Spring 5-2022

# Are Conspiracy Beliefs Induced by Thinking Disposition and Economic Uncertainty?

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# ARE CONSPIRACY BELIEFS INFLUENCED BY THINKING DISPOSITION AND ECONOMIC UNCERTAINTY?

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Submitted in Partial Fulfillment

of the requirements for the degree of

Bachelor of Arts

in

Psychology

Faculty of Arts and Social Science

Huron University College

London, Canada

April 30, 2022

HURON UNIVERSITY COLLEGE

FACSIMILE OF CERTIFICATE OF EXAMINATION

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entitled:

Are conspiracy beliefs induced by thinking disposition and economic uncertainty?

is accepted in partial fulfillment of the requirements for the degree of

Bachelor of Arts

in

Psychology

April 30, 2022 — Dr. Christine Tsang

Date — Chair of Department

# Abstract

Belief in conspiracy theories since 2020 resulted in widespread protests towards governments attempting to mitigate the pandemic. In times of uncertainty, it is not uncommon for conspiracy beliefs to rise in popularity. However, not everyone who finds themselves in a state of uncertainty about the future holds conspiracy beliefs. Higher analytical thinking skills and lower intuitive thinking skills have been correlated with lower acceptance of conspiracy beliefs. In an era of uncertainty, factors such as analytical thinking may provide the ability to discern conspiracy beliefs from reality. Hence, in this study, feelings of uncertainty and thinking disposition (analytical vs. intuitive) were experimentally manipulated to observe their effect on conspiracy beliefs. It was predicted that individuals in the uncertainty and intuitive thinking disposition condition would yield the highest conspiracy theory levels. No significant main effect or interaction was observed. Thus, the hypothesis was not confirmed. Implications of the study findings are discussed.

Keywords; *analytical, intuitive, uncertainty, conspiracy beliefs*

# Acknowledgment

I would like to thank Dr. Gorman for his continuous efforts and for pointing out ideas I had not considered before in my thesis. In our pursuit to finding the truth, two minds are always better than one. I would also like to thank Dr. Tsang and the rest of the psychology department at Huron for creating a welcoming environment where students enjoy learning and feel valued by their professors.

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# Are Conspiracy Beliefs Induced by Thinking Disposition and Economic Uncertainty?

The impact of the COVID-19 pandemic on our lives has seemed to propel the rising prevalence of conspiracy theories (CTs). Modern CTs may have gained the most traction in popular media with the help of the former U.S. President Donald Trump, who has been the subject of political CTs and has managed to launch his own CTs towards his many rivals (Rose, 2021; Kopan, 2018; Goodman & Carmichael, 2020; Marcus, 2020). However, CTs are not unique to the Trump era and, in fact, CTs have been ubiquitous throughout American and European political history (Hofstadter, 1964). Hofstadter describes American politics throughout history as "heated exaggeration, suspiciousness, and conspiratorial fantasy", giving it the term the paranoid style (p. 77). Feelings of uncertainty about the future and thinking disposition in the form of low analytical thinking and dominant intuitive thinking have been shown to relate to higher CT beliefs (van Prooijen & Jostmann, 2012; Swami et al., 2014). Although feelings of uncertainty and thinking disposition have been identified as two related factors for CT beliefs, no research, as of yet, has examined the causal effects of both factors together. Therefore, the goal of the present study is to examine the relationship between feelings of uncertainty, thinking dispositions, and CT beliefs.

Conspiracies may seem to be particularly widespread in recent centuries (Hofstadter, 1964); however, historical evidence indicates that conspiracies have often gained public traction in times of mass crisis and natural disasters. Historical events that lead to widespread belief in conspiracies date back to 64 AD during the fires of Rome (Brotherton, 2015). Nero, the then ruler of Rome, was away from the city during the fire that burnt most of Rome. Citizens of Rome claimed Nero organized the city's destruction because he desired to rebuild it as he envisioned. Nero defended himself against these allegations by blaming the Christians for orchestrating the

fire, further dividing Roman citizens. History repeated itself during the fires of London in 1666 and the forest fires of Turkey in 2021. In both instances, foreigners were blamed for starting the fires, and the leaders were also blamed for their inability to thwart the fires (Brotherton, 2015; Avcı & Korkmaz, 2021). Natural disasters and human tragedies are examples of external factors that can lead to greater feelings of uncertainty (Sword-Daniels et al., 2016), which has been shown to leave individuals more susceptible to conspiracy theories (van Prooijen & Jostmann, 2012).

According to the Merriam-Webster (n.d.) dictionary, the definition of a CT is "an event or set of circumstances as the result of a secret plot by usually powerful conspirators" (def. 1) or "a theory asserting that a secret of great importance is being kept from the public" (def. 2). Feelings of uncertainty seem to attract stronger beliefs in CTs, evident by historical examples, as well as stronger anxiety about the future (Maftei & Holman, 2020).

**Feelings of Uncertainty**

The meaning making literature promotes the idea that the extent to which a view is different than one's personal views can predict the extent to which they experience distress (Park, 2010). Experimental research has shown that when one's personal views are violated after being exposed to new information, participants are more likely to experience increased anxiety, place more effort to gain control over their predictions by conducting more information gathering (Plaks et al., 2005) and search through other information sources to prove their point (Heine et al., 2016). When considering CTs, if an individual's personal views favor a certain ideology, and opposes another, the individual will likely find it less distressful to blame the opposition group for any unfavorable outcomes that occur in their life.

In an experimental uncertainty study, participants were assigned to read multiple statements meant to induce or decrease uncertainty levels after contemplating on a personal event in their lives (Mosca et al., 2016). For example, the uncertainty-inducing participants were asked to read statements like, "concerning the negative event it's difficult not know what will happen" and the uncertainty-decreasing participants were asked to read statements similar, "it does not bother me to not know what will happen to me" (Mosca et al., 2016, p. 5). Higher uncertainty states were experimentally manipulated to induce greater negative affect states and greater worry levels. The results of the study show that manipulating one's cognitive appraisal schemas can influence their emotional reactions.

