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Stress, anxiety, and belief in conspiracy theories

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Nicholas David Fox

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Abstract

The Existential Threat Model of Conspiracy Theories by van Prooijen et al. (2009) implies that perceived stress and anxiety may affect belief in conspiracy theories. The existing literature has provided some evidence that stress and anxiety are positively correlated with belief in conspiracy theories, but it remains unclear whether this is a causal effect. We applied contemporary methodological literature to provide causal inferences about whether higher perceived stress and anxiety significantly predicted an increased belief in conspiracy theories while controlling for age, education, subjective social status and political orientation. A structural equation model tested the effect in two observational survey-based studies. In Study 1 (N = 502), a cross-sectional study of Australasian participants indicated that perceived stress and anxiety did not have a significant estimated effect on belief in conspiracy theories. In Study 2 (N = 1020), a cross-sectional study of US participants showed a significant positive effect of perceived stress on belief in conspiracy theories, but not of anxiety. The present results provide tentative evidence for an effect of perceived stress on belief in conspiracy theories; however, it is becoming increasingly evident that this effect is small. The implication of this is the possibility that the Existential Threat Model of Conspiracy Theories may not be a helpful explanation of belief in conspiracy theories.

Keywords: conspiracy theories, stress, anxiety, existential threat

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Table of Contents

Abstract ..... **ii**

Acknowledgements ..... **iii**

List of Figures ..... **vii**

List of Tables ..... **viii**

Introduction **1**

Conspiracy Theories: Definition 1

Common Features of Conspiracy Theories *3*

Unwarranted Conspiracy Theories *4*

Prevalence of Belief in Conspiracy Theories 5

Conspiracy Theories and Australasia *6*

Consequences of Belief in Conspiracy Theories 8

Theories 11

Social Identity Theory *11*

Pattern Perception *13*

Monological Belief System *15*

Existential Threat *17*

Stress and Anxiety as Forms of Existential Threat 21

Stress and Belief in Conspiracy Theories *21*

Anxiety and Belief in Conspiracy Theories *29*

Rationale for Research 40

Hypotheses *42*

Causal Inference *43*

Confounding Variables *45*

Study 1 ..... **49**

Method 49

Preregistration *49*

Design *49*

Participants *50*

Measures *57*

Procedure *63*

Data Analysis *66*

Results 71

Descriptive Statistics *71*

Structural Equation Model Analysis *76*

Study 2 ..... **81**

Method 81

Preregistration *81*

Design *81*

Participants *81*

Measures *84*

Procedure *86*

Data Analysis *87*

Results 89

Descriptive Statistics *89*

Structural Equation Model Analysis *95*

Discussion **99**

Summary of Findings 99

Explanation of Findings 99

Perceived Stress *99*

Anxiety *102*

The Correlation Between Stress and Anxiety *103*

Additional Findings *104*

Strengths of the Research 106

Implications 107

Limitations 108

Future Research 111

Conclusion 112

References 114

Appendix A 141

Appendix B 143

Appendix C 144

Appendix D 148

Appendix E 150

Appendix F 151

Appendix G 152

Appendix H 154

List of Figures

Figure 1. The Existential Threat Model of Conspiracy Theories 20

Figure 2. Image Used for Subjective Social Status in Survey 63

Figure 3. Structural Model Depicting Causal Pathways 70

Figure 4. Histogram Plots of Participants Scores in Study 1 72

Figure 5. Distribution of Responses to BCT Items in Study 1 73

Figure 6. Participants Subjective Social Status in Study 1 74

Figure 7. Scatter Plots of Main Variables in Study 1 76

Figure 8. Structural Equation Model for Study 1 78

Figure 9. Image used for Subjective Social Status in Study 2 86

Figure 10. Histogram Plots of Participants Scores in Study 2 90

Figure 11. Distribution of Responses to BCT Items in Study 2 91

Figure 12. Participants Subjective Social Status in Study 2 93

Figure 13. Scatter Plots of Main Variables in Study 2 95

Figure 14. Structural Equation Model for Study 2 97

List of Tables

Table 1. Summary of Studies Involving Stress and Conspiracy Beliefs 27

Table 2. Summary of Studies Involving Anxiety and Conspiracy Beliefs 37

Table 3. Demographics Statistics for Study 1.....56

Table 4. Items in the Belief in Conspiracy Theories Measure.....59

Table 5. Descriptive Statistics for Main Variables in Study 1.....71

Table 6. Frequency Table for Political Orientation in Study 1.....74

Table 7. Correlation Matrix: Main and Control Variables 75

Table 8. Regression Paths for Study 1 77

Table 9. Demographic Characteristics of Participants in Study 2 84

Table 10. Descriptive Statistics for Main Variables in Study 2.....89

Table 11. Median Gender Responses in Study 2 90

Table 12. Frequency Table for Political Orientation and Education in Study 2.....92

Table 13. Correlation Matrix: Main and Control Variables 94

Table 14. Regression Paths for Study 2 96

Stress, Anxiety, and Belief in Conspiracy Theories

Being a *conspiracy theorist* is often associated with a terrible reputation (Uscinski, 2020). Thus, it is fascinating that conspiracy theories are so popular for beliefs with such an immense stigma attached to their meaning. There has been a sizeable increase in psychological research on conspiracy theories over the past ten years, with the COVID-19 pandemic creating a wealth of new research. Twenty-five percent of the psychological literature based on conspiracy theories has appeared since the commencement of the COVID-19 pandemic in 2020 (Keil, 2021). Researchers have been able to investigate the psychological effects of a major societal crisis, particularly with regard to belief in conspiracy theories. Historically, during times of societal crisis, an increased belief in conspiracy theories has been seen (van Prooijen & Douglas, 2017). Heightened stress and anxiety levels have been a common side-effect of major societal crises such as the COVID-19 pandemic, and some researchers have considered what role these may have with regard to belief in conspiracy theories. Therefore, the following sections aim to provide a background to conspiracy theories, why people may believe in conspiracy theories and why people may develop beliefs in conspiracy theories at specific times. Lastly, the rationale for the current research and gaps in the literature are discussed.

Introduction

Conspiracy Theories: Definition

The exact definition of a conspiracy theory differs between researchers in psychology and has resulted in confusion and a lack of consistency between studies (Swami & Furnham, 2014). While conspiracy theories can comprise a rational questioning of official narratives, caution needs to be applied to ensure that legitimate questioning of authority or science is not stigmatised (Dentith, 2018). Questioning science is healthy, and one could argue that blindly

trusting science without scepticism could be similar to believing in conspiracy theories (O'Brien et al., 2021). Therefore, the following section articulates the definition of conspiracy theory for the current research and explains why that specific definition will be used.

Coady (2019), a prominent philosophy-based conspiracy theory scholar, has expressed one of the key criticisms of conspiracy theories and the definition. While Coady takes a firm stance against using the term conspiracy theory, he suggests that the definition should be considered more carefully within psychology. Coady (2018) argues that researchers often believe they are discussing the same term within psychology, whereas key conceptual differences arise in standard definitions of conspiracy theories. Definitions of conspiracy theories include some versions that are neutral and others that are loaded, and may refer to considerably different meanings.

Neutral definitions of conspiracy theories are suggested to be the most widely used in psychology (Coady, 2018). An example of a neutral definition includes one by Swami et al. (2010) which states, "conspiracy theories are lay beliefs that attribute the ultimate cause of an event or the concealment of an event from public knowledge, to a secret, unlawful, and malevolent plot by multiple actors working together" (p. 749). Similarly, van Prooijen (2018) proposes "the belief that a number of actors join together in secret agreement, in order to achieve a hidden goal which is perceived to be unlawful or malevolent" (p. 5). These definitions are neutral as they do not imply that a conspiracy theory is false, irrational, or dangerous and include core elements of multiple actors, secrecy and malevolence.

