human rights protection & refugee law
Environmental	Reference to environmental factors	“Education will get people to see the real data and realise that the climate is constantly changing and the effects that humans cause to the change are maybe nil”
Social & sociocultural	Reference to social, societal, cultural, and/or language factors	“I think that they should be allowed to stay in the EU as they will have integrated there...”
Scientific knowledge	Reference to one’s knowledge about scientific matters	“A rise in unvaccinated children is causing an increase in diseases which as measles, placing all children especially those most vulnerable due to existing disabilities at risk of serious harm including death.”
Human rights protection & refugee law	Reference to civil and legal factors, humanitarian considerations, anything relating to human rights (including the right to mental health)	“People that were brought to Europe as children and now live illegally should be allowed to stay. I feel that they came to Europe because there were issues in the country where they came from, and their lives could have been in danger and could still be in danger.”
Socioeconomic & financial	Reference to social, economic, and/or financial factors	“Immigrants are typically found in growing regions and increase the supply and demand of the economy expanding employment opportunities. Many are more willing to work and take up roles people native to that country are.”
Based on case study	Reference to one’s own experiences or the experiences of others that participants are aware of.	“I have witnessed first-hand (being in the health service) that it is more likely a child will have a learning difficulty associated with the vaccine that it is without.”

Qualitative Analysis: Coding of Participants stated reasons.

Two coders participated in coding the participants' essay responses. One coder, who was already familiar with the coding scheme, provided training to the second coder to ensure consistency and accuracy in applying the coding system. To establish interrater reliability, a 10% sample of the responses was collaboratively coded by both raters. This collaborative coding allowed both coders to discuss and align their interpretations of the coding scheme. After this, the coders independently coded an equivalent portion of the data, which was then compared to assess agreement. The coders achieved an 80% agreement rate, indicating a sufficient level of reliability. Following the establishment of interrater reliability, the remaining responses were independently coded by each coder. Each coder was responsible for coding half of the total dataset. The coders carefully read each participant's response, dividing it into relevant segments based on content. Each segment was then assigned to the appropriate coding category. The frequency of each category was recorded based on its occurrence within the dataset. This systematic approach allowed for an organized and consistent coding process.

Coding of Evaluation Criteria

The evaluation criteria mentioned in the justifications of the rankings of the videos as trustworthy were also coded. The coding scheme developed for this purpose was informed by the scheme used by Abed and Barzilai (2022) of the strategies used by students to evaluate scientific YouTube videos and webpages. Five main evaluation criteria were adopted from the aforementioned scheme: *content evaluation*, *source evaluation*, *content evaluation*, *corroborating*, and *searching for more information*. Two recurring evaluation criteria raised by the participants were identified in a bottom-up manner and added to the coding scheme, namely *actor evaluation* (encompassing three sub-criteria: *expertise*, *research*, and *education*) and *intuition and perspective*. Additionally, evidence credibility as a sub-criterion of the *content evaluation* criterion was added.

In coding the responses to the question regarding the perceived trustworthiness of the videos, two coders read each response to determine whether each of the five criteria was reflected, recording the frequency with which each criterion appeared. This process was done collaboratively for 20% of the responses and independently for another 10%, with the results compared afterward. Once 80% interrater reliability was achieved, the coders proceeded to independently code the remaining dataset, each responsible for half of the total responses.

Code descriptions and examples are illustrated in Table 2.

Table 2. Coding Scheme for Video Evaluation Criteria

Criterion	Description	Examples
Source evaluation	Evaluating the who created the video or where, when, and how it was published	"Fox News can be trusted in a way;" "GB news is a mainstream TV channel that presents counterarguments to those often aired by other mainstream media channels."
Actor evaluation	Evaluating the actor featured in the video	"The professor is very professional in his argument, giving solid reasoning behind his statements."
AE: expertise	Evaluating the research work of the actor featured in the video on the specified topic	"Harvard University and a Professor so an expert in his field."

AE: research	Evaluating the research work of the actor featured in the video on the specified topic	"Because the man is a political scientist, meaning that he has spent hours of research on this topic."
AE: education	Evaluating the educational background of the actor featured in the video	"The man was an educated person..."
Intuition & perspective	Expressing one's stance and intuitive insights regarding the topic	"I would feel that what was being said, held some truth in it. America has been built in immigration and these people, as mentioned, have gone on to give a lot back."
Content evaluation	Evaluating the availability or quality of the content or information provided in the video	"Interesting, informative, educational and positive."; "It was a fair presentation of the pros and cons, so I would rate this video as reliable."
CE: evidence credibility	Evaluating the credibility of the evidence presented in terms of reliability and veracity	"Putnam points to concrete evidence for his claims;" "He gives valid and acceptable demonstrations and explanations"
Searching for more information	Searching online for additional information on the topic without explicitly referring to corroboration	"I would still need to read more, to give a definitive answer."
Corroborating	Comparing the video to other information sources or asking a knowledgeable person to corroborate the information	"The arguments I have heard are not new. I have already met people who share the same concerns as the host." "...And also, according to my research, I truth, the things that were said in the video."

In addition to rating videos as trustworthy, participants were also asked to rate the trustworthiness – in terms of content – of various social media platforms. For platforms rated as trustworthy or very trustworthy, participants were asked to specify two factors or criteria they considered when making their ratings.

The prompt was as follows: *"For the media that you have rated as trustworthy or very trustworthy in terms of content, please provide two factors/ criteria on why you perceive it/them as trustworthy or very trustworthy."* The responses to this prompt were open-coded, and recurring factors were identified through a bottom-up approach. Four main evaluation factors were identified inductively from the participants' responses: *Reputable Source*, *Legally Verified*, *Accuracy of Information*, and *Transparency*.

Table 3 presents these factors, including a description of each one and examples drawn from the data.

Table 3. Factors Influencing Trustworthiness Ratings of Media Platforms

Factors	Description	Examples from the data
Reputable Source	The information comes from well-known, established organizations or individuals recognized as experts in their field.	-Universally known as a safe source -Global newspaper -Educated source -Reputation -Because experts have their say
Legally Verified	Content is confirmed to meet legal standards or has undergone legal scrutiny.	-Need to have the information correct as they can be sued if not

		-Whether it is regulated -Legacy -Because it is controlled by the state -Only trustworthy if can be held responsible
Accuracy of Information	The information is factually correct, well-researched, and backed by evidence	-Based on factual evidence -Factual reports -Factual accuracy & references -Information from real people, not just news agencies -References to trustworthy sources (dpa, n-tv, Welt, ...)
Transparency	The platform clearly indicates its sources, authorship, and any potential biases.	-Transparency -Neutrality -Cites sources -Peer-reviewed -As they have systems and editorial procedures in place

Essay Responses

Reference to both conditions

As seen in Figure 8, 62.8% (n = 394) referred to both positions, while 36% (n=226) referred to only one position.

Functional Evidence

Most participants (88.6%) incorporated functional evidence in their responses, with only 72 participants (11.4%) using no functional evidence at all. The most common pattern was using two pieces of functional evidence (n = 178, 28.2%), followed by three pieces (n = 120, 19.0%) and one piece (n = 94, 14.9%). A moderate number of participants used four (n = 65, 10.3%) or five pieces (n = 41, 6.5%) of functional evidence. The use of six or more pieces of functional evidence was less common, with decreasing frequencies from six pieces (n = 24, 3.8%) to twenty pieces (n = 1, 0.2%).

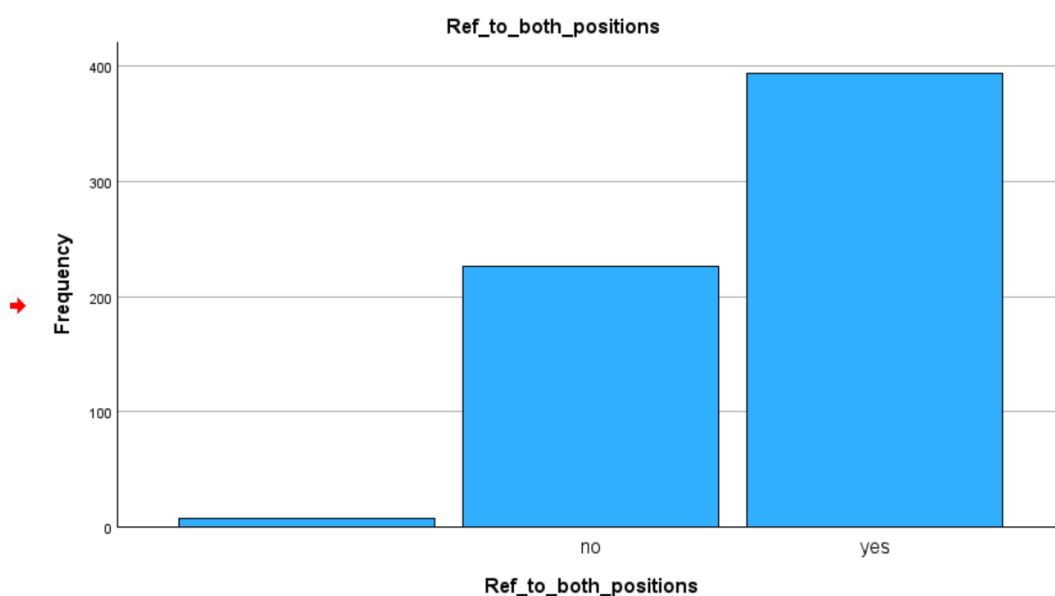
Given Evidence

Almost all participants (n = 604, 95.7%) did not use any given evidence in their responses. Among the few who did incorporate given evidence, most used it only once (n = 26, 4.1%), while only one participant (0.2%) used it twice.

Prior Knowledge based Evidence

Most participants (87.3%) incorporated prior knowledge evidence in their responses which were based on their prior knowledge. The most common pattern was using two pieces of prior knowledge evidence (n = 176, 28.0%), followed by three pieces (n = 114, 18.1%) and one piece (n = 98, 15.6%). A moderate number of participants used four (n = 62, 9.9%) or five pieces (n = 39, 6.2%) of prior knowledge evidence. The use of six or more pieces of prior knowledge evidence was less common, with decreasing frequencies from six pieces (n = 23, 3.7%) down to twenty pieces (n = 1, 0.2%).