Changes in economic and social policies can also lead to feelings of uncertainty followed by widespread speculations about the government. In 2018, 78% of Polish citizens reported that they were worried about their safety due to the large influx of Syrian refugees arriving in their country (Kowalczuk et al., 2015). A research team conducted two follow-up studies where they assessed Pole's stance on a unique conspiracy questionnaire relevant to their socio-political environment. Their questionnaire included items such as, "the EU brings refugees to Poland to destroy Polish culture." and "The EU spreads the world about refugees' situation to divert the world's attention from the EU's real plans." (Marchlewska et al. 2018, p. 111). Additionally, participants in the experimental condition were exposed to an internet conversation which blamed the EU for possessing a hidden agenda against Poland. In the control condition participants read statements that approved EU's policies and were unrelated to conspiratorial thinking. Participants who had a higher need for cognitive closure, a scale that assesses one's desire for certainty (Webster & Kruglanski, 2014), and were exposed to the internet conversations blaming the EU were more likely to believe in the conspiracy statements generated

for the study. Therefore, consuming information that contains conspiracies can be more credible for those who cannot tolerate uncertainty.

In the second part of the study, the participant's state of uncertainty was further manipulated by presenting two real plane crash stories and another fabricated internet conversation meant to incite conspiracy ideation. Participants either read a real story where the cause of the plane accident was known (i.e., Germanwings #9525) or where it was still unknown (i.e., Malaysia Airlines #370). Again, relevant CTs about both plane accidents were generated, and participants were exposed to internet comments blaming hackers for attempting to control the planes in the given stories. Participants exposed to the unknown accident were more likely to endorse relevant CTs. Moreover, participants in the unknown cause condition were significantly more likely to endorse the CTs if they were exposed to the internet comments. Taken together, this evidence supports the notion that events that hold uncertainty for the future and where the cause is unknown is more likely to garner CTs around the matter.

**Conspiracy Theories in the 21st Century**

A real-life example regarding uncertainty and its implications for conspiracy theories is the 9/11 attack, where some CT's purport that "individuals within the US government knew of the impending attacks of 9/11 and purposely failed to act on that knowledge" (Swami et al., 2010, p. 755). It took 20 years for the US government to release previously undisclosed information about the 9/11 attack (Perez, 2021). Hence, it has been one of the most perpetuated and studied CT in popular and academic discourse (Stempel, 2007; Swami, 2010). However, after being labeled as a CT, giving the full explanation of an event may not be enough to convince an individual that the CT is, in fact, false. In an experimental study, the researchers told 290 participants a CT about a newly mandated smoke detector and its alleged harmful side

effects (Imhoff & Lamberty, 2017). During debriefing, researchers told the participants that the CT was created for the study and that it was not real. Despite this, nearly a quarter of the participants were still not convinced that the CT was formulated purely for the study but that it carried legitimate concerns.

Contemporary examples show that CT believers are often unwilling to back down from their stance, despite contradictory scientific evidence: Two such claims made by CT believers are that there is a link between the 5G towers and COVID-19, and that Bill Gates, the co-founder of Microsoft, can somehow manipulate people's genes through the COVID-19 vaccine (Bruns, 2020; Gagliardone, 2021). Even though major platforms such as Twitter, YouTube and Facebook have been banning such misinformation content that carries public risks with it (“Coronavirus”, 2021; “Managing” 2020; Rosen, 2021), CT supporters still argue that these "interventions are proof that they are in the process of uncovering deeper secrets that 'the establishment' does not want them to see." (Bruns, 2020, p. 26). However, following Imhoff & Lamberty's (2017) fortuitous findings during their debriefing, a case can be made for social media platforms' strict policies on preventing misinformation from being disseminated.

False or fake news is defined as “stories, often of a sensational nature, created to be widely shared or distributed for the purpose of generating revenue, or promoting or discrediting a public figure, or movement” (“Fake News”, n.d.). Conspiracy theories and fake news are very similar in meaning, as both terms denote a group or person intentionally attempting to influence the narrative of a current or historical event. In a recent study, when participants were asked to detect false news in short (vs. long) time intervals and rely on their intuition, their detection performance was lower than when they were given more time and asked to deliberately think over the given article (Bago et al., 2020). This is concerning as an interview based social media

study on young adults between 18 to 29 revealed how young “users click on news items sporadically, if at all, and engage with them only superficially on most occasions.” (Boczkowski et al., 2017, p. 1789). Additionally, news consumption through social media has increased considerably with more than half of Americans reporting to receive their news through social media (Shearer & Mitchell, 2021). Hence, the tendency to spend less time reflecting and more time absorbing as much material as possible can be considered ubiquitous, leaving modern-day news consumers vulnerable to greater CT beliefs.

False news can be especially tough to detect if one's online news feed is not diverse, where there is no opposite or neutral spectrum to compare our beliefs against. This is commonly referred to as an echo chamber, which are “environments in which the opinion, political leaning, or belief of users about a topic gets reinforced due to repeated interactions with peers or sources having similar tendencies and attitudes.” (Cinelli et al., 2021, p. 1). However, in general, with the amount of information consumed, the 21st century citizen needs to be spending more time contemplating rationally the information they absorb to avoid falling for CTs. If this is absent, the individual is likely to form judgements through intuition and block any comments that come from an alleged opposition side to their ideology.

**Thinking Disposition**

In his seminal book, Kahneman (2011) described two thinking modes through the dual-processing hypothesis: Systems 1, where our thinking is automated and is associated with intuition, experience, and pattern recognition, while Systems 2 refers to logical judgment and is associated with deliberation, rational thought, and analytics. Kahneman states that Systems 2 influences Systems 1 but that we process a majority of our decisions through Systems 1, our intuitive mode, due to its effortlessness. Therefore, in this study, thinking disposition will be

considered as analytical or intuitive disposition, parallel to Kahneman's Systems 2 and 1, respectively.

A well-known test to measure one's thinking disposition is the cognitive reflection test (CRT). The CRT consists of three challenging questions, where the wrong answer reveals an intuitive answer, and the correct answer requires deliberation by the respondent: "a bat and a ball cost $1.10. The bat costs $1.00 more than the ball. How much does the ball cost?" (Frederick, 2005, p. 26). The common mistake in attempting to solve this question occurs by relying on our Systems 1, that is, saying that the ball costs $ .10. However, the correct answer is $ .05. Lower performance on discerning false news from both political spectrums has been correlated with lower scores on the cognitive reflection test (CRT) (Pennycook & Rand, 2019). The results suggest that intuitive thinkers are more likely to fail at discerning false news than real ones, due to their dearth of reasoning.