In contrast, loaded definitions imply that conspiracy theories are implausible by nature (Coady, 2018). For example, Stojanov and Halberstadt (2019) describe conspiracy theories as "implausible explanations of significant social or political events that postulate

powerful agents working together in secret to achieve a malevolent goal" (p. 215). The critical feature of this type of definition is that conspiracy theories are implausible, and the definition is thus loaded with the assumption that conspiracy theories are unlikely to be true. At the same time, countless historians and political scientists have provided evidence to suggest that conspiracies do happen (Pigden, 1995; Uscinski & Parent, 2014). Therefore, completely dismissing all conspiracy theories may be overstepping and unnecessarily stigmatising such beliefs.

The definition that will be used in the current research is consistent with what Coady (2018) considered a neutral definition: a conspiracy theory is an explanation for an observation or event that involves multiple actors plotting in secrecy to achieve a goal that is perceived to have malevolent intent (Swami et al., 2010, 2016; van Prooijen, 2018).

Common Features of Conspiracy Theories

A conspiracy theory is a *theory* in how it aims to explain significant societal events and why such events occurred (Keeley, 1999; Newheiser et al., 2011). While some conspiracy theories at least appear to be theoretically conceivable (e.g., COVID-19 was the result of a lab leak; see Oransky (2021)), others are not supported by empirical evidence and are unlikely to be true (e.g., the belief that earth is a flat, disc-shaped planet). However, regardless of how true it may be, as outlined by the prior definition of a conspiracy three, three crucial features need to exist to qualify as a conspiracy theory, including coalitions, malevolence, and secrecy (Hofstadter, 1966; Keeley, 1999; Starcevic & Brakoulias, 2021; Swami & Furnham, 2014; van Prooijen, 2018).

1. The first feature involves a coalition, where multiple actors work together (Swami & Furnham, 2014; van Prooijen, 2018). The coalition is typically among powerful groups or organisations; however, the actors in the coalition do not need to be human,

with shapeshifting reptilian humanoids and artificial intelligence at the centre of some conspiracy theories (see Farrier, 2020).

2. The second feature of conspiracy theories is that the conspirators have malevolent intentions. The coalition aims to cause harm, with their goals being not in the public's best interest (Hofstadter, 1966; Starcevic & Brakoulias, 2021; van Prooijen, 2018).
3. Lastly, a hallmark feature of a conspiracy theory is that those involved operate in secrecy (van Prooijen, 2018). The secretive actors are not omnipotent; therefore, they must act in secrecy to reduce the risk of being caught or obstructed (Keeley, 1999).

These unique defining features of conspiracy theories are essential aspects that particularly apply to such beliefs that are opposed to empirical evidence (Keeley, 1999).

Unwarranted Conspiracy Theories

Now that the definition and features of a conspiracy theory have been provided, this sparks a fundamental question: Why should psychologists study belief in conspiracy theories when they can at times be sensible questioning of government conduct and abuses of power (Dentith, 2018), and when some conspiracy theories do transpire to be true (see Pigden, 1995)? One argument provided by van Prooijen (2018) is that psychological research provides an approach that can objectively identify the factors that may lead people to believe in conspiracy theories. Therefore, identifying the factors that may influence belief in conspiracy theories may help identify why people believe in such ideas and inform possible interventions. Thus, we are not so concerned about proving whether a specific conspiracy theory is true or false, but rather about investigating the factors that may predispose an individual to believe in such conspiracy theories. What is of particular interest in the current research is the factors that lead to belief in conspiracy theories that do not appear to be supported by empirical evidence (i.e., unwarranted conspiracy theories). A fine balance is needed in psychological research on belief in conspiracy theories, in order to not dismiss

claims of conspiracies actually occurring, yet to identify why some people believe in unwarranted conspiracy theories. Such unwarranted beliefs in conspiracy theories can have harmful consequences, and identifying why people may have these beliefs is essential, while not dismissing the idea that genuine conspiracies *do happen*. As outlined in the next section, such unwarranted beliefs are common in the general population.

Prevalence of Belief in Conspiracy Theories

Conspiracy theories are observed in many cultures globally; however, more research pertains to western cultures belief in conspiracy theories (Swami & Furnham, 2014; Zonis & Joseph, 1994). When considering belief in conspiracy theories internationally, a recent cross-sectional study by De Coninck et al. (2021) compared eight major countries (N = 8086) and their belief in conspiracy theories. Countries such as the Philippines, the United States, and Hong Kong were found to be more susceptible to conspiracy beliefs. In contrast, countries like New Zealand, Switzerland, Belgium, and Canada demonstrated a significantly lower belief in conspiracy theories and misinformation. The key differences between the level of endorsement were suggested to be due to higher levels of populism and societal polarisation in countries with higher beliefs in conspiracy theories (De Coninck et al., 2021).

The US has been subject to considerable research regarding belief in conspiracy theories. In particular, Oliver and Wood (2014) found that half of the participants believed at least one conspiracy theory in a large US-based nationally representative sample from 2006 to 2011. Uscinski et al. (2011) indicate that almost one-third of the US population believed that Barack Obama gained the US presidency unconstitutionally. In an impressively labour-intense study of American conspiracy theories, Uscinski and Parent (2014) analysed 104,803 published letters to the editor at the New York Times and Chicago Tribune from 1897 to 2010, which aimed to consider the notion that conspiracy theories are increasing in society, especially in the era of the internet. Interestingly, they found that conspiracy thinking has

remained stable throughout US history (Uscinski & Parent, 2014). While many commentators in the media suggest that belief in conspiracy theories is rising, Uscinki (2020) suggests that people may get confused between the number of new conspiracy theories and the number of people who actually believe in them. Therefore, conspiracy theories may not be a new phenomenon, and it is viable that underlying processes may influence conspiracy beliefs, highlighting the need for research to understand why.

The British population have shown a similar tendency to believe in conspiracy theories (Drochon, 2018). Popular conspiracy theories such as that the 9/11 terrorist attacks were an inside job were endorsed by 11% of the British participants, and the belief that climate change is a hoax was endorsed by 18% of British participants (Oliver & Wood, 2014). It is then no surprise that Britain is home to famous conspiracy theorist David Icke, who believes that members of the royal family and other influential celebrities are extra-terrestrial lizard people (Christian, 2016). While this theory may sound absurd, it has a sizeable following, and thousands pay to hear him speak (Farrier, 2020). Thus, within western countries, it appears that conspiracy theories are a prominent aspect of most societies. However, while research is emerging regarding the prevalence of such beliefs in Australasia (see Marques et al., 2021), the factors that may lead to belief in conspiracy theories are still relatively unknown.

Conspiracy Theories and Australasia

There is a specific need for research that considers people from New Zealand and Australia (Australasia). Most conspiracy theory research is from the US, the UK and Europe, with limited psychological research pertaining to Australasia. Therefore, building knowledge about why some people may believe in conspiracy theories from an Australasian perspective can provide unique insights into whether the Australasian results are similar to empirical evidence found in other western cultures.

Local conspiracy theories are common in New Zealand and Australia (Frame, 2005; Marques et al., 2021; Woolf, 2019). For example, in a New Zealand-based convenience sample studied by Woolf (2019), polling found that 40% of participants endorsed the statement that the national rugby team (All Blacks) were purposely poisoned before the 1995 rugby world cup final. In Australia, local conspiracy theories regarding the death of prime minister Harold Holt in 1967 are prevalent, with published books detailing the conspiracy theories that his mysterious drowning has created (Frame, 2005).