Figure 8. Frequency of Participants who Made Reference to Both and one Position in Their Essays



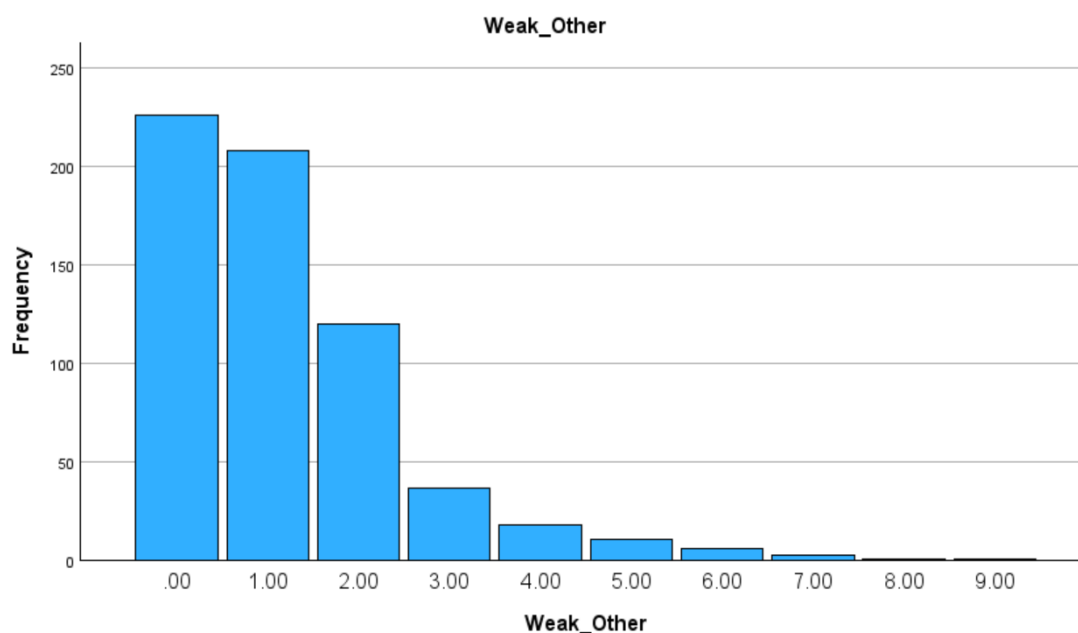
Support-Own

Most participants used the support-own the argumentative strategy, where they provided evidence to support their own position, with the most common pattern being either one instance ($n = 207$, 32.8%) or two instances ($n = 107$, 17.0%). A notable number of participants used this strategy three times ($n = 49$, 7.8%) or four times ($n = 23$, 3.6%). The use of five or more one-sided supporting statements was less common, with diminishing frequencies from five instances ($n = 6$, 1.0%) up to twelve instances ($n = 1$, 0.2%). Overall, one-sided support for one's own position was a frequently used argumentative strategy, with 65.3% of valid responses including this element at least once. The pattern suggests that most participants used this strategy one or two times.

Support own two-sided

Most participants ($n = 598$, 94.8%) did not include any support own two-sided statements supporting their own position. Of those who did use this argumentative strategy, it was most commonly used three times ($n = 15$, 2.4%), followed by two times ($n = 7$, 1.1%). Very few participants used one or more than three two-sided supporting statements, with only three participants (0.5%) using it once, two participants (0.3%) using it four times, three participants (0.5%) using it five times, and single participants using it six, seven, or nine times (0.2% each).

Figure 9. Frequency of Participants who Used the Weaken-Other Argumentative Strategy



Weakening-Other

Approximately one-third of participants ($n = 226$, 35.8%) did not include any statements weakening others' positions in their responses. Most participants did employ this strategy, with most using it either once ($n = 208$, 33.0%) or twice ($n = 120$, 19.0%). A smaller proportion used this strategy three times ($n = 37$, 5.9%) or four times ($n = 18$, 2.9%). Even fewer participants included five or more instances of weakening others' positions, with decreasing frequencies from five instances ($n = 11$, 1.7%) up to nine instances ($n = 1$, 0.2%). Overall, this demonstrates that weakening others' positions was a commonly used argumentative strategy, with 64.2% of valid responses including this element at least once, though most participants who used this strategy did so only once or twice.

Supporting-Other & Weakening Own

When considering strategies that could potentially weaken their argumentative position, participants rarely used either supporting others' positions or acknowledging weaknesses in their own position. For supporting others' positions, the vast majority of participants ($n = 611$, 96.8%) did not use this strategy at all, with only 19 participants (3.0%) using it once and a single participant (0.2%) using it twice. Similarly, most participants ($n = 601$, 95.2%) did not include any statements weakening their own position, while 28 participants (4.4%) used this strategy once, and only two participants used it more frequently (one participant used it twice and another used it four times, 0.2% each). Both variables had four missing responses (0.6%). These patterns suggest that participants strongly avoided strategies that might compromise their argumentative position, with only about 3-5% of participants employing either strategy. When these strategies were used, they were typically limited to a single instance rather than repeated multiple times in the response.

"However," clauses

The use of however clauses was relatively uncommon in participants' responses. Most participants ($n = 563$, 91.7%) did not use any however clauses in their writing. Of those who did employ this rhetorical device, most used it only once ($n = 47$, 7.7%), while very few participants ($n = 4$, 0.7%) used it twice.

Criteria for evaluating the trustworthiness of videos

Figures show the number of participants who have used each criterion at least once per topic.

Figure 10. Criteria for Evaluating the Trustworthiness of Videos per Topic

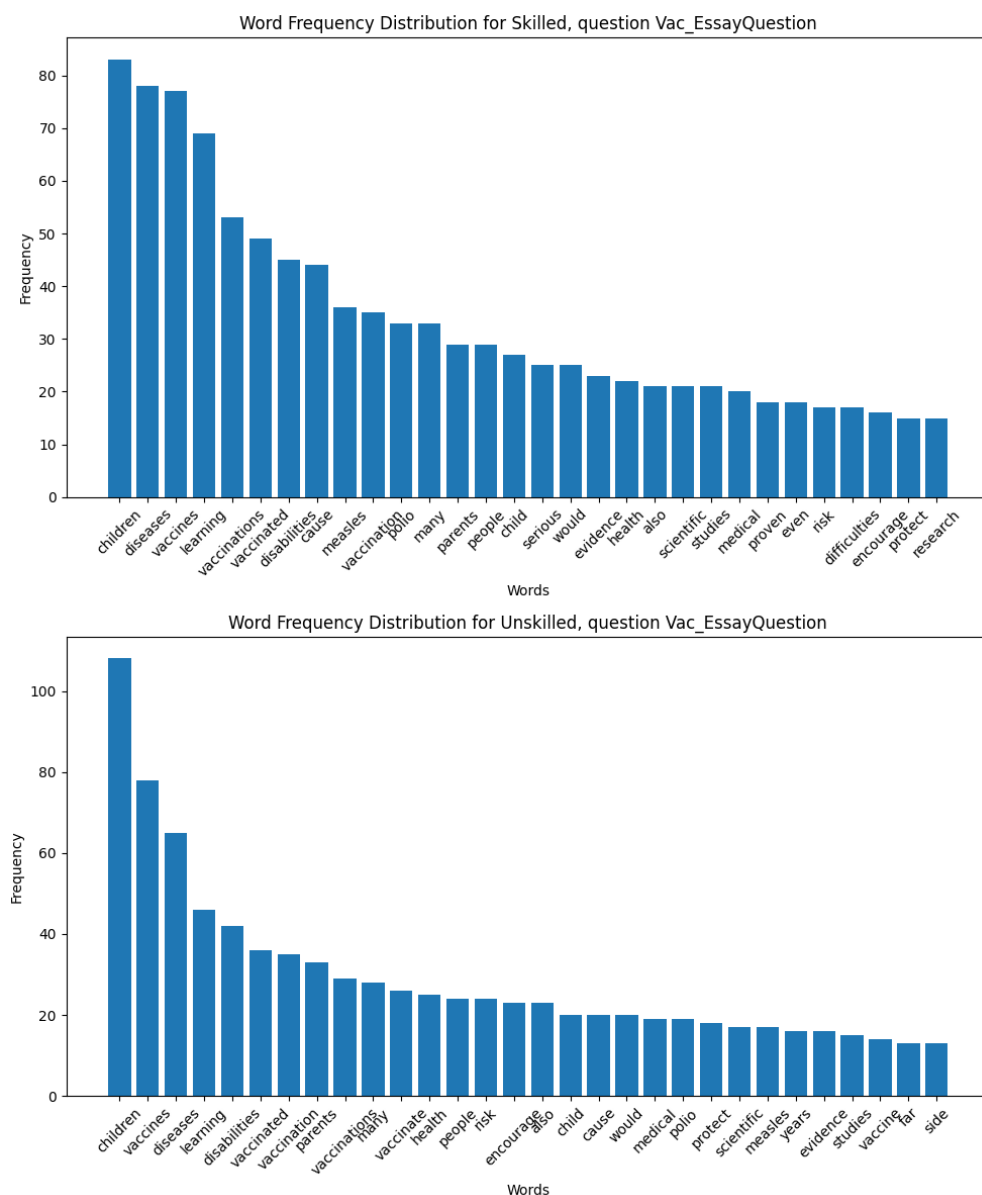


The graphs illustrate how the videos on the three topics (vaccination, climate change, and immigration) were evaluated across various criteria, revealing several notable trends. All topics exhibit a similar hierarchical pattern, with content evaluation consistently emerging as the dominant criterion used. There were topic-related differences in how students engaged with the evaluation criteria. The vaccination topic prompted a greater focus on actor evaluation and evidence credibility

checks, indicating a heightened concern for the actor featured in the videos and the reliability of the information presented. The videos on climate change elicited a low use of most criteria, except for content evaluation, suggesting that content quality was the primary factor considered in evaluating this specific video. Active verification strategies, including research and corroboration, were consistently under-utilized across all topics, highlighting deficiencies in cross-referencing for more rigorous information validation. Meanwhile, the videos on the immigration topic stood out for prompting more intuition-based evaluation compared to the videos on the other two topics, indicating that respondents may have relied more on gut feelings or personal beliefs when evaluating the immigration video. Content Evaluation was the most frequently employed criterion across all three topics, while evaluation based on intuition/perspective constituted the second most used criterion across all topics. The Actor Evaluation criterion showed notable variation across topics, with the highest use for evaluating the videos on vaccination (about 110 individuals), moderate use for the videos on immigration (about 90 individuals), and lowest use for the videos on climate change (about 60 individuals). The Evidence Credibility criterion also varied by topic, with the highest use for evaluating the videos on vaccination (about 105 individuals), moderate use for evaluating the videos on immigration (about 80 individuals), and the lowest use for evaluating the videos on climate change (about 55 individuals). These results suggest that the videos on vaccination lent themselves more readily to the use of evidence credibility as a criterion for evaluation, whereas the videos on climate change were the least conducive to engagement with this criterion in their assessment.