Lacking analytical thinking, when necessary, may motivate one to see connections in two events that in reality are not connected: A CT study presented real-life but peculiar statements, in which it was suggested that two factual events were related, but the relationship was, in fact, spurious. Events included "the number of Nobel prize winners and per capita chocolate consumption." and "drownings in American swimming pools and power generated by US nuclear power plants." (van der Wal, 2018, p. 973). Results indicated that participants were more likely to score higher CT scores if they determined there to be a causal connection between such events. Later, during the same study, participants were given stories of natural disasters and human tragedies. When participants were told similar human tragedies had occurred close to when the first human tragedy story took place, they were more likely to believe in relevant conspiracy theories, than when the given human tragedy was an isolated event. Chance-related

co-occurrence can aid one in justifying a seemingly implausible relationship, such as in the case of most CT believer's reasoning. A CT believer's method of connecting two events may rely on intuitive and subjective experiences, which are difficult to argue against. Furthermore, paranormal and superstitious ideations, which are both based on intuition and subjective experiences, have been correlated with higher CT ideation in multiple studies (Swami, 2011; Wilson 2018; Kay, 2021).

A common cognitive error humans can make when judging the potential connection between two events is called the base-rate fallacy, which is defined as "a failure to take account of the base rate or prior probability of an event when subjectively judging its conditional probability." (Coleman, 2008). An example of this fallacy was seen in Israel, when vaccinated individuals made up 60% of the hospitalized patients suffering from COVID-19, while nearly 80% of their citizens were vaccinated (Carbajal, 2021). Many vaccine skeptics intuitively pointed out that vaccinated people comprised a larger portion of the COVID-19 hospital beds, while not realizing that a larger portion of the population was vaccinated (Blake, 2021)

The high occurrence of falling for the base-rate fallacy when making intuitive judgements was revealed in Kahneman & Tversky (1973): when participants were given detailed evidence (e.g., a personality description), the predicted outcomes (e.g., occupation) and the percentage the people representative of the outcome in the general population pool, a significant portion of participants made the mistake of making a judgement for the predicted outcome through personality descriptions, rather than the percentage the person was a representative of the outcome in the general population: "Jack is a 45-year-old man. He is married and has four children. He is generally conservative, careful, and ambitious. He shows no interest in political and social issues and spends most of his free time on his many hobbies which include home

carpentry, sailing, and mathematical puzzles. The probability that Jack is one of the 30 engineers in the sample of 100 is [how much] % ?." (Kahneman & Tversky, 1973, p. 241). Participants gave higher ratings for the probability of Jack being an engineer when the personality description remained, as opposed to when it was removed.

To see if a dominant intuitive thinking style can result in higher likelihood of belief of fake personal profiles, an experimental study manipulated participants' thinking disposition (Mikušková & Cavojová, 2020). Participants either solved a word-scramble task (see Gervais & Norenzayan, 2012) for the analytical condition, or associated nonsense shapes to nonsense words (see Oberman and Ramachandran, 2008) for the intuitive condition, or completed the CRT (see Frederick, 2005) for the control condition, where there was no manipulation. The participants in the analytical condition were asked to think deliberately, and participants in the intuitive condition were asked to listen to their gut when solving the word scramble questions. Participants were also given a personality questionnaire at the beginning of the study that was allegedly to generate astrological or psychological profiles, depending on participants' conditions. However, every participant in the astrological condition and psychological condition received identical profiles in their own conditions. The acceptance rate of these profiles by participants helped form the credulity measure. Other factors such as paranormal attributions and depression scores were also recorded for a regression analysis. The analysis of variance did not yield a significant result, however "analytic thinking and prior paranormal beliefs, as well as depression, predicted credulity… [In addition] people in the astrology condition [compared to the psychological profiles] tended to see the accuracy of the profile as evidence that astrology works and not as a result of random coincidence or lucky chance." (Mikušková & Cavojová,

2020, p. 8) Thus, higher analytical thinking skills may aid in discerning real and fake connections between two seemingly related events.

**The Present Study**

The objective of the current study is to examine whether thinking disposition (analytical vs. intuitive) and feelings of uncertainty can change people's propensity to believe in CTs. Thinking disposition will be manipulated through similar experimental methods utilized in Rusou et al. (2013), where participants were asked to tackle the given tasks (math problems and face pairs) with either compatible or contradictory thinking dispositions (analytical vs. intuitive). Afterwards participants will be presented with a news article generated by the researchers that covers the current state of the global economy. The news article is meant to present an ambiguous event with no attached uncertainty or certainty effects. Additionally, the news article is aimed to allow the reader to more directly reflect how their life has been impacted by the pandemic. Feelings of uncertainty are primarily going to be manipulated through statements from Mosca et al. (2016), where participants were experimentally manipulated to increase or decrease their feelings of uncertainty regarding a future event. It is expected that the relationship between feelings of uncertainty about the future and conspiracy theories will be higher for the uncertainty group than for the certainty group (H1). Furthermore, the relationship between thinking disposition and conspiracy beliefs will be stronger for the intuitive thinking groups than the analytical thinking group (H2). Finally, it is expected that participants who were given instructions for high uncertainty states and intuitive thinking will yield higher conspiracy belief scores than those in the other three groups (H3). The result of this study may aid the public in times of uncertainty to develop methods that could reduce peoples' beliefs about harmful CTs.

## Methods

## Participants

The original sample of this study consisted of 187 participants. All participants consented to take part in the study. Participants who did not complete the study were excluded. Participants were also excluded if their total duration in the study was less than or equal to five minutes, or if their answers for the dependent variable demonstrated a response bias pattern (e.g., all responses were recorded as "7"). After excluding 59 participants, there were 128 remaining participants for our main analyses. The participants were all recruited from Amazon Mechanical Turk's (MTurk) online worker pool using the CloudResearch participant-sourcing platform (https://www.cloudresearch.com/). MTurk workers were recruited if their age was above or equivalent to 18 and had a 95% or higher approval rating on the MTurk platform. Participants were compensated $2.46 CAD for 20 minutes. This rate was based on the average U.S. minimum wage at the time of the study of $7.25 per hour.

The sample consisted of 74 males, 53 females and one unidentified participant. Participant ages ranged from 21 to 69 ($M$ = 39.15, $SD$ = 11.61). Furthermore, 84.4% of the participants identified as White, 7% as Black, 3.9% as East/Southeast Asian, 3.1% as Latino, .8% as Indigenous and .8% as other. There was 1 participant who identified as Asian & White.

## Study Design

The current study is a two (feelings of uncertainty: uncertainty vs. certainty) by two (thinking disposition: analytical vs. intuitive) between-subjects design, and the dependent variable is belief in CTs, operationally defined by the scores on the CT scale. As a cover story, the letter of information stated that the purpose of the study was to investigate cognitive processes' influence on our perceptions of the global economy. The real purpose of the study was initially hidden from participants due to concerns over participant bias, such that their CT beliefs

may potentially deviate from their natural attitude after having read that the study would attempt to measure their CT beliefs.