While local conspiracy theories are highly endorsed, Australasian beliefs in international conspiracy theories have only recently been considered. Marques et al. (2021) conducted the most extensive Australasian-based psychological studies that considered belief in local conspiracy theories (i.e., specific to New Zealand or Australia) and international conspiracy theories. Marques et al. (2021) found that 50.1% of New Zealanders and 56.7% of Australians endorsed at least one of 15 conspiracy theories. Similarly, Woolf (2019) reported that nearly three in four New Zealanders endorsed one conspiracy theory. Interestingly, in the study by Marques et al. (2021), the participants indicated higher awareness of international-based conspiracy theories (e.g., the death of Princess Diana and the JFK assassination) than local-based conspiracy theories. Therefore, it appears the level of belief in conspiracy theories in Australasia is similar to levels measured elsewhere. However, what remains unclear is whether the psychological antecedents remain the same.

The research that does exist currently in Australasia indicates an association between perceived stress and belief in conspiracy theories (Williams et al., 2022). This research has important implications for Australasia, with indigenous populations commonly suffering higher psychological distress rates than non-indigenous populations (McNamara et al., 2018; Ministry of Health, 2021). Rangiwai (2021) suggests Māori may be highly susceptible to believing in conspiracy theories, partly as a by-product of years of oppression, colonialism,

and intergenerational trauma (Ngata, 2020). Unfortunately, belief in conspiracy theories is inherently related to the rejection of public health advice and vaccination intention (Jolley & Douglas, 2014b; van Prooijen et al., 2021). Therefore, indigenous populations who often face worse health outcomes for various reasons are also more susceptible to conspiracy theories that may influence their decision-making when getting the COVID-19 vaccine. If higher stress and anxiety increase belief in conspiracy theories, this may provide a helpful intervention point to reduce the susceptibility to belief in conspiracy theories in Australasia.

Consequences of Belief in Conspiracy Theories

The consequences of believing in specific conspiracy theories can be disastrous, and imply the need for a better understanding of the factors that play a role in why people begin to believe in conspiracy theories. The consequences of conspiracy theories are especially relevant in the current COVID-19 pandemic, with research surrounding conspiracy theories proliferating upon the commencement of the pandemic (Furnham, 2021; Keil, 2021). Longitudinal research by van Prooijen et al. (2021) found that belief in conspiracy theories at the start of the pandemic predicted whether people had been tested for COVID-19 and subsequently tested positive eight months later, andalso predicted worsened reported well-being. Additional longitudinal research by Hornsey et al. (2021) found that those high in conspiracist ideation were more likely to be concerned for their well-being but less likely to participate in preventative behaviour that would protect others' well-being (e.g., mask-wearing).

Therefore, it is no surprise that conspiracy theories have been identified as a significant issue in the context of the COVID-19 pandemic. This problem has been highlighted by the World Health Organisation, which has termed the spread of harmful health misinformation an "infodemic" (Banerjee & Meena, 2021). The infodemic is closely related to conspiracy theories, as those who doubt the reality of the COVID-19 pandemic often turn

to conspiracy theories to explain why they believe it is all a hoax. This was demonstrated by Quinn et al. (2020) in an analysis of 300 Instagram posts with the hashtag “plandemic,” meaning the COVID-19 pandemic was planned or organised by a powerful group of actors. They found that conspiracy theories about COVID-19 were highly endorsed, along with the idea that the government or media were hiding or fabricating information (Quinn et al., 2020).

More generally, Lewandowsky et al. (2013) found a significant relationship between conspiratorial thinking and the rejection of science, such as climate change and vaccination attitudes. Similarly, the spread of COVID-19 conspiracy theories may be partly due to the denial of science (Miller, 2020b). Miller (2020b) suggests that interpreting complex data about infection rates may be difficult to understand, leading individuals to look for other sources of information that are easier to understand and which often include denial of the pandemic occurring. In this search for information that is easier to understand, conspiracy theories often fill thie gap by providing a simple answer to explain a complex phenomenon. However, those who reject science often endorse particularly harmful health-related conspiracy theories (Lewandowsky et al., 2013).

One significant consequence of contemporary relevance is the anti-vaxxer movement, which is in part fuelled by misinformation about the dangerous side effects of vaccines. The COVID-19 vaccine is a crucial next step in fighting the disease (Loomba et al., 2021), and conspiracy theories promoting vaccine misinformation may threaten the likelihood of mass immunisation. Experimental evidence by Jolley and Douglas (2014b) found that when exposed to anti-vaccination conspiracy theories, participants were less likely to vaccinate a fictitious child. The findings of this study have important implications regarding the influence of conspiracy theories on vaccination attitudes, especially in the current pandemic. During the COVID-19 pandemic, support for COVID-19-related conspiracy theories predicted resistance

to behaviours such as mask-wearing, social distancing and future vaccination intention in a sample of 1050 US-based adults (Romer & Jamieson, 2020). Thus, conspiracy theories appear to be harmful given their influence on decision-making when choosing whether or not to get vaccinated and participate in preventative health measures.

Experimental research also provides evidence of conspiracy theories predicting intentions to engage in everyday crime in the UK. In a cross-sectional experimental study, Jolley et al. (2019) found evidence for a relationship between conspiracy theory belief and intention to engage in everyday crime. Compared to a control group, participants exposed to conspiracy theories prior to the study indicated increased intention to engage in everyday crime in the future, with the relationship of belief in conspiracy theories and criminal behaviour mediated by anomie,

Jolley et al. (2020) also found that a sample of UK participants exposed to conspiracy theories displayed exacerbated prejudice toward immigrants coming to Britain from the European Union. Jolley et al. replicated the study with two more groups and found the same effect in different intergroup contexts, indicating potentially severe consequences for intergroup relations.

On a more global scale, conspiracy theories about climate change have potentially catastrophic consequences. Conspiracy theories about climate change being a hoax have led to a climate change denial movement that insists humans are not to blame for global warming (van Prooijen & Douglas, 2017). Experimental evidence suggests that even the presence of climate change conspiracy information reduced participants' intention to participate in actions that may reduce global warming (Jolley & Douglas, 2014a; van der Linden, 2015). Such climate change denial movements have the consequence of hampering attempts to address climate change (Uscinski et al., 2017). Ultimately, Uscinski et al. (2017) suggest that

it is not the denial of robust evidence that is the underlying cause of these beliefs; it is instead conspiracy thinking which entails an ideology that does not engage with evidence and reason.

These consequences are not exhaustive, yet they demonstrate the significance and possible widespread consequences that may arise from belief in unwarranted conspiracy theories. The consequences highlight the need to understand the factors that may influence people to believe in conspiracy theories, in order to develop possible interventions to reduce them. Some theories may appear harmless, especially when individuals believe the earth is flat or controlled by a secret group of elites who are lizards, yet the actual negative consequences of anti-vaccination efforts and climate change denial have harmful implications. Given the potential negative consequences of belief in conspiracy theories, it is vital to examine the causes. The need for an understanding of the factors that can lead to belief in conspiracy theories can be seen in prominent theories about conspiracy theories. These theories provide insight into why some people may believe in conspiracy theories and point towards the importance of stress and anxiety in such beliefs.

Theories

Social Identity Theory

An influential theory that can be applied to explain belief in conspiracy theories is social identity theory (Tajfel & Turner, 1979). Social identity theory considers the role of social categorisation, group membership, intergroup relations and individual identity to their group (Hogg, 2006). A key aspect of social identity theory is that people classify themselves into groups, which creates a clear distinction between an ingroup and an outgroup. The ingroup can consist of individuals from the same country, political beliefs, race, or even a group of people who believe in a conspiracy theory. A person's ingroup guides their beliefs and behaviours through observations of the group norms and values (Tajfel & Turner, 1979).