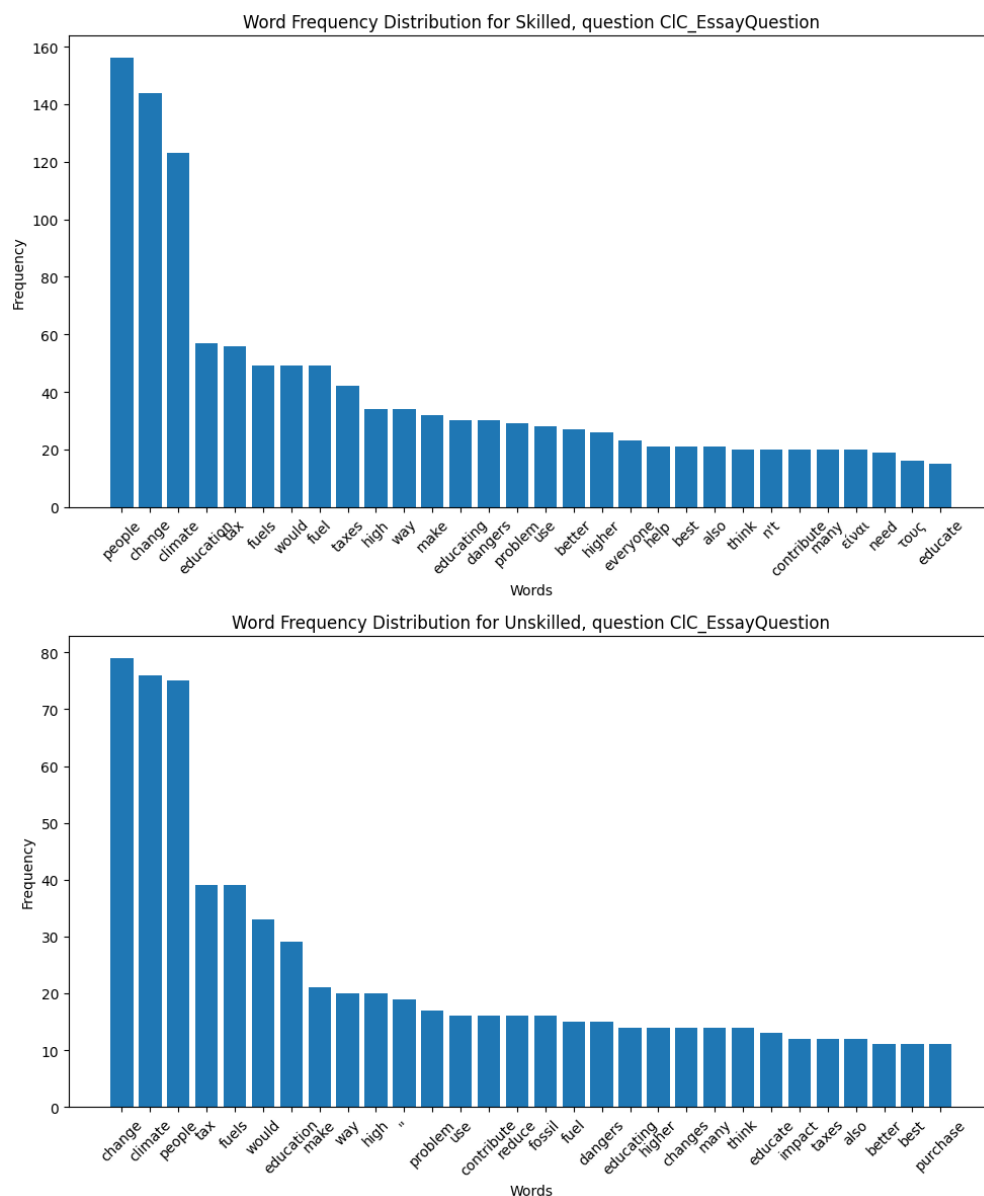
Frequency of word usage

Figure 11. Word Frequency Distributions Between High and Low Fake News Discernment Groups on the Vaccination Topic.



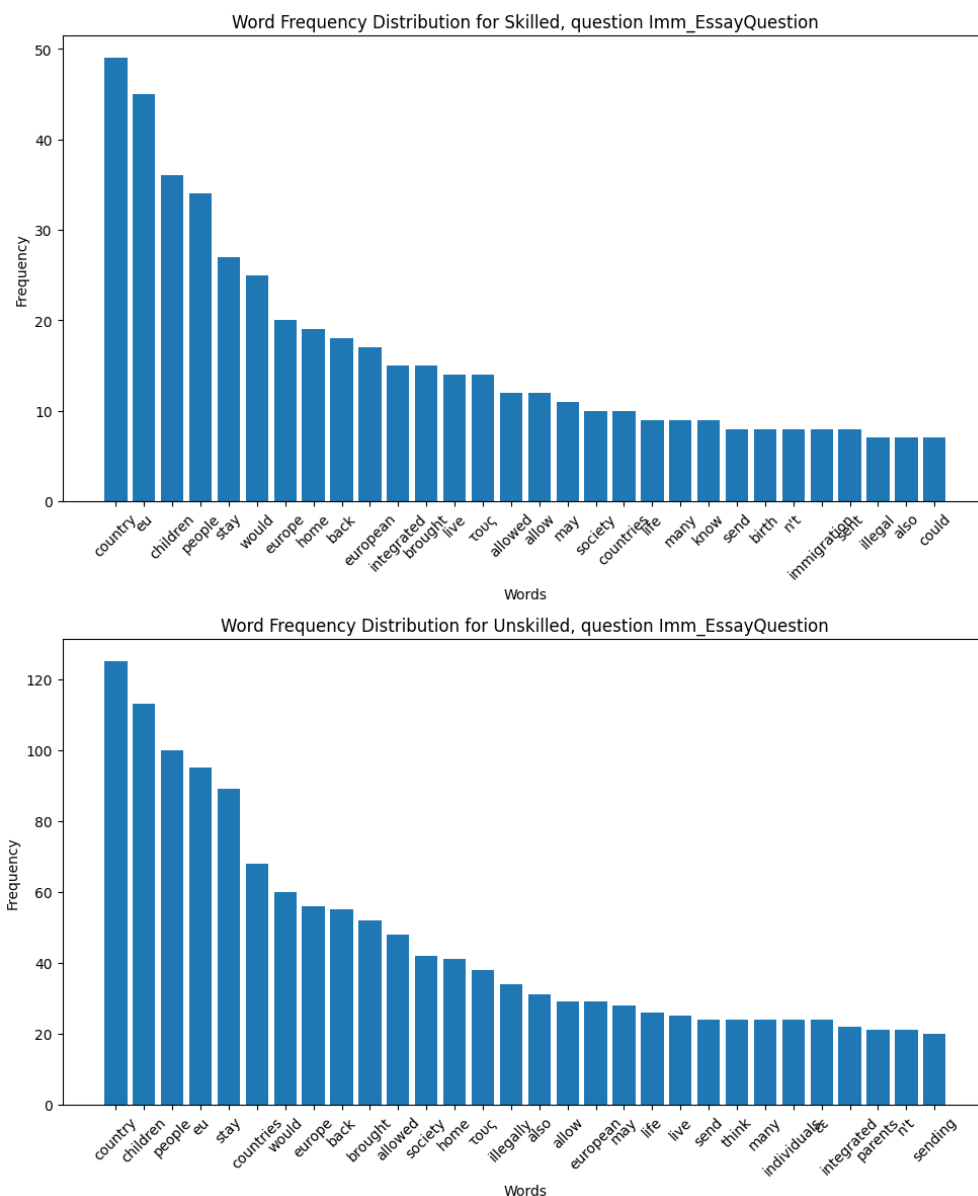
As seen in the figure 11, both skilled and unskilled individuals use the same terms 'vaccines' and 'diseases' most of the time. However, skilled individuals demonstrate more words related to scientific and research aspects, such as 'scientific' (frequency ~20), 'evidence' (frequency ~25), 'research' (frequency ~15), and 'medical' (frequency ~20) in their responses, compared to unskilled individuals showing frequencies of around 15 or below for those terms. In addition, skilled individuals appear to incorporate more terms associated with evidence-based discussion, as shown by the presence of 'evidence,' 'serious,' and 'scientific' in their top 25 most frequent words. This suggests that those better at identifying fake news tend to refer to scientific evidence and research-based perspectives in their arguments.

Figure 12. Word Frequency Distributions Between High and Low Fake News Discernment Groups on the Climate Change Topic.



As seen in Figure 12, while both groups commonly use terms like 'people,' 'change,' and 'climate,' skilled individuals maintain higher frequencies across a broader range of words, including specific terms related to solutions and consequences such as 'educate,' 'fuels,' 'taxes,' and 'dangers.' This suggests that those better at identifying fake news may possess a more thorough understanding of climate change issues and can articulate their thoughts more extensively.

Figure 13. Word Frequency Distributions Between High and Low Fake News Discernment Groups on the Immigration Topic.



The figure 13 shows that both skilled and unskilled individuals frequently use terms like 'country' and 'children,' though with notably different frequencies. Unskilled individuals show higher overall word frequencies (peak around 125 for 'country' compared to 50 in skilled group), suggesting more repetitive language use. Skilled individuals' responses include distinctive terms like 'integrated' and 'society' (frequencies ~15), indicating a focus on social integration aspects. Unskilled individuals show a higher usage of terms like 'illegal' and 'send' (frequencies ~30-35). This difference in terminology suggests that skilled individuals tend to frame immigration discussions around integration and societal aspects, while unskilled individuals may focus more on legal status and enforcement aspects.

Overall, this comparison reveals that climate change discussions show the largest quantitative difference in word frequencies between skilled and unskilled groups, with skilled individuals using words approximately twice as frequently as unskilled individuals.

Climate change

Table 4. Themes Found in Participants Responses to the Essay Question on the Climate Change Topic

Themes in participants essay responses on the climate change topic – Is climate change best reduced by educating people about its dangers or by charging a high tax on the purchase of fuels that contribute to the problem?

Themes favorable to education of people about climate change and its dangers

1. Education is the key, providing awareness and understanding of causes. (n = 81)
2. Educating people will motivate them to change. (n = 7)
3. Education will increase the understanding of the dangers. (n = 41)
4. Educating people from a young age will benefit future generations. (n = 22)
5. Education will allow individuals to make informed decisions. (n = 12)
6. Education on the causes of climate change would help reduce the things that cause climate change. (n = 3)
7. Education is the best way to start behavioral changes. (n = 47)

Themes unfavorable to education of people about climate change and its dangers

1. Education about the dangers of climate change can hardly achieve the same effect as reductions in "negative" consumption for climate change. (n = 7)
2. Education may help, but it depends on personal responsibility: if they don't want or disagree this will not have an impact. (n = 49)

Themes favorable to charging high tax on the purchase of fuels that contribute to the problem

1. Implementing a high tax on purchase of fuels is crucial for combating climate change. (n = 11)
2. High tax on the purchase of fuels, will discourage the use of these fuels (n = 16)
3. High tax on the purchase of fuels would be the most effective and immediate measure (n = 5)
4. High tax on the purchase of fuels could fund future prevention (n = 12)
5. High tax on the purchase of fuels will encourage people to use alternative solutions (n = 20)
6. With taxing fuel products people will convert to cheaper ways of traveling like public transport which will help combating air pollution and resulting in better environment for everyone (n = 4)
7. Financial impact can drive change, when people can no longer afford these fuels, they will quickly start seeking alternatives. (n = 9)

Themes unfavorable to charging high tax on the purchase of fuels that contribute to the problem

1. High tax on the purchase of fuels is a short-term solution (n = 7)
2. High tax on the purchase of fuels is unfair. A lot of individuals are unable to choose alternatives (e.g., rural areas don't have public transport). (n = 3)
3. High tax on the purchase of fuels will negatively affect people with lower incomes. Individuals with high incomes will still be able to pay high taxes. (n = 29)
4. Charging high tax on purchase of fuels will make everyone feel angry, since they will not understand the issue. (n = 10)

5. Punitive measures just lead to resentment and lack of commitment to a cause (n = 8)
 6. Increasing fuel taxes would only lead to a worsening of economic conditions because the level of use would remain the same. (n = 8)
 7. Money will not solve the problem – physically, it will not change the temperature. (n = 7)
- Themes favorable to both positions

1. It is necessary to use both education about the dangers of climate change and charging high tax on the purchase of fuels. (n = 25)

Most of the participants supported that educating people about climate change and its dangers is preferred to reduce climate change, compared to charging tax on the purchase of fuels. Specifically, participants indicated that education could provide awareness and understanding of the causes of climate change (n = 81). Key themes supported that, educating young age will benefit future generations (n = 22), education would motivate individuals (n=7) and will allow the public to understand of the dangers (n = 41). Education will allow individuals to make informed decisions (n = 12), while it will contribute to behavioural changes (n = 47) and will reduce things that cause climate change (n = 3).