## Materials

### *Thinking Disposition*

The thinking disposition questionnaire was a modified version of Rusou et al.'s (2013) manipulation (see Appendix A), where compatibility between thinking dispositions (analytical vs. intuitive) and tasks (objective and subjective) were measured. The thinking disposition tasks also included instructions from Mikušková & Čavojová's (2020) credulity study: "In many life situations, we must think carefully about things… please think thoroughly about your response; "In many life situations, we should decide fast, following our first inclination and gut feelings… please respond quickly and listen to your gut feelings." (Appendix B). The answers from the thinking disposition tasks were not analyzed as the tasks and instructions their selves intended to manipulate participants thinking disposition.

### *News Article*

A fictitious news article was created to allow participants to further reflect on the changes in their lives since the beginning of the pandemic (see Appendix C). However, the news article contained factual information from various news sources and reflected the state of the global economy around the Q4 of 2021.

### *Feelings of Uncertainty*

Feelings of uncertainty was manipulated by uncertainty and certainty statements utilized in Mosca et al (2016), where participants rated statements that carried uncertainty affects (e.g. "With respect to the negative event pointed out, it's difficult to not know what will happen") or certainty affects (e.g. "This is part of life; It doesn't disturb me to not know what will happen to

me"), in regard to the pandemic. Participants were unaware of the bias in statements, and the affects the statements carry aimed to manipulate their feelings of uncertainty. From the original study, 13 statements were selected (see Appendix D) for both conditions and utilized in this study's uncertainty (α = .95) and certainty (α = .95) conditions. The statements were rated on a 7-point Likert scale. The answers from the feelings of uncertainty tasks were not analyzed as the tasks and instructions their selves intended to manipulate participants feelings of uncertainty.

***Conspiracy Theories***

The CT questions used in the present study were gathered from multiple CT scales: Generic Conspiracy Belief Scale, "Government officials are involved in the murder of innocent citizens and/or well-known public figures, and keeps this a secret" (Brotherton et al., 2013); 9/11 Conspiracist Beliefs Scale, "Individuals within the U.S. government knew of the impending attacks of 9/11 and purposely failed to act on that knowledge" (Swami et al., 2010); Belief in conspiracy theories inventory, "The moon landings were staged by NASA to achieve a propaganda victory against the USSR during the Cold War" (Swami et al., 2013). Three CT items were also created by the researchers to target COVID-19 beliefs ("Information regarding effective natural remedies against COVID-19 are suppressed by pharmaceutical companies in an attempt to enforce the COVID-19 vaccine on people"). The CT questions were rated on a scale from 1 (strongly disagree) to 7 (strongly agree) and the Cronbach's alpha score for the 13-item CT questions was .98.

***Covariates***

The Very Short Authoritarianism (VSA) scale, the single item paranormal belief scale (PBS) question and the three-item Sheep Goat Scale (SGS) on a 7-point likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The 6-item VSA has been established as a

reliable alternative for the longer RWA scale and had an average of .76 Cronbach's alpha over its 3 study phases (e.g., "What our country needs most is discipline, with everyone following our leaders in unity"; Bizumic & Duckitt, 2018). In our analysis, a Cronbach's alpha of .76 was also acquired for the VSA scale. To measure paranormal beliefs, a single item from the PBS (e.g., "A person's star sign can have a direct influence on their personality") (Dean, 2021) and the 3-item SGS ("I believe in the existence of thought transference, telepathy, clairvoyance") (Thalbourne & Haraldson, 1980) were combined into a 4-item paranormal scale (PS) and had a Cronbach's alpha of .94. Thus, the CT related items (see Appendix E2) were included in the present study as covariates.

**Procedures**

After logging on to their account, MTurk workers were presented with the study link. Those who chose to participate were taken to the online Qualtrics (Qualtrics, Provo, UT) survey where the remainder of the study was completed. After completing the consent form, participants were randomly assigned to the thinking disposition condition. The intuition and analytical conditions were presented to participants as part of a cognitive process test.

In both analytical and intuitive conditions, participants received mathematical number groups (analytical task) and face pairs (intuitive task), but differing thinking disposition instructions (analytical vs. intuitive). After reading the instructions from Mikušková & Čavojová (2020) participants also received separate instructions for their condition under each question: "which of the multiplications **seems** larger; which of the faces **seems** nicer?" for the intuitive condition; "which of the multiplications **is** larger; which of the faces **is** nicer?" (Rusou et al., 2013, p. 611) for the analytical condition (bold font added here for emphasis). Eight number pairs and eight profile picture pairs were presented to all participants. The profile pictures used in

this study were acquired through the Face Research Lab in London, England (DeBruine & Jones, 2017). Lastly, participants were asked to reflect on a personal experience where either analytical vs. intuitive thinking worked to their benefit.

Participants then read the fictitious news article created by the researchers. A fictitious journalist's name and date were included to hide the fact that the news article was not an original submission. Study participants were recruited from various English-speaking countries, thus, to ensure the article would be relevant to all participants, information from multiple local and international news corporations were synthesized. Topics such as general inflation, shortages in housing and labour, and increases in food, housing and gas prices were discussed. Two statements with true, false and uncertain options were presented after reading the news article to determine if participants engaged with the article: “During a housing shortage, building more houses will swiftly push the prices of houses down; If the central banks eases the interest rates, it would help the real economy but this might also spark inflation.” However, as retaining information from the news article was not in our interest the researchers did not exclude participants based on their answers on these questions.

Subsequently, participants were randomly assigned to either the uncertainty or certainty conditions. Participants were first asked to reflect on their own life and answer how the issues discussed in the news article may further negatively impact their life (uncertainty) or how these issues might improve going forward (certainty). The reflection question meant to intensify feelings of uncertainty or certainty, depending on the condition. Afterwards, participants rated the 13 statements that either carried uncertainty or certainty affects.

Lastly, participants answered the pseudo cognitive test, which was in fact the CT questionnaire that also contained our covariates. In this questionnaire, participants rated the 13

CT statements, the 6-item VSA scale, and the 4-item PB scale. At the end, participants age, gender and racial identity were collected to form our demographics data.