Social identity theory helps explain belief in conspiracy theories, as the malevolent intentions of a group of actors may be perceived as harmful to ingroups best interests. This is particularly evident with politically-based conspiracy theories, which are often used to cast rival nations and social outgroups as harmful to the ingroup members' best interests (e.g., COVID-19 was an act of biological warfare against the world by China; Uscinski & Parent, 2014; van der Wal et al., 2018). Unsurprisingly, when the outgroup is perceived as harmful, conspiracy thinking about outgroups significantly correlates with anxiety (Grzesiak-Feldman, 2013).

Belief in intergroup conspiracy theories is often related to a stronger connection to one's ingroup. Robust evidence has been provided that the acceptance of conspiracy theories is associated with a defensive identification with the ingroup (Cichocka et al., 2015, 2016; Marchlewska et al., 2019). Defensive identification has specifically been related to collective narcissism, which reflects a belief in the greatness of the ingroup and a feeling of underappreciation. This perceived lack of appreciation of the greatness of the ingroup has been found to predict specific conspiracy beliefs about outgroups (Marchlewska et al., 2019).

The perceived social norms of the ingroup have also been found to be particularly influential in explaining why people believe in conspiracy theories. If the ingroup with which a person identifies has a norm of endorsing conspiracy theories, this strongly predicts a personal belief in conspiracy theories (Cookson et al., 2021). Interestingly, participants consistently overestimated how widespread belief in conspiracy theories occurred within their ingroup.

Recent research by Oleksy et al. (2021) examined the influence of conspiracy theories' specific content, particularly around powerful and threatening outgroups. A sample of 2726 Polish participants found that exposure to COVID-19 conspiracy theories, that

included a threatening outgroup (e.g., COVID-19 is being spread to benefit specific groups), led to negative views about Chinese and Italian people and resulted in more acceptance of xenophobic policies. Thus the adoption of belief in conspiracy theories may cause increased prejudice towards outgroups. Such beliefs may be that the ingroups need to be vigilant with regard to possible powerful outgroups who may cause harm, in order to protect against future harm (van Prooijen & Douglas, 2017).

Although individuals who believe in the same conspiracy theories are likely to reject counterevidence, if the same evidence comes from a trusted source within the ingroup, they are far more likely to listen and believe it (Nisbet, 2009). The research by Nisbet (2009) establishes that a "trusted messenger" may be more successful if a valued ingroup member indicates their support for the evidence. For example, a member of a conspiracy theory forum may more willingly accept information (e.g., that COVID-19 is not a hoax) from an influential figure within the same conspiracy theory forum, rather than from scientists or government sources (Douglas, 2021).

Pattern Perception

Researchers have suggested a theory that a tendency towards illusory pattern perception causes belief in conspiracy theories (Marchlewska et al., 2018; van der Wal et al., 2018; van Prooijen et al., 2018; van Prooijen & Jostmann, 2013; Whitson & Galinsky, 2008). While pattern perception, in general, has been considered, it appears that illusory patterns (i.e., finding meaningful patterns in random stimuli or events) predict belief in conspiracy theories (Douglas & Sutton, 2018). An example of this is perceiving that long series of heads during a coin flip experiment are not random; instead, they are perceived as following a specific pattern or order (see van Prooijen et al., 2018). Belief in conspiracy theories is related to pattern perception, as such beliefs are often explained as being motivated by finding meaning in random events outside one's control (Goertzel, 1994). Often, this is an

attempt to alleviate the conspiracy theory believer's anxieties about their lack of control and uncertainty about specific events (Moulding et al., 2016).

Whitson and Galinsky (2008) first provided evidence for illusory pattern perception and belief in conspiracy theories, who posited that those who faced a lack of control may require more structure to make sense of such random patterns. Whitson and Galinsky (2008) considered the relationship between perception of visual patterns (in the form of pictures) while manipulating lack of control and measuring a range of beliefs about the stock market, superstitions and conspiracies. Notably, in experiment four, it was found that pattern perception, motivated by a lack of control, led participants to perceive illusory patterns in a random scattering of black dots on a white background and were also more likely to perceive a situation as a conspiracy (Whitson & Galinsky, 2008). Although this initial research was only considered indirectly through lack of control, further research aimed to clarify the relationship between belief in conspiracy theories and pattern perception.

Van Prooijen et al. (2018) conducted a comprehensive study that established an empirical relationship between belief in conspiracy theories and illusory pattern perception. Using a sample of US participants, van Prooijen et al. tested the idea that belief in conspiracy theories is related to illusory pattern perception. In a sequence of cross-sectional and experimental studies, they tested participants' pattern perception in relating to random coin tosses, art paintings, short text, and experimentally manipulating belief in conspiracy theories. Van Prooijen et al. (2018) differentiated between general pattern perception and illusory pattern perception, using paintings that contained identifiable patterns compared to other more chaotic paintings. Importantly, and related to early research by Goertzel (1994), the findings indicate that pattern perception assists individuals in predicting an uncertain future by acting as a coping mechanism for uncertain and distressing events (van Prooijen et al., 2018).

Further research by van der Wal et al. (2018) expands on the findings by van Prooijen et al. (2018), focusing on the tendency to draw implausible causal connections between events and their role in conspiracy thinking. Van der Wal et al. (2018) made an important distinction in the tasks performed in their study, using a newly designed scale to measure causal interpretations of spurious correlations (e.g., increase in global temperature is associated with an increased budget for the national science foundation). This differs from van Prooijen et al. (2018), who used visual stimuli such as paintings. The findings by van der Wal et al. established a significant correlation between conspiracy belief and illusory pattern perception. However, conspiracy belief was strongly predicted by the willingness to draw imaginary causal connections between events, even when controlling for the tendency to perceive illusory patterns (van der Wal et al., 2018). Thus, finding order in one's environment through implausible causal connections could serve as a way to find meaning and reduce the distress that uncertainty may be causing.

Monological Belief System

An interesting but somewhat controversial theory is the monological belief system, which explains why belief in a variety of conspiracies tends to positively correlate across people. Put simply, developing a belief in one conspiracy theory can reinforce or lead to beliefs in other conspiracy theories (Goertzel, 1994). This seminal research by Goertzel (1994) examined the general tendency to believe in conspiracy theories in 348 US-based participants. In his findings, he suggests there are two groups of belief systems – dialogical and monological. Those with dialogical belief systems engage with facts and evidence to test theories. Those with monological belief systems engage within their belief systems and do not search for factual evidence, where belief in one conspiracy theory reinforces belief in others (Goertzel, 1994).

The monological belief system was first argued by Goertzel (1994) as an approach for individuals to have a simple explanation for new events which may be complex or threaten the current belief systems. Therefore, believing in conspiracy theories may be a coping mechanism for finding meaning in potentially random and uncertain events outside their control. Miller (2020a) found evidence for this, suggesting that those who have higher uncertainty than their counterparts had higher belief in conspiracy theories. Thus, individuals who may find new phenomena distressing may turn to conspiracy theories to ease their uncertainty and consequently reinforce belief in other conspiracy theories.

The monological belief system is an influential theory to consider, as it has implications for how the conspiracist mindset begins. Notably, while times of stress and anxiety may encourage belief in conspiracy theories, once one conspiracy theory is taken as a fact, it may begin to lead the person down a 'rabbit hole' of sorts where they begin to explore more conspiracy theories.