In contrast, participants presented that education will not achieve the same results as reductions in negative consumption for climate change (n = 7). The importance of personal responsibility was highlighted, suggesting that individuals who disagree or they do not believe in climate change, will not be influenced by education (n = 49).

A notable amount of participants supported charging high tax on the purchase of fuels, with themes underlying that high tax will contribute to the problem (n=11). Some of the statements were emphasized on the idea that high tax will discourage the use of these fuels (n = 16), and that tax is effective and immediate measure (n = 5), which will convert to, alternative solutions (n=20) and cheaper ways of traveling, like public transportation (n = 4). Some of the participants adopted the belief that financial impact will not allow people to afford the use of these fuels (n = 9).

Significant amount of statements not supporting high tax were used. Beginning with, high tax is a short – term solution, which will not have enough results (n = 7), high tax is unfair, and many will not have the option for alternatives (n = 3). Similar ideas shared the individuals who supported that tax is not the best solution because it will affect individuals with lower incomes, although it will not affect individuals with higher incomes, who will be able to pay high tax (n = 29). By increasing the taxes would lead to worsening economic conditions because the level of use would remain the same, since the public will not understand the reason behind (n = 8). Further, it was mentioned by few individuals that, high tax will make people angry, and they will not understand the issue (n = 10). Some individuals view high tax as punitive measure which lead to resentment and lack of commitment (n = 8). Participants indicated that money will not physically solve the problem, it won't change the temperature of the earth (n = 7).

It is very important to be considered that some participants supported the use of both solutions since climate change is an issue which requires several solutions (n = 25).

In conclusion, most of the participants supported the education as solution, a significant amount of the participants adopted charging higher tax as best idea to contribute to the climate change issue. On the one hand, individuals who support education mention that it will contribute to awareness, behavioural change, motivation and make informed decisions, on the other hand, individuals who support high tax were focused on the belief that it will force the public to find alternative solutions. Also, the individuals who supported high tax indicated the importance of being mindful to

individuals who will not afford high taxes and that this is a punishment which will not affect equally everyone.

Immigration Topic

Table 5. Themes Found in Participants' Responses to the Essay Question on the Immigration Topic

Themes found in participants responses to the essay question on the immigration topic – Should the EU allow people, who were brought to the EU as children illegally, to stay or should they be sent back?

Themes Favourable to Allowing Children to Stay

1. They should be allowed to stay. (n = 76)
2. The children had no power or control in the decision-making of coming to a country. (n = 56)
3. The children have been integrated into society by now / allowing them to stay will help integrate them (e.g., speak the language, education, understanding culture). (n = 50)
4. The children are contributing to the country and community. (n = 35)
5. The EU/the country they live in has become their home. (n = 29)
6. Their country of birth is foreign to them by now and reintegration would be difficult. (n = 28)
7. Deportation would be unfair and possibly traumatic. (n = 21)
8. Now as adults, the children should be rewarded citizenship in the EU. (n = 21)
9. There is potential danger in their country of birth, it could be harmful for them. (n = 17)
10. Sending them back would be detrimental to them and risky. (n = 12)
11. European countries need immigrants (i.e., ageing populations and the need to finance pensions). (n = 12)
12. The EU is all they know by now. (n = 9)
13. Punishing the children would be unfair. (n = 8)
14. Deporting them would endanger the children's future prospects and is not in their best interest. (n = 8)
15. Children are innocent and are in need of protection and care. (n = 7)
16. Deportation would be costly. (n = 6)
17. They are enriching the culture, economy, and community. (n = 4)
18. Allowing them to stay would be practical. (n = 4)
19. They likely have no support system in their country of birth. (n = 3)

Themes Favourable to Sending the Children Back

1. People should be sent back to their countries. (n = 15)
2. Illegal immigrants are expensive and overburden the system. (n = 12)
3. Laws must be upheld. (n = 5)
4. If they're not deported, more immigrants will come. (n = 5)
5. There needs to be a bigger focus on keeping new immigrants out. (n = 4)

Themes Taking a Conditional Position

1. If they have lived in the EU for many years, they should be allowed to stay. (n = 9)
2. Only law-abiding immigrants that are integrated should be allowed to stay. (n = 6)
3. If they are not eligible for asylum and are not contributing, they should be sent back. (n = 4)

Themes Taking a Neutral Position

1. It is a difficult and complex topic. (n = 4)
 2. This issue should be evaluated on a case-by-case basis. (n = 3)
-

Most participants supported the idea that individuals who were brought to the EU as children should be allowed to stay rather than being deported. Specifically, participants emphasized that children in these situations had no control or decision-making power in their immigration status (n = 56), and they have often become integrated into society by now, making them familiar with the language, culture, and educational systems (n = 50). Many highlighted that children are contributing to the country and community (n = 35), and that the EU or the European country they live in has become their home (n = 29). Participants also highlighted that reintegrating into their country of birth would be difficult as it is now foreign to them (n = 28), and that deportation could be unfair, traumatic, and even detrimental to their well-being and safety (n = 21). Additionally, some argued that these (former) children should not only be allowed to stay but also be rewarded citizenship as they are now adults (n = 21), while others emphasized potential danger in the children's countries of origin, which could be harmful (n = 17). Other themes suggested that deporting them would endanger their prospects and is not in their best interest (n = 8), while some simply stated that children are innocent and in need of protection and care (n = 7). A few highlighted that deportation would be costly (n = 6), that these individuals are enriching the culture, economy, and community of the country they live in (n = 4), that allowing them to stay would be the practical thing to do (n = 4), and that they likely lack a support system in their country of birth (n = 3).

In contrast, some participants argued in favor of sending these individuals back, emphasizing that people should be returned to their countries if they are undocumented or illegal immigrants (n = 15). Themes also included concerns that illegal immigrants are costly and overburden social and economic systems (n = 12), and that laws must be upheld to maintain order (n = 5). A few participants believed that allowing these children to stay would set a precedent, potentially leading to increased immigration (n = 5), and suggested that focusing on preventing new immigrants from entering would be a more effective approach (n = 4).

A smaller group of participants expressed conditional support, indicating that children who have lived in the EU for many years should be allowed to stay (n = 9) and that only those who are law-abiding and well-integrated should remain (n = 6). Some felt that individuals who are not eligible for asylum and are not contributing to society should be sent back (n = 4).

There were also neutral or mixed positions. A few participants acknowledged the complexity of the issue, labelling it a difficult and controversial topic (n = 4), while others suggested that cases should be evaluated on an individual, case-by-case basis (n = 3).

Overall, most participants supported the notion of allowing individuals brought to the EU as children to remain, viewing them as integrated, contributing members of society who had no choice in their initial immigration. Those in favor of deportation focused on legal and economic concerns, while few participants took a conditional or neutral stance.

Vaccination Topic

Table 6. Themes Found in Participants' Responses to the Essay Question on the Vaccination Topic

Table 6 presents the themes that emerged from participants' essays in response to the question of whether the EU should encourage parents to vaccinate their children

Themes Favorable to Vaccinating Children

1. The Impact of Declining Vaccination Rates on Childhood Disease Resurgence ($n = 12$)
2. The Dual Protection of Vaccination: Personal and Herd Immunity ($n = 14$)
3. Vaccine Effectiveness ($n = 22$)
4. Vaccine Safety ($n = 24$)
5. Vaccines Protect Against Diseases ($n = 30$)
6. Vaccines Eradicate Diseases ($n = 22$)
7. Long-Standing Use of Some Vaccines ($n = 12$)
8. Increased Life Expectancy due to Vaccines ($n = 3$)
9. Debunking Myths: The Lack of Scientific Evidence Linking Vaccines to Learning Disabilities ($n = 59$)
10. The Reduction of Mortality Rates Due to Vaccination ($n = 9$)
11. The Impact of Declining Vaccination Rates on Childhood Disease Resurgence ($n = 12$)
12. The Greater Severity of Diseases Compared to the Risks of Vaccines ($n = 11$)
13. The Positive Benefit/Risk Ratio of Vaccines ($n = 21$)
14. Serious Health Risks of Contracting Diseases Without Vaccination ($n = 31$)
15. Strain on the Health System Posed by not Vaccinating ($n = 2$)
16. Mass Vaccination and the Absence of Learning Disabilities ($n = 3$)
17. Vaccination as a Public Health Protection Measure ($n = 11$)
18. A Data-Driven Approach to Promoting Vaccination Uptake and Supporting Informed Decision-Making ($n = 8$)
19. Other Factors Contributing to Learning Disabilities, Not Vaccines ($n = 5$)
20. Trust in Expert Authority in Shaping Health Decisions and Navigating Unqualified Opposition ($n = 15$)
21. Long-Standing Use of Some Vaccines and Absence of Link to Learning Disabilities ($n = 6$)
22. Parental Sense of Duty to Protect Their Children ($n = 3$)
23. Online Misinformation as a Misleading Deterrent to Vaccination ($n = 5$)
24. Positive Health Outcomes after Vaccination ($n = 6$)

Themes Unfavorable to Vaccinating Children

1. Unknown Long-Term Side Effects of Vaccines ($n = 1$)
2. Possible Serious Side Effects of Vaccines ($n = 2$)
3. Concerns Over the Potential Link Between Vaccines and the Rising Prevalence of Learning Disabilities ($n = 1$)
4. The Erosion of Trust in Medical and Scientific Authorities Due to Financial Motives, Lack of Transparency, Past Dishonesty, and the Decline of Institutional Authority. ($n = 1$)

Themes Reflecting a Neutral Stance to Vaccinating Children

1. The Right to Choose Vaccination ($n = 4$)
2. Encouraging Empowered Decision-Making ($n = 3$)

Many participants expressed strong support for child vaccination, with 234 participants contributing to themes that emphasize the importance and benefits of vaccines. Key themes included the

effectiveness and safety of vaccines ($n = 46$), with many highlighting the robust evidence supporting their positive impact. Participants also stressed the role of vaccines in protecting against diseases ($n = 30$) and eradicating diseases ($n = 22$), emphasizing the public health benefits of immunization. The positive benefit/risk ratio of vaccines ($n = 21$) was noted, with most agreeing that the health benefits far outweigh the risks. A sizable portion of participants ($n = 59$) focused on debunking myths, specifically the lack of scientific evidence linking vaccines to learning disabilities or other negative health outcomes. Additionally, many participants highlighted the broader public health protection provided by vaccination ($n = 11$) and noted the serious health risks of contracting preventable diseases ($n = 31$). Trust in expert authority ($n = 15$) was regarded as crucial in supporting vaccination decisions. Notably, misinformation ($n = 5$) was recognized as a major barrier to vaccine uptake; this acknowledgment indirectly supports the promotion of vaccination, as addressing misinformation aligns with efforts to increase vaccine acceptance and public trust in vaccines.