## Results

From the 128 participants included in our analysis, under the uncertainty conditions, 30 were in the analytical thinking condition and 34 were in the intuitive thinking condition. Under the certainty conditions, 31 participants were in the analytical thinking condition, while 29 were in the intuitive thinking condition.

A 2 X 2 between-subjects analysis of variance (ANOVA) was conducted, with CT beliefs as the dependent variable and feelings of uncertainty and thinking dispositions as the independent variables. The VSA scale and our PB scale were incorporated into the analysis as covariates. There was no main effect for thinking disposition $F(1, 118) < .000$, $p = .99$, partial $\eta^2 < .000$. CT belief levels did not differ significantly between the analytical thinking condition ($M = 4.19$, $SD = 1.97$) and the intuitive thinking condition ($M = 4.19$, $SD = 1.90$). There was no main effect for feelings of uncertainty $F(1, 118) = .25$, $p = .62$, partial $\eta^2 = .002$. CT beliefs did not differ significantly between the uncertainty condition ($M = 4.24$, $SD = 1.99$) and the certainty condition ($M = 4.14$, $SD = 1.87$). There was also no significant thinking disposition by feelings of uncertainty interaction $F(1, 118) = .19$, $p = .67$, partial $\eta^2 = .002$. The means and standard deviations for each condition is shown in table 1. The covariates VSA, $F(1, 118) = 9.35$ , $p = .003$ , partial $\eta^2 = .073$, and the combined PB scale $F(1,118) = 160.86$ , $p < .001$, partial $\eta^2 = .57$ were significant.

| | Analytical Thinking | | Intuitive Thinking | |
|---|---|---|---|---|
| **Thinking Disposition** | ***M*** | ***SD*** | ***M*** | ***SD*** |
| | | **Feelings of Uncertainty** | | |
| **Uncertainty** | **3.98** | **2.02** | **4.21** | **1.99** |
| **Certainty** | **4.67** | **1.88** | **3.90** | **1.81** |

*Table 1.* Mean and Standard Deviations for CT beliefs

## Discussion

The present study attempted to manipulate thinking dispositions and feelings of uncertainty to observe significant changes in CT beliefs. A significant result was not achieved in both of the main effects and the interaction of the two variables on CT beliefs. It was predicted that higher feelings of uncertainty would lead to higher CT beliefs (H1). Previous studies have been successful in correlating those with higher feelings of uncertainty through lower self-esteem levels (van Prooijen 2015), higher intolerance of uncertainty levels (Farias & Pilati 2021) and higher NFCC levels (Marchlewska et al., 2018) with greater CT beliefs. Although no study that we have encountered has successfully demonstrated a main effect of manipulating feelings of uncertainty towards beliefs of CTs, some research has demonstrated manipulated interaction effect: For example, van Prooijen (2015) manipulated feelings of belongingness (i.e., exclusion vs inclusion) and feelings of uncertainty, acquiring a significant interaction for the two variables, where the dependent variable was CT beliefs; nevertheless, there was no main effect in van Prooijen (2015) for the two variables.

van Prooijen (2015) manipulated feelings of uncertainty by asking participants to reflect and write about a time when they felt uncertain. Similarly, in our study, one of the techniques used to influence participants' feelings of uncertainty was to ask them to reflect on how their lives may be negatively impacted in relation to the pandemic. In another study, van Prooijen & Jostmann (2013) were also unsuccessful in finding a significant main effect between the independent variable, feelings of uncertainty, and CT beliefs, with the same uncertainty manipulation utilized in van Prooijen (2015). The other independent variable in van Prooijen & Jostmann (2013) was the perceived morality of the subject of a conspiracy theory.

Although many studies have demonstrated a correlation between feelings of uncertainty and CT beliefs, we have not encountered a study with a significant main effect of feelings of uncertainty on CT beliefs. The current study attempted to influence participants' feelings of uncertainty using previously established methods. Mosca et al. (2016) influenced subjects' intolerance of uncertainty, worry, and negative affect levels by asking participants to read multiple uncertainty or certainty statements. Hence, the current study implemented the manipulation of reflecting on an uncertain vs. certain future event and reading statements that carried uncertain vs. certain effects. However, a significant influence of feelings of uncertainty on CT beliefs was not achieved in this study. In the original study, in which the uncertainty vs. certainty statements was developed, the authors did mention that there was only a significant increase in worry levels post-test among participants who had low levels of anxiety, stating that "a ceiling effect could explain this finding." (Grenier & Ladouceur, 2004, p. 63). Considering the uncertain nature of the pandemic and its toll on the global economy, in general, peoples' worry and uncertainty levels can be expected to be higher than the pre-pandemic era. If true, this might explain why, in the present study, there was not a significant difference between the uncertainty and certainty conditions; because in general, we would expect higher than average uncertainty levels among our participants.

Our second hypothesis predicted that analytical thinking would predict higher CT belief scores (H2). Thinking disposition has also been a common variable that has significant correlational findings with CT beliefs through analytical vs. intuitive thinking (Swami et al., 2014; Lantian 2020; van der Wal 2018; Stoica & Umbreș, 2020), higher education levels (van Prooijen, 2016; Douglas et al. 2016; van der Wal 2018), and perceiving spurious correlations (van der Wal., 2018; van Prooijen et al., 2017; Douglas et al. 2016). Higher education levels are

believed to predict lower CT levels through higher critical thinking abilities, which enables one to avoid excessive Systems 1 thinking when encountering a potential CT. Perceiving spurious correlations can also link to higher credulity for CTs through the presence of a strong Systems 2 thinking in the individual.

Successful manipulation of thinking disposition was attained in Swami et al.'s (2014) study; analytical thinking was manipulated through a word priming task and disfluent, or broken, typography, activating cognitive disfluency in the reader. The word priming task requires participants to rearrange a list of five words where in the analytical condition, one of the words was either "analyze, reason, ponder, think, [or] rational" (Swami et al. (2014, p. 578). No reference to analytic thinking was made in the list of words in the control condition. The broken typography utilized difficult-to-read fonts as their manipulation to induce analytical thinking, while in the control condition the fonts were regular. Researchers suggest that this strategy effectively induces analytical thinking because it requires a more discerning processing of information (Swami et al., 2014), consequently, activating Systems 2 processes.