The monological belief system may be less of a predictor of belief in conspiracy theories and more of a predictor of a general conspiracist mindset. Demonstrating this, Swami et al. (2011) used entirely fictitious conspiracy theories about Red Bull. In line with Geortzel's (1994) findings, when individuals believe in one conspiracy theory, they are more likely to believe in others, even if the initial theory was entirely fictitious. This suggests the general tendency to believe in conspiracy theories despite the content. Further evidence to suggest a general conspiracist mindset is found by Wood et al. (2012), which contradicts what is posited by the monological belief system. They found that participants often endorse competing and conflicting conspiracy theories. Not only do participants who endorse conspiracy theories have a higher chance at endorsing other theories, but these theories can be completely conflicting (e.g. believing that Osama Bin Laden is still alive and simultaneously believing that he has been dead for years).

More recently, Miller (2020a) considered the monological belief system within COVID-19 conspiracy theories in a large sample of 3019 US adults. Their findings indicate that the monological belief system exists amongst COVID-19 conspiracy theories. Miller's findings have important implications when considering the general population. It suggests that if an individual who otherwise did not have conspiracy beliefs then develops a belief in COVID-19 conspiracy theories, it could lead that person down a rabbit hole to consider other conspiracy theories (Douglas, 2021).

Existential Threat

The previous theories provide an insight into why some people may believe in conspiracy theories and why others do not. The Existential Threat Model of Conspiracy Theories by van Prooijen (2019) extends on these theories and provides a possible explanation of why people might develop belief in conspiracy theories at specific times. The value of such an explanation is that it has implications for intra-individual change in beliefs. Importantly, if an existential threat does indeed influence belief in conspiracy theories, this may provide useful intervention points to reduce such beliefs and have important implications for the current COVID-19 pandemic.

Existential threat is defined by van Prooijen (2019) as a feeling of anxiety or uncertainty, which can result from distressing events that have a considerable influence on one's life or values or even one's existence. Examples of such events include terrorist attacks, financial crises, and the COVID-19 pandemic. In general, it can be provoked both by societal crises and also by smaller day to day stressors.

The model posits that feelings of existential threat can trigger a sense-making process, which under certain conditions can lead to the endorsement of conspiracy theories (van Prooijen, 2019). The model establishes an empirically supported link between existential

threat and conspiracy theories through the processes people use to make sense of their social and physical environment (van Prooijen, 2019). The sense-making process will not always lead to conspiracy belief, only when an antagonistic outgroup is salient. The outgroups may include those both high in power (e.g., government officials, major corporations) or low in power (e.g., minority groups); however, the important aspect here is that these outgroups are viewed as different from the ingroup and are perceived to be untrustworthy (van Prooijen, 2019).

The sense-making processes are suggested to originate from evolutionary processes where existential threats create hypervigilance with regard to the social and physical environment (van Prooijen & van Vugt, 2018). The inborn threat-management system is suggested by van Prooijen and van Vugt (2018) to detect hostile coalitions and used as a survival tool to predict and reduce danger to their own ingroup. The Adaptive Conspiracist Hypothesis posits that ancient hunter-gathers were evolutionarily predisposed to being sceptical of possible outgroups, particularly when faced with an existential threat (van Prooijen & van Vugt, 2018). The scepticism could be valid and may have led to survival, but often it was unfounded and would appear to be conspiracy theories about outgroups. Thus, while possibly being evolutionally predisposed to sense-making processes may increase belief in conspiracy theories, this may not be so adaptive in modern society, and in the face of existential threat, it may lead to belief in conspiracy theories to satisfy existential motives.

According to the model, significant and provoking events in society may stimulate belief in conspiracy theories because they can comprise existential threats (van Prooijen, 2019). These provoking events are not limited to acts of violence or terror but can be long-standing such as the COVID-19 pandemic or even events such as the reality of climate change. Furthermore, the event may only be real in the believer's eyes, such as if an individual genuinely believes that extra-terrestrial reptilian humanoids who control

humankind live among us (Christian, 2016). Overall, such impactful societal events are often associated with elevated anxiety, stress and uncertainty levels, which may stimulate belief in conspiracy theories.

Conspiracy theories can be a source of existential threats themselves, further exacerbating feelings of uncertainty and fear (Douglas et al., 2017; van Prooijen, 2019). The belief in the existence of a powerful and evil conspiracy may be perceived as overwhelming, which may lead to an extra existential threat, thus influencing belief in more conspiracy theories. A cyclical loop is proposed in the model (see Figure 1), which may contribute to the general conspiracist mentality that is proposed by the monological belief system (Goertzel, 1994). Thus, it could suggest a causal effect of conspiracy theories as a source of anxiety itself.

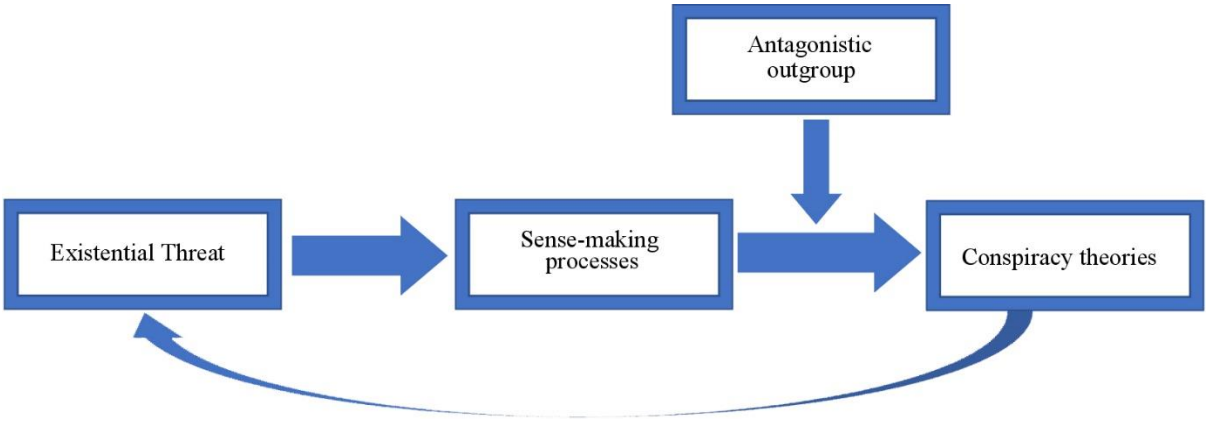
In support of existential threat predicting an increased belief in conspiracy theories, the emotions that underlie existential threat provide an empirical basis for such a claim. In particular, when a person faces an existential threat, feelings of lack of control and uncertainty often arise. An individual needs to make sense of their environment, particularly in the face of existential threat. Existential crises often activate feelings of uncertainty and lack of control (van den Bos, 2009), and personal beliefs often shape how an individual responds to such a threat. Early evidence from a study by van Prooijen and Acker (2015) indicates that a lack of control increases belief in conspiracy theories and identifies that increasing feelings of control can reduce belief in conspiracy theories. Recent experimental evidence from Stojanov et al. (2021) expands on this and indicates that perceived lack of control in the wake of political strife and natural disasters increases belief in conspiracy theories. Thus, Stojanov et al.'s (2021) findings provide a potential link between emotional responses to existential threats and an increased belief in conspiracy theories.

Uncertainty and feelings of lack of control are both associated with stress and anxiety due to the uncertainty and powerlessness that arises, particularly when faced with distressing societal events (Peters et al., 2017). Feelings of lack of control and anxiety can also be seen as having a role in the sense-making mechanisms associated with the increased belief in conspiracy theories (Šrol et al., 2021). Thus, an aspect of the Existential Threat Model of particular interest is how these two specific emotions underlying existential threat may predict belief in conspiracy theories.