A handful of participants ($n = 4$) expressed concerns about vaccinating children. Their concerns were primarily focused on the possible side effects of vaccines ($n = 2$), including unknown long-term risks, and a fear of a link between vaccines and learning disabilities ($n = 1$). Additionally, one participant raised concerns about the erosion of trust in medical and scientific authorities, citing past dishonesty and perceived financial motivations.

A few participants ($n = 7$) adopted a neutral stance on vaccination, emphasizing personal choice ($n = 4$) and the importance of empowered decision-making ($n = 3$), suggesting that individuals should be well-informed and have the freedom to make their own decisions regarding vaccination.

Overall, the findings suggest a strong consensus in favour of vaccinating children, with only a minor contingent of participants expressing concerns or advocating for more autonomy in the decision-making process.

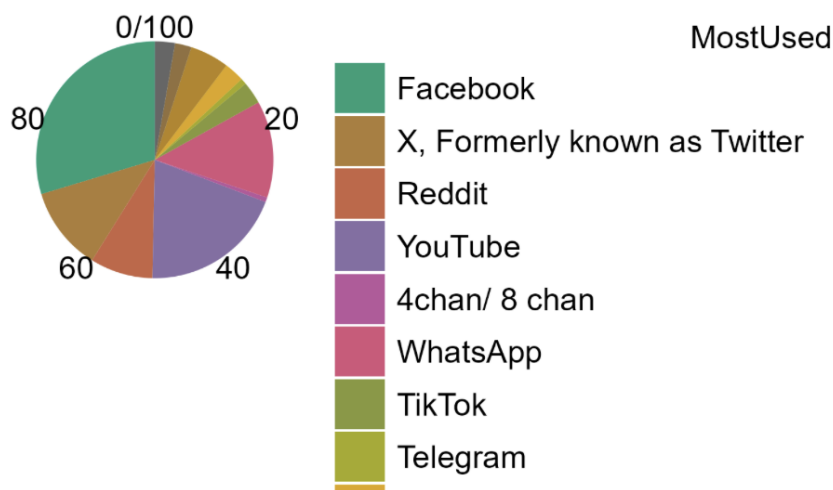
Social Media Use

Most used website or social media platform

The results indicate that 28.98% of the participants mostly use Facebook. Followed by YouTube, which was mostly used by the 19.05% of the participants and WhatsApp, which was mostly used by the 12.91% of the participants. Least used was Telegram, with 0.79% of the participants using it and 4chan/ 8chan, which was used by the 0.63% of the participants.

Figure 14. Most Used Social Media Platforms

MostUsed



Time spent in a typical day using a website or social media

Participants were asked to indicate how much time in a typical day they use websites or social media. Results indicated that most participants spent less than 1 hour per day (45.67%) on a media platform. Fewer participants spend 1 to 2 hours a day (35.59%). Participants who spend 2 to 3 hours were 7.72% of the sample and participants who spend more than 4 hours were 4.88% of the sample followed by the participants who did not spend any time on online media 3.94%.

Table 7. Frequencies for Time Spend on Social Media Platform/Website

Time Spend	Frequency	Percent
Not at all	25	3.94
Less than 1 hour	290	45.67
1 – 2 hours	226	35.59
2 – 3 hours	49	7.72
More than 4 hours	31	4.88
Total	621	97.80
Missing	14	2.21
Overall Total	635	100.000

Primary Sources for learning the news and current affairs

The most used primary source for learning the news and current affairs was the Newspaper on a paper (18.27% of the participants) and the least used primary source was National TV (4.57% of the participants).

Trustworthiness of information shared on social media

Participants rated how trustworthy they considered information shared on several social media platforms. Facebook was considered as not trustworthy at all by 43.31% of the sample and as very trustworthy by the 0.95% of the sample. Similar pattern was found for X, formerly known as Twitter, for which 30.87% of the sample evaluated it as not trustworthy at all, compared to 0.63% of the sample who rated this platform as very trustworthy. 21.73% of the participants rated Reddit as not trustworthy at all and 2.05% of the participants rated it as very trustworthy. YouTube was considered as not trustworthy at all by the 20.32% of the participants, where the 3.15% of the participants rated it as very trustworthy. Like the patterns of Facebook and X, 4chan/8chan, TikTok, Telegram, Tumblr, and Twitch were rated by many of the participants as not trustworthy at all. WhatsApp was evaluated by the 27.78% of the participants as not trustworthy at all and only by the 1.57% as very trustworthy. Google news was rated as not trustworthy at all by the 6.93% of the participants and very trustworthy by the 7.24% of the participants.

Ways of participating on online media in an average week

The majority of the participants (28% - 83.78%) indicated low engagement on online media, specifically regarding the following active methods of participation: rate or like a favourite news story (61% no or rarely engage), comment on a news story in a social network (e.g. Facebook) or a news website (78% no or rarely engage), write a blog on a news or political issue (95% no or rarely engage), write an online poll or take part in an online campaign via a news site or social network (82% no or rarely engage), sharing a news story via a messenger application (e.g., WhatsApp, Messenger, Telegram, Viber) or sharing a news story via social network (e.g., Facebook, X former Twitter) (68% no or rarely engage). Less than 3.15% of the participants indicated that they were always engaged in the following methods of participation: rate or like a favourite news story, comment on a news story in a social network (e.g. Facebook) or a news website or write a blog on a news or political issue or write an online poll or take part in an online campaign via a news site or social network on average week. The results indicated that 29.13% of the sample did not share any news story via a messenger application (e.g., WhatsApp, Messenger, Telegram, Viber) or share a news story via a social network on average week (e.g., Facebook, X former Twitter); this was compared to 1.58% of the sample who were always engaged in this way of participation. Rating or liking of a favorite news story was the most common way of participation as endorsed by 3.15% of the participants.

Methods of fact-checking online content

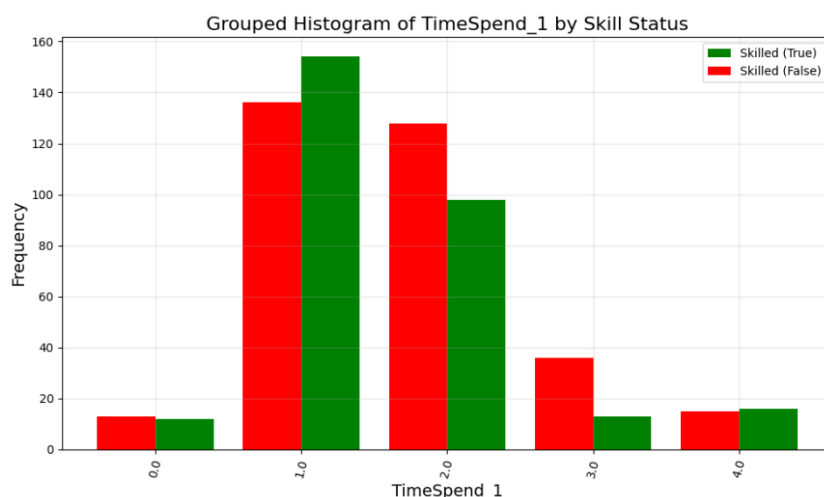
Participants were asked to rate various methods of fact-checking the trustworthiness of online content about news and current affairs on a scale of not at all to every time. Methods included checking other digital sources, checking the source, the style, asking friends and family, checking comments below the post and checking subscribers. The most common method (with 52% of the sample indicating that they engage in it every time or very often) was checking other digital sources, while the second most popular method was checking the source of the information (with 50% of the sample indicating that they engage in it every time or very often). The third most popular method strongly endorsed by 49% of the sample was checking the style, images and spelling of the language used on the online post. The least used method, with only 7% of the sample strongly endorsing it, was asking friends and family or colleagues to verify the content of the online post.

Effect of demographic variables on ability to discern misinformation on online posts

Time spent on social media

The results indicated that time spent on social media significantly influenced the ability to discern between accurate and inaccurate posts (Chi-square: 14.40, $p=.007$). Individuals who spend less time on social media are better at discerning misinformation than individuals who spend more time on social media.

Figure 15. Time Spent on Social Media per day and Ability to Discern Accurate/Inaccurate Posts



Gender, education, employment, income

Gender did not appear to be an influential factor in individuals' ability to discern between accurate and inaccurate content (chi-square: 3.52, $p=.32$) and nor did education (chi-square: 6.14, $p=.52$), employment (chi-square: 5.77, $p=.52$), or income (chi-square: 1.08, $p=.58$).

Political orientation

Political orientation emerged as a significant factor in affecting one's ability to discern between accurate and inaccurate content in an ANOVA test considering a 10-scale political orientation grouping ($F(10, 610) = 7.06$; $p=.00$). As the graph illustrates, more leftist political orientation indicated higher ability to discern misinformation. When looking at this analysis per topic, the difference across political orientation categories is strongly significant for the immigration topic ($F(10, 196) = 4.20$; $p=.00$), just reaching significance on the climate change topic ($F(10, 195) = 1.86$; $p=.05$), and not significant for the vaccination topic ($F(10, 197) = 1.43$; $p=.16$).