The word priming manipulation and broken typography in Swami et al. (2014) was derived from another study that utilized analytical priming through two tasks to influence religious belief levels (Gervais & Norenzayan, 2012). Religious belief has been positively correlated with paranormal beliefs (Weeks et al., 2008; Drinkwater et al., 2017) and conspiracy beliefs (van der Wal, 2018; Galliford & Furnham, 2017). A visual paradigm, the word priming and the broken typography tasks in Gervais & Norenzayan (2012) produced significant results with participants' level of religious beliefs, such that participants in the analytical conditions were more likely to have lower religious belief scores. The visual paradigm consisted of participants in the analytical condition staring at a picture of Rodin's Thinker statue, a statue

depicting a man in deep thought, or a picture of Myron's Discobolus statue, a statue depicting a man throwing a discus, in the control condition. However, when Sanchez et al. (2017) attempted to replicate the visual paradigm part of the study with a much larger sample, no significant results were reached for religious beliefs. Thus, despite Swami et al. (2014) being cited frequently in the CT literature, it would be pertinent to replicate the study.

To avoid the unpredictable effects of priming, the analytical manipulation utilized in the current study came from Rusou et al. (2013), which did not utilize priming effects, but the dual processing hypothesis. However, for non-priming manipulations, participants would arguably have to spend more effort during the survey, and this is where our nonsignificant findings may be explained. For our feelings of uncertainty and thinking disposition tasks, participants had to reflect on anecdotes in multiple instances and relay in text their experiences. The researchers hypothesized that the attempt on the part of the participant would influence them to adopt the condition of the variable they were nudged towards.

In our survey, although we did not exclude participants based on the written answers they gave because it was not part of our analysis, but rather our manipulation, further examination of participants open ended responses seem to indicate that participants did not read or put effort into the survey. Of the 128 participants who remained in the study after the exclusion, nearly half failed to give an anecdote to when analytical or intuitive thinking worked to their benefit. Most of the answers failed to make any sense or were left blank. Of the 128 participants, more than a quarter of the participants failed to give a proper answer as to how the issues discussed in the news article may further impact their lives. The answers either failed to make any sense, were left blank or were copied verbatim from the news article that was presented earlier in the study. Hence, the participants in this study likely did not engage enough to activate the effects of our

manipulations. As our participant pool was from MTurk, where participants get paid per survey completion, participants may attempt to complete multiple studies in a short time, thus it may be possible that participants were not engaged with our study manipulations.

There is some evidence to suggest that this might be the case. To help strengthen the study's cover story, participants were asked to answer a few factual questions about the news article. Although the question responses were later determined to not be used in our exclusion criteria, upon further examination, it was discovered that nearly half of the participants selected incorrect answers for several of the items. It is unclear whether participants were misunderstanding the questions, however, it is possible that the rate of incorrect answers could indicate that a large majority of the sample was not fully engaged with the study. This may suggest issues with data quality which could, in part, account for the lack of significant findings in the study.

For participants who have extreme political ideologies, the source of the news article may have been a credibility issue, leaving them to not take the article and the following tasks seriously. The heading of the news article showed that it was obtained from the Canadian Broadcasting Company (CBC). A 2017 survey revealed that 50% of the respondents perceived CBC to be the most biased Canadian news media outlet (Anderson & Coletto, 2017) Although, participants were from a variety of English-speaking countries in the current study, their beliefs about CBC through what they have heard may have had unintended consequences on their responses throughout the rest of the survey. Due to the challenges of finding a news company with relatively no biases, future studies should consider removing the source of a news article.

Another explanation for our insignificant findings is that manipulation of uncertainty and thinking disposition in a psychological study may not be enough to change people's beliefs in

CTs. Although many studies have found significant correlations between the two variables and CTs beliefs, only Swami et al. (2014) have found success in manipulating thinking disposition and that was through priming effects. Beliefs are defined as "mental representations of the ways our brains expect things in our environment to behave, and how things should be related to each other—the patterns our brain expects the world to conform to." (Lewis, 2018). Considering how beliefs are integral to our identity and are formed over a long course of time (Connors & Halligan, 2017), perhaps manipulation of feelings of uncertainty and thinking disposition in a lab setting might not have a significant effect in changing one's beliefs on CTs. Findings from the debriefing notes of Imhoff & Lamberty (2017) show that despite the evidence contradicting the veracity of a CT, some individuals are persistent in holding on to their beliefs.

The manipulations conducted on the two variables in the present study were intended to change one's bottom-up information processing system: "Bottom-up processing is processing which depends directly on external stimuli, whereas top-down processing is processing which is influenced by expectations, stored knowledge, context and so on." (Eysenck, 1998, p. 152). However, our beliefs that have been formed over a long-time influence how we view the world in a top-down manner (Connors & Halligan, 2017). Thus, manipulation of how one processes information through a bottom-up manner may not have a significant effect on their top-down information processing system.

It should be noted that the covariates, PB and VSA scales were highly significant in the ANOVA. Previous studies have found significant correlations between paranormal beliefs (Swami, 2011; Wilson 2018; Kay, 2021) and authoritarianism (Swami, 2011; Prichard & Christman, 2020) against CT beliefs as well. The higher CT scores among paranormal believers may be explained by their credulity in seeing connections in spurious events and our general

tendency to imbue meaning onto the world (van der Wal, 2018). Especially in an atmosphere of uncertainty, coupled with a dominant Systems 1 thinking, our need to imbue meaning onto the world may lead to erroneous decisions; no causal study has confirmed this yet, but correlational studies through need for cognitive closure (Marchlewska et al., 2018), and intolerance of uncertainty (Farias & Pilati, 2021) have confirmed these connections.

Authoritarians have been described as sensitive towards threats to the stability of the current social order (Duckitt & Sibley, 2007). A significant threat to the current social order such as COVID-19 may be a reason for the increase CT beliefs among authoritarians. Additionally, during the pandemics first two years, citizens were required to comply with strict public health measures. Authoritarians are known to abide by social conformity firmly (Vaughan & White, 1966), however when rules appear to be prejudiced against them by an outgroup, they tend to have higher negative behavioral intentions (Górska et al., 2021). For an authoritarian, who had to comply to new public norms set by an outgroup, and the ensuing distress may have led to an increase in their CT beliefs.

Future studies should consider replicating priming studies such as Swami et al. (2014), where priming effects through previously critiqued methods yielded significant effects on CT beliefs. Future studies should also consider exploring causal connections between paranormal, superstitious beliefs and authoritarian beliefs against CT beliefs, since results from this study showed that there is significant connection between the variables.