Therefore, the current study argues that the Existential Threat Model of Conspiracy Theories is especially important to test. The model suggests that emotions which underly existential threat of perceived stress and anxiety may be influential in developing belief in conspiracy theories, especially during times of societal crises. If people tend to believe in conspiracy theories when they have higher levels of perceived stress and anxiety, this could better understand why some people believe in conspiracy theories and during specific times.

Figure 1

The Existential Threat Model of Conspiracy Theories



Note. This model depicts the cyclic nature of the Existential Threat Model of Conspiracy Theories, moderated by a salient antagonistic outgroup. Adapted from "An Existential Threat

Model of Conspiracy Theories," by J-W. van Prooijen, 2019, *European Psychologist, 25* (1), p. 17.

Stress and Anxiety as Forms of Existential Threat

The current research aims to consider one aspect of the Existential Threat Model of Conspiracy Theories: specifically, the prediction that existential threat may cause an increased belief in conspiracy theories. Stress and anxiety are both speculated to be intimately related to existential threats (Buttlar et al., 2017; Finseth, 2021; Ritchie et al., 2011; Sullivan et al., 2012; van Prooijen, 2019). Anxiety is often used to define an existential threat (Krohne, 2001; Lazarus, 1993; van Prooijen, 2019), and it has recently been directly associated with anxious arousal (see Tabri et al., 2020). Stress is also posited to be related to existential threats. For example, Buttlar et al. (2017) argue that psychological stress and existential threat have significant overlap. Drawing upon pioneering work on psychological stress by Lazarus and Folkman (1984), an existential threat could be viewed as an immense stressor that an individual may face. Thus, when provoked by an existential threat, psychological stress requires an individual to make sense of their environment in an effort that Lazarus (1993) termed coping. This coping process may be related to belief in conspiracy theories, as a result of the need to make sense of their uncertain environment. Indeed, in the past 10 years, literature on the influence of stress and anxiety on belief in conspiracy theories has flourished, and the following section is a discussion of the current research.

Stress and Belief in Conspiracy Theories

An area that has been identified as of interest to psychologists is the finding that higher levels of perceived stress appear to be associated with a tendency to believe in conspiracy theories (see Table 1). Perceived stress (often also called psychological stress) is defined by Cohen et al. (2007) as occurring when "an individual perceives that environmental demands tax or exceed his or her adaptive capacity" (p. 1685). Perceived stress is a subjective

appraisal of one's stress levels, which is a valuable guide in understanding individuals' responses to stressful situations or times in their lives.

Stress has been indirectly related to the increased tendency to believe in conspiracy theories in times of crisis. Belief in conspiracies in times of crisis has been traced to historical times, with van Prooijen and Douglas (2017) relating this to the great fire of Rome in 64 AD. Through their interpretation of the historical event, van Prooijen and Douglas found that conspiracy theories were rife during this societal crisis. In particular, Emperor Nero happened to not be in Rome during the fires, and conspiracy theories began to circulate regarding Nero, suggesting that he instigated the fires in order to build a new palace and an entirely new city. The claims that Nero was the one who instigated the fires did not sit well with Nero, and thus he shifted the blame onto the new religious sect of Christians, blaming them for the fire, which was the development of a new conspiracy theory. Overall, van Prooijen and Douglas (2017) argue that the tendency to believe in conspiracy theories increased during historical societal crises. Although, van Prooijen (2019) suggests that the conspiracy theories may be an added threat level, creating further distress rather than alleviating it.

A small amount of empirical research has considered the relationship between belief in conspiracy theories and perceived stress outlined in Table 1. Swami et al. (2016) conducted a notable study in this area, who proposed empirical evidence to suggest a relationship between belief in conspiracy theories and perceived stress. A sample of 420 US-based adults found a significant partial correlation (r = .15, when controlling for age and subjective social status). Swami et al. (2016) interpreted their results as suggesting an effect of stress on belief in conspiracy theories: "this view suggests that stressful events give rise to sense-making processes that favour conspiracy theories…. stressful intra-individual life events may sometimes lead to a tendency to adopt a conspiracist mindset" (p. 74). Importantly, the presence of salient life stressors may prompt a search for further

information, and the sense-making process may lead an individual to turn to conspiracy theories to fill the void, consistent with the Existential Threat Model (van Prooijen, 2019).

The COVID-19 pandemic is a major societal crisis and has been implicated with elevated stress (Gamonal-Limcaoco et al., 2021), with researchers particularly interested in the role stress may have with belief in conspiracy theories. While stress has not been considered directly, van Prooijen et al. (2021) found that in longitudinal research using Dutch participants, when COVID-19 conspiracy theories were endorsed at the beginning of the pandemic, this predicted deterioration in participants' self-reported well-being by December 2020. However, numerous cross-sectional studies have considered the role of COVID-19 and belief in conspiracy theories providing valuable insights into the role that stress may have in this process (Chen et al., 2020; Constantinou et al., 2021; Kuhn et al., 2021; Simione et al., 2021). Chen et al. (2020) found that belief in COVID-19 conspiracy theories was associated with high levels of psychological distress in 252 healthcare workers in Ecuador. Research by Constantinou et al. (2021) in a sample of 1001 participants from Greece and Cyprus at the beginning of the COVID-19 pandemic, found a small but significant bivariate correlation between distress levels and belief in COVID-19 conspiracy theories. Similarly, Kuhn et al. (2021) found a significant positive bivariate correlation between specific COVID-19 conspiracy theories and momentary stress (r = .19) in a large sample of 1684 Swiss participants. Lastly, Simione et al. (2021), who considered psychological factors that may influence COVID-19 vaccine hesitancy, found a significant positive bivariate relationship (r = .20) between belief in conspiracy theories and perceived stress in a sample of 374 Italian participants. Thus, initial correlational evidence suggests a propensity for those who have higher levels of stress to be more likely to endorse conspiracy theories. Determining whether these beliefs are increased during times of crisis requires further research.

Despite the initial findings by Swami et al. (2016) and the other studies cited above, some ambiguity remains as to whether there truly is a relationship between perceived stress and belief in conspiracy theories. A notable study that took a contrary position was conducted by Georgiou et al. (2020). Their survey-based study of 640 participants found no significant bivariate relationship between belief in conspiracy theories and perceived stress (r = .07). Their findings are consistent with those Ferreira et al. (2020), who in a sample of 438 participants, found no significant bivariate relationship between COVID-19 conspiracy theories and perceived stress (r = .01).

A recent study by Braud et al. (2021) aimed to replicate the findings of Georgiou et al. (2020). It uncovered significant errors in their research and challenged the conclusions made surrounding belief in conspiracy theories and perceived stress. The flaws in the study by Georgiou et al. were highlighted by Braud et al., which consisted of errors in the data analyses and inconsistencies with measurement scale scoring. Braud et al. did replicate the findings of Georgiou et al.; however, they explain that their use of three measures of conspiracy beliefs (Belief in Conspiracy Theories Inventory; BCTI, Generic Conspiracist Beliefs; GCB, and COVID-19 Conspiracy Beliefs) were all highly correlated and thus could not detect any other relationships. Additional analyses were conducted to address this issue, and a multiple regression analysis found that using a combined conspiracy belief scale (all three measures together), there was a significant positive partial correlation.

Further adding to the ambiguity, a recent preprint article by Samayoa et al. (2021) considered belief in COVID-19 conspiracy theories and stress in a sample of 441 US-based participants. Interestingly, the results show the complete opposite of what previous research has found, where increased stress predicted decreased belief in conspiracy theories (β = -.20, p < .001). Because these results were so different from previous results, we completed further analyses with the data set that had been made publicly available by Samayoa et al. (2021).