Figure 16. Political Orientation and Ability to Discern Accurate/Inaccurate Posts

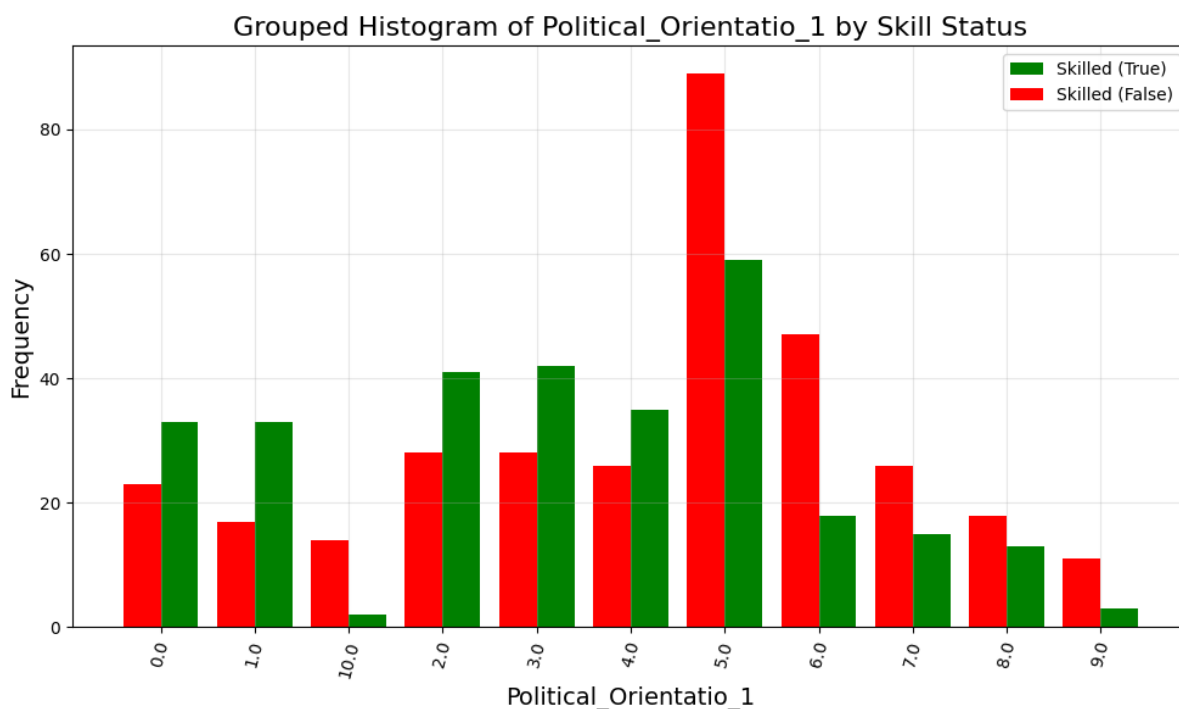
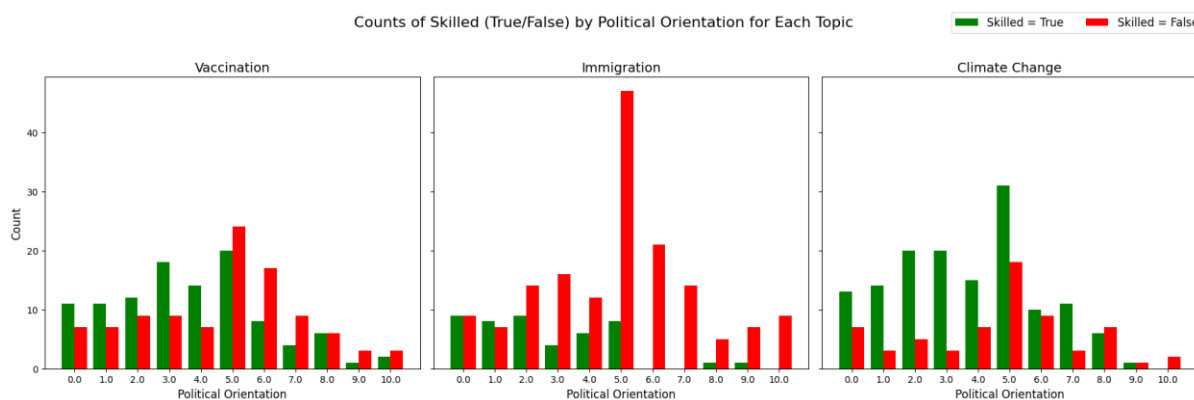


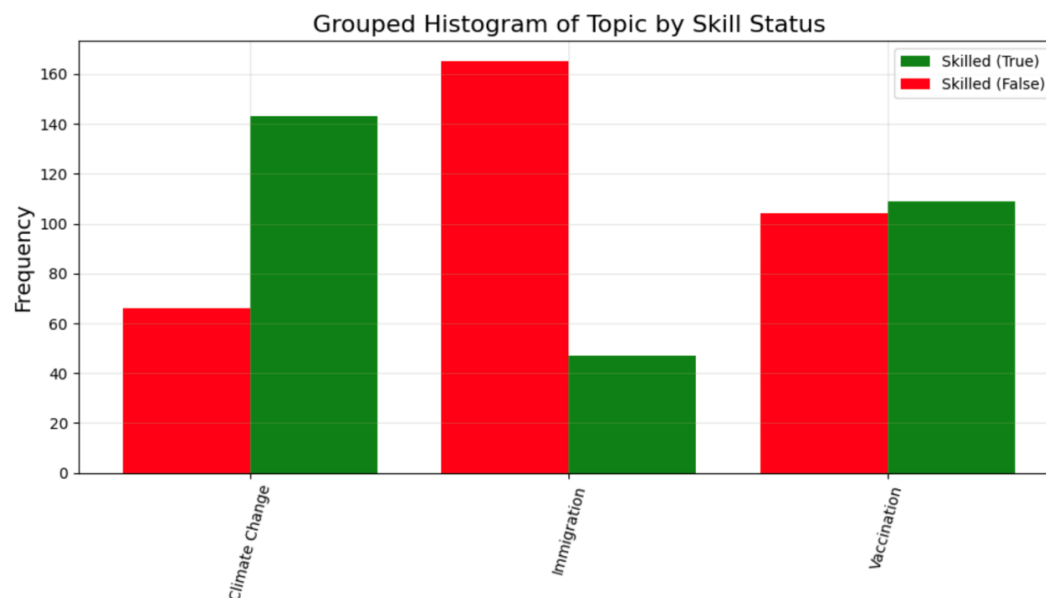
Figure 17. Political Orientation and Ability to Discern Accurate/Inaccurate Posts per Topic



Topic

The graph presents the topic that the participants were randomly assigned to affect their response, $F(2, 631) = 49.00, p < .001$. The topic of immigration had the most incorrect responses and the least correct responses. Climate change had significant difference between correct and incorrect responses, with more correct responses. The difference between correct and incorrect responses was minor in vaccination.

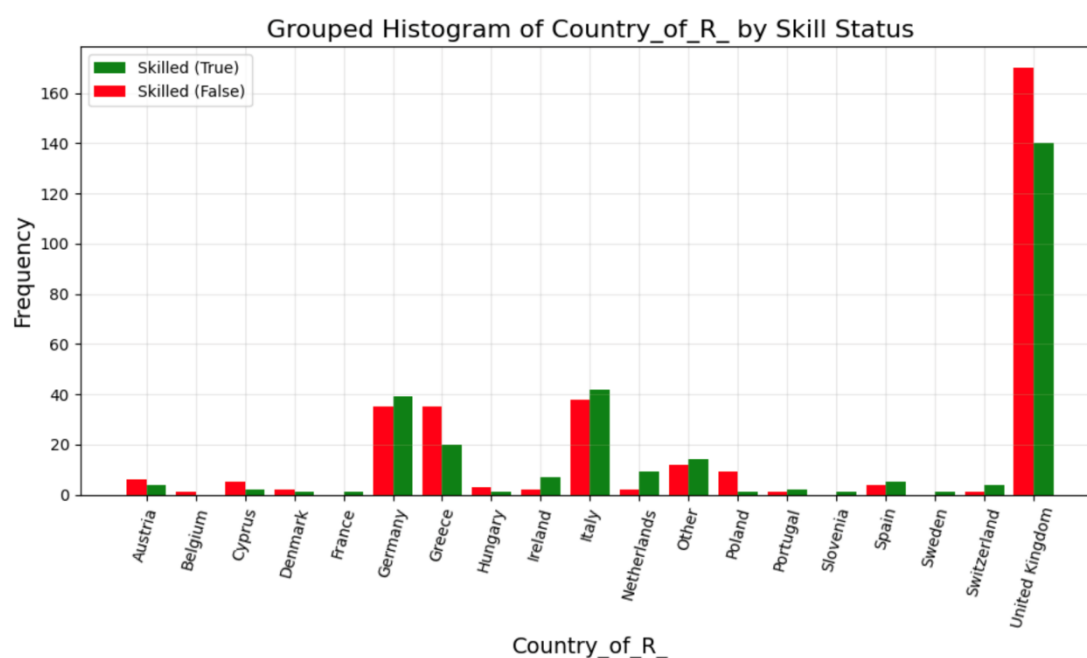
Figure 18. Topic and Ability to Discern Accurate/Inaccurate Posts



Country of Residence

The results indicate that country of residence is an important variable that can shape the response of the participants to the topic they received, $F(18, 601) = 2.07, p < .001$. A higher number of participants from the United Kingdom had more incorrect responses than correct ones. Similar patterns had Austria, Cyprus, Greece, and Poland. Individuals from Germany, Ireland, Italy, and the Netherlands had more correct responses than incorrect.

Figure 19. Country of Residence and Ability to Discern Accurate/Inaccurate Posts



Factors predicting conspiratorial thinking and ability to discern misinformation

Reasoning, Evaluation, Referencing

Ability to Discern Between Factual and Inaccurate Headlines

Multiple regression analysis examined the effect of scores on the multivariate reasoning task, the topics, and whether participants referred to both positions in their essays on their ability to discern between factual and inaccurate headlines. The model was significant, and the predictors explained 15% of variance ($R^2 = .155$, $F(4, 622) = 28.47$, $p < .001$). All predictors except for scores of the multivariate reasoning task ($\beta = .05$, $p = .362$) were significant. Referencing both positions ($\beta = 28.29$, $p < .001$), not referencing to both positions ($\beta = 24.71$, $p < .001$), and all three topics (vaccination; $\beta = 24.13$, $p < .001$, immigration; $\beta = 11.18$, $p < .001$, climate change; $\beta = 17.69$, $p < .001$) positively predicted ability to discern between factual and inaccurate headlines.

Multiple regression analysis examined if participants' reasoning, epistemic beliefs - reliance on emotions, reliance on evidence - and referencing both positions predict the ability to discern between factual and inaccurate headlines. The model was significant, explaining 14% of variance ($R^2 = .139$, $F(4, 622) = 25.14$, $p < .001$). Reliance on emotional assessments negatively predicted the ability to discern between factual and inaccurate headlines ($\beta = -0.45$, $p < .001$). Reliance on evidence ($\beta = .053$, $p < .001$), referencing both positions ($\beta = 29.85$, $p < .001$) and not referencing both positions ($\beta = 27.23$, $p < .001$) positively predicted the ability.

Conspiratorial Thinking

Another model examined the impact of scores on the multivariate reasoning task and whether participants referred to both positions on participants' level of conspiratorial thinking. The model was significant, explaining 2% of variance ($R^2 = .016$, $F(4, 625) = 5.10$, $p = .006$). Reference to both positions ($\beta = 8.89$, $p < .001$) and no reference to both positions ($\beta = 12.21$, $p < .001$) were significant predictors. Scores on the multivariate reasoning task were not a significant predictor ($\beta = 0.19$, $p = .709$).