Another direction researchers can consider taking is changing CT beliefs through top-down approaches. This would entail more explicit education on rational thinking and cognitive biases and focusing on common paranormal or CT beliefs during the manipulation phase of the study. Caroti et al. (2021) applied a "critical thinking promotion training with a focus on

pseudoscience and epistemic beliefs… as well as an overview of several reasoning and cognitive biases" (p. 10) to their pseudoscience focused group. After the training, participants were invited to a group discussion to debate certain issues with the skills they just learned. A month after the intervention, participants in the treatment group had substantially lower paranormal and conspiratorial beliefs. Similarly, participants in another study were significantly less likely to believe in CTs after listening to a tape recording that either contained ridiculing or rational responses towards CTs, compared to when the recordings contained empathetic responses (Orosz et al., 2016).

## Conclusion

CTs seem to be more significant in the 21st century, as seen with the recent pandemic, others' beliefs and actions can have real effects on others. The current study explored the relationship between feelings of uncertainty, thinking disposition and CT beliefs. The results from the current study were non-significant. The limitation of this study notwithstanding, our study contributed to revealing how priming effects among feelings of uncertainty and thinking dispositions in CT experiments may not be as successful as purported to be. The results indicate that beliefs are not easy to change in real life, and that there may be preliminary barriers that need to be overcome first to avoid high uncertainty when personal biases are violated through opposing information. Lastly, widely cited priming studies especially in the CT literature should be successfully replicated before being used as a foundation for a hypothesis in another study.

*"We seem practically built to give reasons for whatever we think we must and not the reasons we actually used to reach a conclusion."*

-Michael D. Scott

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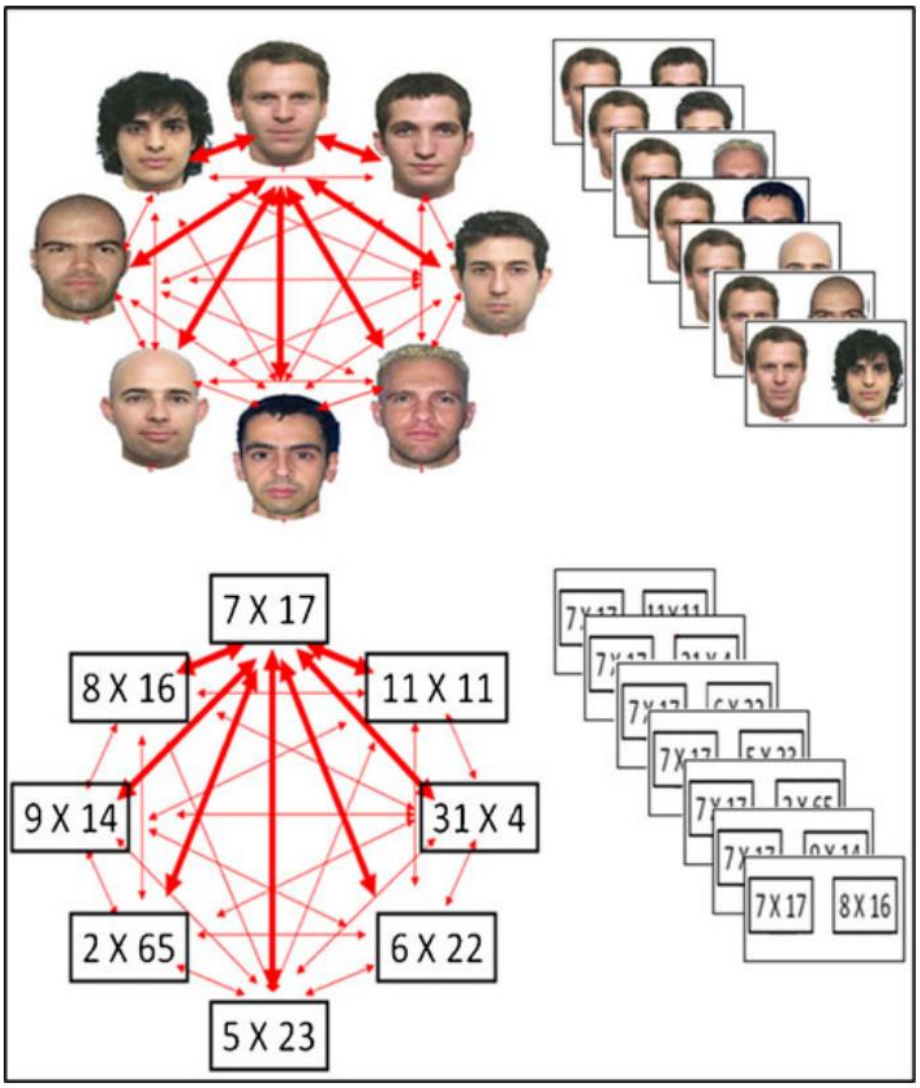
## Appendix A

### Analytical and Intuitive Task in Rusou et al. (2013)



## Appendix B

### Instructions for the Analytical and Intuitive Conditions

Analytical Condition

In many life situations, we must think carefully about things. Now, we will test this ability, so when answering the following tasks, please think thoroughly about your response."

Intuitive Condition

"In many life situations, we should decide fast, following our first inclination and gut feelings. Now, we will test this ability, so when answering the following tasks, please respond quickly and listen to your gut feelings."

**Appendix C**

**The News Article Generated by the Researchers**

Eric Stanber, CBC News
December 18, 2021 7:49 pm Updated December 21, 2021 4:17 pm

Should people worry about the current outlook of the global economy? The global economy survived the pandemic mainly due to massive central bank intervention. The side effects of this necessary life support has been high debt and inflation in many countries

"Because inflation is so much higher, the bar for central bank intervention is going to be very high," said Tobias Adrian, director of the IMF's monetary and capital markets department. If central banks eases, it would help the real economy but might spark inflation. If they tighten, they might get inflation down eventually, but "it might be very costly," Adrian said.

The second quarter of 2020 resulted in a decrease of 10.7% GDP growth in the G7 nations, the lowest output ever recorded. As measured by the consumer price index, the annual inflation rate in the U.S. to October 2021 was 6.2%. Annual inflation was running at 4.4% in October in Europe, and the U.K.'s Consumer Prices Index rose by 4.2% in the 12 months to October.

Inflation may seem like a financial term obtuse to ordinary citizens, but it is felt in every essential service and product of our lives. The price of oil rose above $80 a barrel for the first time in 3 years and natural gas is the costliest in 7 years. TotalEnergies Chief Executive Patrick

Pouyanne said the gas crisis that's affecting Europe is likely to last all winter.