Strikingly, while not reported in the article, a bivariate relationship was not found between stress and belief in conspiracy theories (r = -.042, p = .349). However, we replicated the association found once the multiple regression model introduced negative economic consequences experienced due to COVID-19. What this highlights is potentially an issue of including negative economic consequences and creating a distorted path between stress and belief in conspiracy theories. Thus, Samayoa et al.'s (2021) conclusion about belief in conspiracy theories having a positive psychological benefit (reduced stress) may be subject to substantial uncertainty.

Although empirical evidence suggests a relationship between perceived stress and belief in conspiracy theories, the relationship is often contained in studies with a range of different predictors. In response to this issue, Williams et al. (2022) considered a bivariate relationship between perceived stress and belief in conspiracy theories in a sample of 372 participants from New Zealand and Australia. Similar to the results found by Swami et al. (2016), a significant positive correlation was found (r = .20). This is similar to the positive bivariate correlation found by Blondé et al. (2020) between conspiracy theory belief and perceived stress (r = .16) in a sample of 376 Swiss women. Thus, the evidence for a correlational relationship between perceived stress and belief in conspiracy theories is supported by a range of studies, albeit small.

The vast majority of evidence found for the relationship between belief in conspiracy theories and perceived stress is correlational, with the exception of the studies by Swami et al. (2016) and Braud et al. (2021). They used the multiple regression method and controlled for confounding variables. However, even these studies did not provide a clear case for why the variables were controlled and believed to be plausible confounding variables. The remaining studies did not control for plausible confounding variables; nor can any inferences be made regarding the causal mechanisms of this relationship. Therefore, there still needs to

be further research that uses more robust statistical analyses or designs to determine whether perceived stress has a causal effect on belief in conspiracy theories.

Table 1

Summary of Studies Involving Stress and Conspiracy Beliefs

Author	Country	*N*	Statistical Method	Control variables	Conspiracy Scale	Stress Scale	Relationship	Pre-registered
Blondé et al. (2020)	Switzerland	376	Bivariate correlation	-	1-item measure of Conspiracy Belief	PSS (French)	*r* = .16**	No
Braud et al. (2021)	No country specified	237	Multiple regression	Education	Combined Conspiracy Beliefs	PSS	B = .83** (Table 10)	Yes
Constantinou et al. (2021)	Cyprus & Greece	1,001	Bivariate correlation	-	Original COVID-19 Conspiracy Beliefs	COVID-19 Distress	*r* = .13***	No
Ferreira et al. (2020)	Not specified	438	Bivariate correlation	-	Original COVID-19 Conspiracy Beliefs	PSS	*r* = .01	No
Georgiou et al. (2020)	UK, US, Europe	640	Bivariate correlation	-	BCTI	PSS	*r* = .07	No
Kuhn et al. (2021)	Switzerland	1,684	Bivariate correlation	-	Specific COVID-19 conspiracy beliefs.	MSS	*r* = .19***	No

Simione et al. (2021)	Italy	374	Bivariate correlation	-	BOC-19	PSS	r = .20**	No
Swami et al. (2016)	USA	420	Multiple regression	Age, Subjective social status	BCTI	PSS	r = .15*	No
Williams et al. (2022)	New Zealand, Australia	372	Bivariate correlation	-	Original Belief in Conspiracy Theory Scale	PSS	r = .20***	Yes

Note. BOC-19 = Beliefs on COVID-19 Conspiracy sub-scale; BCTI = Belief in Conspiracy Theories Inventory; Combined Conspiracy Beliefs = Belief in Conspiracy Theories Inventory, Generic Conspiracist Beliefs and COVID-19 Conspiracy Beliefs; MSS = Momentary Subjective Stress; PSS = Perceived Stress Scale; PSS-French = Perceived Stress Scale (French version). All studies used cross-sectional survey designs. The different studies used a variety of effect sizes measures, including correlations (r) and unstandardised regression weights (B).

*p < .05, **p < .01, ***p < .001

Anxiety and Belief in Conspiracy Theories

Another potential predictor of belief in conspiracy theories of particular interest to psychologists is anxiety. Anxiety is often cited as a prominent predictor of belief in conspiracy theories (see Table 2). Anxiety also has a key role in van Prooijen's (2019) Existential Threat Model of Conspiracy Theories. The theory posits that belief in conspiracy increases during existential threat (through feelings of anxiety and uncertainty) only when antagonistic outgroups are salient. The current COVID-19 crisis may evoke feelings of existential threat and thus influence belief in conspiracy theories. Indirect evidence is provided by Radnitz and Hsiao (2020), who found that individuals who have higher levels of COVID-19-related anxiety support politicians who endorse conspiracy theories. The research suggests that in an effort to reduce uncertainty, an individual may endorse leaders who endorse conspiracy theories as it provides a simple explanation that may serve to lower their anxiety (Radnitz & Hsiao, 2020).

A sense of ambiguity exists in the current literature which considers anxiety and belief in conspiracy theories. The ambiguity derives from two influential studies conducted by Grzesiak-Feldman (2007, 2013). In the first of her studies, she examined the role of state and trait anxiety in conspiracy thinking in a sample of 118 Polish high school students. State anxiety refers to the amount of anxiety felt *right now* versus trait anxiety which is purported to measure anxiety as a personality trait and is measured with the State-Trait Anxiety Inventory (STAI; Spielberger, 2010). Initial analyses found no significant correlation between conspiracy thinking and either type of anxiety. However, she conducted further analyses which considered genders separately. It was found that boys (n = 49) showed a positive but not statistically significant correlation with trait anxiety (r = .39) but not statistically significant, whereas conspiracy thinking girls (n = 69) showed a negative but not statistically significant correlation with trait anxiety (r = -.32). She concluded that "trait

anxiety is another personality characteristic associated with conspiracy thinking" (p. 202), which is a rather large claim given the dubious analyses approach (i.e., reporting exploratory analyses as evidence of an effect) and small sample size.

Grzesiak-Feldman (2013) conducted further research to consider whether being exposed to a high anxiety situation would increase conspiracy thinking in an attempt to solidify anxiety as a key antecedent of conspiracy belief. The research consisted of 200 Polish university students who participated in three studies. Study 1 tested 87 participants' anxiety and their conspiracy thinking about Arabs, Germans and Jewish people. Grzesiak-Feldman used a six-item measure of conspiracy thinking and placed each race or nationality in the question "members of the given nationality want to subordinate the world's mass media to themselves" (p. 114). A multiple regression model was used to analyse the data, with two analyses being run, one with state anxiety and one with trait anxiety as the dependent variable. When controlling for trait anxiety, it was found that state anxiety had a positive partial correlation ($r = .25$, $p < .05$) with conspiracy thinking about Jewish people, but conspiracy thinking about Arabs and Germans had no significant association. Study 2 consisted of a sample of 46 male Polish university students. Participants were split into a high anxiety situation (15 minutes before an exam) and a control condition (before a lecture). The two groups appear to have been divided into a high anxiety group and a control group; however, key information about randomisation was unclear. From the findings in the previous study, only conspiracy thinking about Jewish people was used, and only state anxiety was used. A significant difference in conspiracy thinking about Jewish people was found (using a one-way ANOVA), with high anxiety increasing conspiracy thinking. To replicate the findings in Study 2, a female sample of 67 psychology students completed a similar study. Consistent with the previous two studies, it was found that when participants

were exposed to a situation with high anxiety, it was also associated with elevated levels of conspiracy thinking about Jewish people.

The reason for going into such detail about these studies by Grzesiak-Feldman (2007, 2013) is that they are particularly important (176 citations) in the conspiracy theory literature as evidence for an association between conspiracy beliefs and anxiety. While these studies are a valuable contribution to the field, the validity of their conclusions is limited given the small sample sizes and low statistical power. Furthermore, other than controlling for trait anxiety in Study 1, no attempt was made to control for possible confounding variables. Given that the participants were also young, well educated, and university-aged, the generalisability of this research is limited. However, more recently, studies have sought to address these issues.