Examining whether the reliance on emotions, reliance on evidence, and referencing both positions predict the level of conspiratorial thinking, multiple regression analysis found that the model was significant, explaining 22% of variance ($R^2 = .219$, $F(4, 623) = 58.12$, $p < .001$). Relying on emotions for evaluations positively predicted conspiratorial thinking ($\beta = 0.52$, $p < .001$), while relying on evidence negatively predicted conspiratorial thinking ($\beta = -0.61$, $p < .001$). Referencing both positions ($\beta = 13.08$, $p < .001$) and not referencing both positions ($\beta = 15.92$, $p < .001$) also positively predicted conspiratorial thinking.

Values

A multiple regression analysis was conducted to examine the relationship between values (self-transcendence, conservation, self enhancement, and openness) and **level of conspiratorial thinking**. The model was significant with the variables predicting 11% of variance in participants' level of conspiratorial thinking ($R^2 = .111$, $F(4, 616) = 19.28$, $p < .001$). Among the predictors, conservation had a significant positive association with level of conspiratorial thinking ($\beta = 0.76$, $p < .001$), and self-transcendence had a significant negative association ($\beta = -0.60$, $p = .048$).

A second model examined the relationship between the previous values and the **ability to discern between factual and inaccurate headlines**. The model was significant and showed that the variables predicted 14% of variance in participant's ability to discern between factual and inaccurate headlines ($R^2 = .143$, $F(4, 616) = 25.65$, $p < .001$). Conservation and self-transcendence were

significant predictors, with self-transcendence positively associated with the ability ($\beta = 1.29, p < .001$) and conservation negatively ($\beta = -0.89, p < .001$).

Impact of Topics

Multiple regression analysis was used to also examine the topic specific effects of the two significant variables (self-transcendence and conservation).

Multiple regression analysis was used to test if self-transcendence and conservation significantly predicted participants' level of conspiratorial thinking on the topic of **immigration**. The model was significant, with the two predictors explaining 16,5% of variance ($R^2 = .165, F(2, 204) = 20.08, p = .004$). Both predictors were significant. Self-transcendence had a negative association ($\beta = -0.77, p = .008$) and conservation a positive association ($\beta = 0.87, p < .001$).

The model for **vaccination** was also significant although weak, with the predictors explaining 5% of variance ($R^2 = .052, F(2, 205) = 5.62, p = .001$). Only conservation was a significant predictor ($\beta = 0.60, p = .001$).

The model predicting conspiratorial thinking based on self-transcendence and conservation within the **climate change** topic was also significant. It explained 14% of variance ($R^2 = .138, F(2, 203) = 16.27, p < .001$). Only conservation was a significant predictor ($\beta = 0.88, p < .001$).

Narcissism and Collective Narcissism

A simple linear regression was applied to examine the predictive relationship between narcissism and conspiratorial thinking. Narcissism was significant ($F(31, 622) = 1.47, p = .05$) although only predicting 7% of the variances of conspiratorial thinking. On the other hand, collective narcissism (i.e., belief in the specialness of one's group) was also a significant predictor of conspiratorial thinking ($F(24, 622) = 5.53, p < .001$) but with a much more influential effect of 18% of variance explained.

Multiple regression analysis examined whether type of reliance of evaluation, the value conservation, referencing both positions, and narcissism predicted conspiratorial thinking. The model was significant, explaining 27% of variance ($R^2 = .274, F(5, 608) = 45.79, p < .001$). Relying on emotions for evaluation ($\beta = 0.26, p = .001$), conservation ($\beta = 0.53, p < .001$), referencing both positions ($\beta = 14.07, p < .001$), and not referencing both positions ($\beta = 14.90, p < .001$) positively predicted levels of conspiratorial thinking. Relying on evidence for evaluation ($\beta = -0.73, p < .001$) negatively predicted conspiratorial thinking. Narcissism did not significantly contribute to this model ($\beta = 0.15, p = .067$).

Discussion

The SMIDGE survey was successful in revealing several important factors that influence the ability of middle-aged individuals to discern accurate information on social media, factors predicting their propensity for conspiratorial thinking as well as general information and demographics about this group's use of and behaviour on social media and other online sources.

Political Orientation

The results indicated that political orientation is a significant factor that can influence the response of the participants to the topic they received. Participants with left– wing ideologies had more correct responses compared to the individuals with right – wing ideologies, specifically in the topics of immigration and climate change, suggesting that individuals with left – wing ideologies being more skilled to respond to these topics. Several studies indicate that individuals with right – wing ideologies are more engaged in conspiratorial thinking (Krouwel et al., 2017; van der Linden et al., 2020). This result is consistent with previous studies, which indicated individuals with right – wing ideologies are more prone to endorse conspiracy thinking (Patternson, 2019).

Ethnicity

Aligned to previous studies, country of residence shaped the response of the participants to the topic they received. In this study, Northern European countries (Sweden, Ireland) had more correct than incorrect responses (Jabkowski et al., 2023), although, Denmark, had lower scores on correct results. In contrast to the study of Walter and Drochon (2020), which supported that UK had low levels of conspiratorial thinking, in this study UK had more incorrect responses, which suggest proneness to conspiratorial thinking. Countries from Central and Eastern Europe had more incorrect results than correct results, which aligns with previous research (Jabkowski et al., 2023). Italy and Germany had elevated correct results, which aligns with the study of Walter and Drochon (2020), suggesting low endorsement in conspiracy thinking. Similar patterns have the individuals from Austria, Cyprus, Greece and Poland. Individuals from Germany, Ireland, Italy and the Netherlands had more correct responses than incorrect. The findings suggest the importance of understanding the different conceptualization of each country, while considering countries have diverse backgrounds which may affect their understanding on vaccine, climate change and immigration.

Criteria of evaluation of the trustworthiness of videos

The survey's findings on video evaluations align with those in the relevant literature, particularly in terms of the dominant use of the content evaluation criterion and the underuse of active verification strategies. Our results are in line with Braten et al. (2015) who found content evaluation to be the primary criterion university students used to evaluate multiple documents containing conflicting information about health risks from cell-phone electromagnetic radiation. Our results are also in concordance with those of Abed and Barzilai (2023), where 80.6% of students relied on the content evaluation criterion when evaluating climate change videos, scrutinizing both the verbal and visual content of the videos. This trend was also observed in our survey study, where the content evaluation criterion emerged as the dominant one used across all three topics. This finding suggests that individuals, regardless of the topic of a given video, tend to prioritize the actual substance of videos when evaluating their trustworthiness, focusing on the accuracy, relevance, and quality of the information provided. Meanwhile, in both our survey and Abed and Barzilai's (2023) study, the use of active verification strategies was low, particularly corroboration. This finding is particularly

notable in our study, which focused on middle-aged adults. Our results suggest that the participants did not acknowledge the value of cross-referencing information from other sources when evaluating a video's trustworthiness, pointing to a potential gap in the skills needed to effectively assess online information, including critical media literacy skills. A novel element of our study is that it explored topic-related differences in how videos are evaluated by examining videos on three distinct topics. This comparative approach revealed that the nature of the content influenced the evaluation criteria employed by the respondents. More precisely, the videos on vaccination elicited greater attention to actor evaluation and evidence credibility, while the immigration videos prompted more intuition-based evaluation. These results underscore how different types of content can shape the evaluation process, offering insights not observed in the study by Abed and Barzilai (2023), which focused solely on climate change videos.

Reasoning Skills

Our findings show that reasoning, particularly argumentative reasoning which refers to the ability to construct and evaluate arguments (Iordanou et al., 2016), is related with conspiratorial thinking and fake news discernment. Particularly, individuals who can construct two-sided arguments tend to be more adept at discerning "fake news" online. Our finding that argumentative reasoning ability relates to "fake news" discernment complements existing research on the role of reasoning in identifying misinformation (Lewandowsky et al., 2017; Pennycook & Rand, 2018). Analytical thinking - defined as engagement in deliberative reasoning processes rather than relying on intuitive gut responses - has been shown to be an important factor in discerning "fake" from "accurate" news (Pennycook & Rand, 2019). In their large-scale studies with over 3,400 participants, Pennycook and Rand found that individuals who scored higher on the Cognitive Reflection Test (a measure of analytical thinking) were consistently better at distinguishing between "fake" and "accurate" news headlines, regardless of whether the content aligned with their political attitude. In the present work examining argumentative reasoning, we asked individuals to generate arguments addressing a controversial issue and found that participants who were able to take multiple perspectives in their responses were also better at discerning "fake" from "real" posts on this topic. Argumentative reasoning encompasses the ability to construct evidence-based arguments while taking multiple considerations into account (Iordanou & Rapanta, 2021). Since argumentative reasoning is closely related to critical thinking (Kuhn, 2019), we expected it to be related to both conspiratorial thinking and the ability to discern misinformation online. The fact that both argumentative reasoning ability and analytical thinking skills are associated with better misinformation discernment suggests that critical thinking capabilities broadly play an important role in how people evaluate online information.

Values

The findings from the current study revealed that values play an important role in the ability to discern between factual and inaccurate information. Conservation values were positively associated with discernment and self-transcendence values showed a more nuanced relationship. Conservation values were consistently linked to improved discernment ability, suggesting that individuals prioritizing these values critically evaluate information to maintain stability and avoid risks. Conversely, self-transcendence values were negatively related to discernment in some contexts. These findings build on existing theories suggesting that values filter engagement with information. Jost et al. (2018) and Marietta and Barker (2019) propose that values, more so than political identity,

shape the types of information individuals select and pay attention to in their environments, including social media. While the current study did not rank its significant factors, such as values and political orientation, the findings empirically support the notion that values play a critical role in the detection and engagement with inaccurate information. Schwartz's (1992, 2012) framework defines values as the criteria people use to select and justify actions and evaluate people and events, emphasizing how different value dimensions (e.g., universalism, tradition, security) influence perceptions and actions. In line with these theories, our findings suggest that conservation values, specifically, may protect individuals from misinformation by fostering a more cautious and critical approach to information processing. On the other hand, self-transcendence values might introduce vulnerabilities regarding the ability to discern between factual and inaccurate information. Farrell et al. (2019) found that 'closed' values rendered individuals more susceptible to misinformation, though they called for further exploration of how values interact with prior knowledge. The findings of the current SMIDGE study reveal that values play a significant role in the context of misinformation discernment and conspiratorial thinking.