More expensive products and services are being observed worldwide due to supply chain disruptions and a shortage in labour markets. According to Trucking HR Canada, there was a labour shortage of 20,000 truck drivers in the second quarter of 2021. This image parallels the shortages experienced across a variety of trades jobs in North America. RBC Economics latest Statistics Canada report predicts that there will need to be an influx of an additional 700,000 trades workers to prevent labour shortages of apprentices in 2028. The largest sector the trucking industry competes with for youth workers is the construction industry. However, the construction industry had a job vacancy of 62,000 in the second quarter of 2021.

Unfortunately, the law of supply and demand does not translate to the labour costs of construction. Building more houses during a housing shortage does not mean the price of homes will drop. When the demand for housing is high, labour costs actually increase, which translates to an increase in the costs of houses. In addition, global supply chain disruptions caused by the pandemic has caused items used to build homes such as brick and lumbar costing more to purchase. In Ontario, the province where average house costs are predicted to have accelerated the highest by the end of 2021 (22%) in Canada, the average cost of houses is expected to rise to $859,533.

In addition to the increase in house prices, labour and supply chain shortages have critically affected the agriculture industries worldwide. Farmers have not been able to process their meat, processors have not been able to supply to the markets, and households have endured a rise in their grocery bills. Some notable increases in grocery products are: meat increased 3.1% year-over-year, dairy by 3%, seafood by 1.5% and bakery items by 0.6%. Fresh or frozen chicken

prices rose 8.6% year-over-year. For dairy products, which have been experiencing year-over-year inflation for the past 3 years, butter was up 10% year-over-year, and eggs up 5.8%. Even the cost of peanut butter, which has remained largely stagnant over two decades, is up to 3% from January. In terms of volume, beef sales are down 6 % from last year's figures, and chicken and pork sales are down 12% and 17%, respectively. The price of tomatoes and bacon are also up by

20% and 19.6% respectively. Orange juice and pasta are now cheaper than last year, which will be good news for students.

The future of the Canadian economy may not be too bright, however, this image parallels the current economic struggles of many other countries. Global supply chain shortages and labour shortages caused by the pandemic are affecting the prices of goods and services all over the world. With the new variant Omicron from Africa spreading across the globe, the border measures governments take will determine the state of the global supply chain. It is also up to the citizens to decide how the negative events caused by the pandemic will affect them at the end of the day and what measures they will take to adapt to the new economic reality.

## Appendix D

### The Uncertainty and Certainty Statements

Certainty Statements

1. With respect to the future, it's comforting knowing what's going to happen
2. I'm content with the prospect of my future
3. My future is in my control
4. I'm at peace when thinking about my future
5. It's easy to live in this socioeconomic climate
6. I feel good about my future
7. It's easy to plan for what's going to happen tomorrow
8. I am comforted when thinking about my future
9. I know what is going to happen to me
10. My future is uncertain, but I can handle whatever life throws at me
11. I feel excited about the possibilities of the future
12. I feel calm when thinking about my future
13. It's enjoyable for me to think of my future

Uncertainty Statements

1. With respect to the future, it's difficult to not know what will happen
2. I'm frustrated with the prospect of the future
3. My future is out of my control
4. I worry when thinking about my future
5. It's difficult to live in this socioeconomic climate
6. I don't feel good about my future
7. It's hard to plan for what's going to happen
8. I am bothered when thinking about my future
9. I don't know what is going to happen to me
10. It doesn't matter what I do, future is always full of uncertainties

11. I feel depressed about the possibilities in the future
12. I feel uneasy when thinking about my future
13. It's difficult for me to think of my future

**Appendix E1**

## Conspiracy Theory Questions

1. COVID was a deliberately planned act in order to enact a great reset on the pre-established failing systems of the world such as capitalism and international currencies
2. Secret organizations have access to large amounts of personal data on every citizen and sell it to governments (Brotherton, 2013; GCBS)
3. The moon landings were staged by NASA to achieve a propaganda victory against the USSR during the Cold War (Swami et al., 2013; Belief in the moon landings conspiracy theory)
4. Information regarding effective natural remedies against COVID-19 are suppressed by pharmaceutical companies in an attempt to enforce the COVID-19 vaccine on people
5. Area 51 is just a decoy for the actual alien investigation military base, that is different from Area 51 (Brotherton, 2013; GCBS)
6. Certain major global events have been the result of the activity of a small group that secretly manipulates world events (Brotherton, 2013; GCBS)
7. The COVID-19 vaccine was created to control and manipulate the human population's DNA
8. Evidence of alien contact is being concealed from the public (Brotherton, 2013; GCBS)
9. Progress towards a cure for cancer or AIDS and other diseases is deliberately hindered or hidden by pharmaceutical companies (Brotherton, 2013; GCBS)
10. Government officials are involved in the murder of innocent citizens and/or well-known public figures, and keeps this a secret (Brotherton, 2013; GCBS)
11. Groups of scientists deliberately manipulate, fabricate or suppress evidence in order to deceive the public (Brotherton, 2013; GCBS)

12. Political leaders such as John F. Kennedy and Martin Luther King's assassinators were framed by the US government to hide their own involvements (Brotherton, 2013; GCBS)

13. Individuals within the US government knew of the impending attacks of 9/11 and purposely failed to act on that knowledge (Swami et al., 2010; 9/11 Conspiracist Belief Scale)

## Appendix E2

### Covariates: VSA, PS

1. A person's star sign can have a direct influence on their personality (Dean, 2021; PS)
2. What our country needs most is discipline, with everyone following our leaders in unity (Bizumic & Duckitt, 2018; VSA)
3. God's laws about abortion, pornography, and marriage must be strictly followed before it is too late (Bizumic & Duckitt, 2018; VSA)
4. The facts on crime and the recent public disorders show we have to crack down harder on troublemakers if we are going to preserve law and order (Bizumic & Duckitt, 2018; VSA)
5. Our society does NOT need tougher government and stricter laws (Bizumic & Duckitt, 2018; VSA)
6. There is nothing wrong with premarital sexual intercourse (Bizumic & Duckitt, 2018; VSA)
7. It's great that many young people today are prepared to defy authority (Bizumic & Duckitt, 2018; VSA)
8. I read/watch content on psychic phenomena (Thalbourne & Haraldson, 1980; PS)
9. I believe in the existence of thought transference: telepathy, clairvoyance (Thalbourne & Haraldson, 1980; PS)
10. I believe in the ability to know the future or have dreams of it (Thalbourne & Haraldson, 1980; PS)

# Curriculum Vitae

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|---|---|
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