Education

The current study found no significant impact of participants' education on their ability to discern between factual and inaccurate headlines, adding to the mixed findings in the literature. Previous research has often highlighted a negative relationship between education and susceptibility to misinformation or conspiracy theories (Hwang & Jeong, 2022; Imhoff et al., 2022; Prooijen, 2017). For example, Hwang and Jeong (2022) found that individuals with lower education were more likely to accept misinformation, mediated by factors such as issue knowledge, information processing styles, and reliance on social media. Similarly, Imhoff et al. (2022) demonstrated a negative relationship between education and conspiracy mentality across 26 countries, suggesting that education serves as a protective factor against such beliefs. However, the current findings of a non-existing relationship align with those of Enders et al. (2021) and Sebalo et al. (2023). These studies emphasize the importance of other factors, such as cognitive predispositions, reasoning skills, and information processing styles. Sebalo et al. (2023), for instance, highlighted the role of intuitive (System 1) versus analytical (System 2) thinking, finding that reasoning style was more predictive of conspiracy endorsement than education level. The reasons for the discrepancy in findings across research might be linked to other variables that influence levels of education. Prooijen (2017) and Ballová Mikušková (2022) identified mediators such as cognitive complexity, feelings of control, and scientific reasoning that underpin the relationship between education and discernment. In the absence of these mediators, the direct effect of education might not manifest consistently. Additionally, differences in sample characteristics, cultural contexts, or the type of misinformation presented may influence the observed relationships.

Personality

The results indicated a weak association of narcissism with conspiratorial thinking contrary to previous studies (Cosgrove & Murphy, 2023), which suggests that this personality trait may affect this age group differently. We expected this link given an established relationship between

narcissism and critical thinking skills such as cognitive reflection (Littrell et al., 2020; Grundmann et al., 2022). Interestingly and consistent with our expectations and the literature (e.g. Zavala, 2020), collective narcissism (one's belief on the uniqueness of their ethnic group) had a more pronounced effect on conspiratorial thinking in our findings. Similarly, a study by Zavala and Federico (2018) looking at US politics also found that collective narcissism increased participants tendency to view political events in terms of group-based conspiracies. The present findings highlight how the impact of in-group alliance can affect propensity for endorsing conspiracist ideation in the middle-aged group.

Social media Usage

The present study found that increased time spent on social media was associated with a reduced ability to discern between factual and inaccurate information. This finding aligns with prior research indicating a strong association between social media use and endorsement of misinformation and conspiracy theories (Hall Jamieson & Albarracín, 2020; Lazer et al., 2018; Schwartz, 2012). While the relationship between social media use and misinformation engagement is correlational, studies have consistently shown that frequent reliance on social media for news is linked to higher endorsement of conspiratorial beliefs, potentially moderated by individual factors such as cognitive style or trust in social media (Enders et al., 2021; Enders et al., 2023; Xiao et al., 2021). The virality and unchecked spread of information in social media echo chambers may amplify this effect (Bessi et al., 2015; Del Vicario et al., 2016). Within these environments, misinformation thrives, creating networks where content aligns with prior beliefs, reinforcing biases. The current study highlights the negative role of increased social media usage on discernment ability, emphasizing the need to explore how the structure and dynamics of social media platforms interact with individual cognitive and social factors to shape misinformation engagement.

Epistemic beliefs

The survey results indicated that advanced epistemic beliefs predicted a greater ability to discern posts containing false information. Echoing our results, studies by Adam-Troian et al. (2019), O'Connor and Weatherall (2020), and Pennycook and Rand (2020) all highlight the importance of reflection—the ability to critically evaluate the sources, quality, and complexity of information—in fostering better judgment in identifying misinformation. Adam-Troian et al.'s (2019) finding that epistemic rationality moderates the relationship between cognitive abilities and conspiratorial beliefs suggests that individuals with higher epistemic rationality are better equipped to resist false beliefs and critically assess the validity of information. This aligns with our own findings, indicating that individuals with more advanced epistemic beliefs are more adept at recognizing and rejecting misinformation. Taken together, these studies underscore the importance of developing epistemic reflection as a key tool for enhancing critical thinking and combating misinformation. The ability to apply rigorous standards of evidence, evaluate sources, and question the validity of claims is essential in navigating today's complex information landscape, where false narratives can spread rapidly.

Conclusion and Implications for the project SMIDGE

This online survey offers insights into factors that are related to the individuals' ability to think critically and discern misinformation or conspiratorial content online, with a focus on middle-aged adults. The survey aimed to investigate how demographic factors (gender, ethnicity), individual characteristics (political orientation, educational background), social characteristics (values),

cognitive traits (argumentation skills, epistemic thinking), personality attributes and online media use are related to these outcomes.

Our findings show that demographic factors such as gender did not appear to be influential, but ethnicity differences emerged, with individuals from certain Central/Eastern European countries (Austria, Cyprus, Greece and Poland) as well as the UK demonstrating poorer discernment compared to those from Western European countries (Germany, Ireland, Italy and the Netherlands). Political orientation as noted on a right-left placement scale was a significant factor, as those with left-wing orientations exhibited stronger skills in evaluating the veracity of information compared to those with right-wing views, especially on immigration and climate change topics. The educational background did not have a significant impact.

In terms of social characteristics, conservation values were positively associated with discernment ability, while self-transcendence values showed negative relationships. Personality attributes such as narcissism, particularly collective narcissism, revealed modest connections to conspiratorial thinking. Cognitive traits like sophisticated epistemic thinking and strong argumentation skills were linked to superior discernment of misinformation. Lastly, increased social media use was found to be related to a lower capacity to distinguish accurate from inaccurate content online.

Our findings provide insights for the development of the SMIDGE videos in WP6. In particular, our findings show that middle-aged individuals' values, political beliefs, epistemic beliefs, and reasoning skills matter in their conspiratorial thinking and ability to discern fake news online and should be taken into consideration. Additionally, our findings revealed that conspiratorial thinking and fake news discernment are topic-specific, with the controversial social topic of immigration showing to be the most challenging for discerning fake posts. This finding highlights the need for efforts targeting conspiratorial thinking to be topic specific. Our qualitative analysis, providing a detailed analysis of the reasons participants provided to support their views on the topics we examined – immigration, climate change, and vaccination – can be particularly helpful for developing topic-specific counter-narratives serving as debunking and prebunking interventions.

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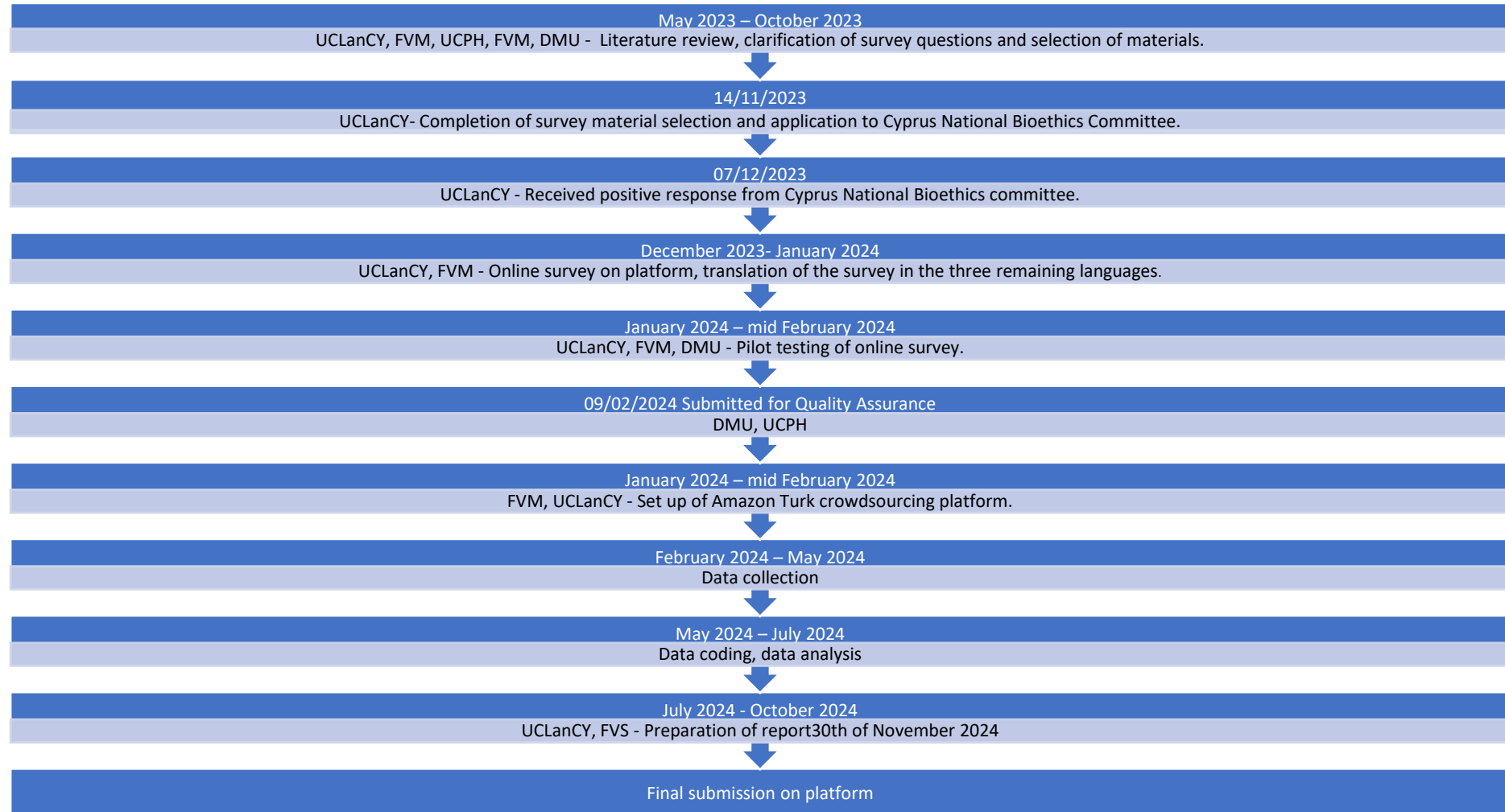
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Figure 20. Timeline of SMIDGE Survey



Revision Notes

Glossary of Terms

Table 8: Glossary of Terms

Term	Explanation
Term	Explanation
Misinformation	the propagation of inaccurate information, may also carry, or promote content of a conspiratorial or harmful nature -though not always
Conspiratorial content	alludes to a context whereupon a 'secret' or 'powerful' authority or group is manipulating situations or plotting to serve its own purposes
Conspiracy theory	a belief that an event or situation is the result of a secret plan made by powerful people. A conspiracy theory is distinct from a conspiracy; it refers to a hypothesized conspiracy with specific characteristics, including but not limited to opposition to the mainstream consensus among those who are qualified to evaluate its accuracy. Conspiracy theories tend to be internally consistent and correlate with each other; they are generally designed to resist falsification either by evidence against them or a lack of evidence for them.

Extremist beliefs and ideologies	extremist political ideologies are in opposition to the fundamental values of society and the principles of democracy and universal human rights by advocating racial, political, social, economic, and religious supremacy. Extreme ideologies express disregard for others' life, liberty, and human rights (Neuman, 2010).
Truthfulness	refers to an impression formation regarding the critical assessment of the credibility of online content and ability to identify bias
Fact-checking	the process of verifying information to promote the veracity and correctness of reporting and statements.