Recent cross-sectional studies support the relationship between anxiety and belief in conspiracy theories. Sallam et al. (2020) considered the influence of conspiracy belief in a sample of 1540 University of Jordan students in the country of Jordan. Sallam et al. specifically considered the effects of knowledge and anxiety on belief in COVID-19 conspiracy theories. It was found that lower knowledge about the virus and higher anxiety levels were associated with a high prevalence of believing the pandemic is a part of a conspiracy (Sallam et al., 2020). Furthermore, Simione et al. (2021), in a sample of 374 Italian participants, found a bivariate correlation between belief in conspiracy theories and the STAI ($r = .14$, $p < .01$). Similarly, Newheiser et al. (2011) found that individuals may be attracted to conspiracy theories to cope with existential anxiety stemming from thoughts of death. Attachment anxiety has also been associated with conspiracy thinking, with partial correlations suggesting significant relationships ($r = .16$, $r =. 18$) in two studies by Green and Douglas (2018).

While the research discussed above has been cross-sectional, longitudinal research by Leibovitz et al. (2021) investigated the relationship between COVID-19 conspiracy beliefs and anxiety over two-time points using a sample of US-based adults (N = 395). The findings include that when controlling for anxiety and belief in conspiracy theories at baseline, the relationship between anxiety and belief in conspiracy theories were negligible upon follow up one month later (r = .07, p > 0.05). Likewise, Heiss et al. (2021), in a sample of 632 Austrian participants assessed at two-time points, found that two months later, threat perception (i.e., anxiety about COVID-19) positively predicted an increase in belief in COVID-19 conspiracy claims when controlling for baseline conspiracy claims at time one (β = .05, p < .01). However, this effect was almost negligible in size. Overall, these two studies have an important limitation; using only two-time points may not be enough time between measurements to identify if increased anxiety predicts increased belief in conspiracy theories.

Liekefett et al. (2021) addressed this limitation in research which considered the role of anxiety and conspiracy beliefs in two longitudinal studies. In Study 1, a convenience sample of German participants (N = 405) was surveyed four times every two weeks. The researchers used a cross-lagged panel model to distinguish between within-person effects (e.g., how much an individual varies) and between-person effects (e.g., differences between individuals). Thus, in their first study, increases in an individual's anxiety did not subsequently increase conspiracy beliefs (β = .05, p = .297). In their second study, Liekefett et al. (2021) used a large representative sample of German participants (N = 1012), surveying participants every four months over an 18-month time frame. Despite the longer time frame between survey responses, the effects remained the same as Study 1, with no significant within-person effects between increased anxiety and subsequent belief in conspiracy theories. Interestingly, the between-person effects in both of Liekefett et al.'s (2021) studies found on average, more anxious participants were more likely to believe in conspiracy theories (r =

.26, $p < .001$), similar size to other bivariate correlations found (Green & Douglas, 2018; Grzesiak-Feldman, 2013; Simione et al., 2021). This suggests further ambiguity to the relationship between anxiety and belief in conspiracy theories, given the disparity between the within-person effects and between-person effects.

Previous studies have not been able to determine whether a relationship exists between anxiety and belief in conspiracy theories; one possibility is due to confounding variables. A large-scale study by De Coninck et al. (2021) with data from eight COVID-affected countries ($N = 8806$), which considered conspiracy theories and misinformation about COVID-19, provides a unique look into the role anxiety plays. They found a significant bivariate correlation ($r = .23$ $p < .001$) between belief in conspiracy theories and anxiety. However, once a structural equation model was included, and education and age were controlled for, the three-item measure of conspiracy beliefs was not associated with anxiety ($\beta = .03$). When broken down into separate models per country, New Zealand and the US showed no significant or sizeable association between belief in conspiracy theories and anxiety ($\beta = .04$, $\beta = -.08$). Similarly, in a multiple regression analysis, once Swami et al. (2016) accounted for stress, age, and subjective social status, the association between trait anxiety and belief in conspiracy theories, was negligible ($r = .10$, $p < .05$). Survey-based research by Bowes et al. (2020) found similar results, with a negligible non-significant bivariate relationship ($r = .01$) in a sample of 327 US-based participants. Furthermore, once Heiss et al. (2021) had controlled for confounding variables (age, gender, level of education and overall news consumption), the overall effect of $\beta = .05$ was similar to that of De Coninck et al. ($\beta = .03$). This suggests that the relationship between anxiety and belief in conspiracy theories may be unsubstantial once appropriate variables are controlled for.

An area of interest is that a small amount of research conducted during the initial COVID-19 pandemic in 2020 found a significant relationship between conspiracy beliefs and

anxiety. For example, cross-sectional research by Peitz et al. (2021) found in a sample of 1,579 UK participants that that belief in COVID-19 conspiracy theories in May 2020 predicted an increase in anxiety levels ($\beta = .17$, $p < .001$). Similarly, Leibovitz et al. (2021) found in their longitudinal research (May 2020) that those who endorsed conspiracy theories were found to have higher anxiety levels at follow-up ($r = .10$ $p < .05$). Potential explanations could be due to the COVID-19 pandemic being viewed as a major societal crisis provoking existential threat. As per the Existential Threat Model of Conspiracy Theories, the existential threat may lead to sense-making processes that may increase belief in conspiracy theories. Outgroups are particularly salient during the pandemic, with governments, pharmaceutical companies and entire countries being targeted as the outgroup. Therefore, targeting COVID-19-related conspiracy theories may be eliciting higher anxiety levels with the critical factor of antagonistic outgroups being salient, leading to the completion of the model of increased belief in conspiracy theories.

In terms of experimental evidence, Radnitz and Underwood (2017) conducted a well-designed study that explicitly considered anxiety and belief in conspiracy theories in a sample of 1997 US-based participants. To test for belief in conspiracy theories, they developed a fictional conspiracy vignette, presented as a news article with details left intentionally vague, so participants might perceive a conspiracy or not. Half of the participants were primed using the Macroeconomic Anxiety Prime (MAP), which was a statement about the negative consequences of the US financial crisis. The results of the anxiety prime compared to the no prime was significant ($M_{noprime} = 3.62$, $M_{prime} = 3.79$, $p < .001$), indicating a small effect ($d = .21$), suggesting that participants who were exposed to the anxiety prime were more likely to perceive the vignette as a conspiracy. Additionally, partial correlations suggest that a momentary surge of anxiety successfully primed participants to perceive the vignette as a conspiracy ($r = .15$, $p < .001$). While this research provides an informative account of the

relationship between anxiety and belief in conspiracy theories, limitations apply. Radnitz and Underwood (2017) only measured belief in conspiracy theories relating to a fictional vignette, not belief in conspiracy theories that are of contemporary relevance. Thus, it is unclear how generalisable the experimental results are.

The Existential Threat Model and previous literature have suggested that anxiety cause belief in conspiracy theories. However, it is also possible that belief in conspiracy theories causes anxiety. Indeed, Liekefett et al. (2021), who, in their first longitudinal study (starting March 2020), found a significant relationship of conspiracy beliefs predicting increased anxiety in later time points ($\beta = .37$, $p = .012$). However, they could not replicate this when a second study was conducted over 18 months when surveyed every four months. Unlike Study 1, Liekefett et al. (2021) found no evidence of within-person associations between conspiracy beliefs and anxiety. This means that ambiguity remains about whether belief in conspiracy theories affect anxiety.

In the reviewed literature, three anxiety studies are particularly relevant to the current research (De Coninck et al., 2021; Heiss et al., 2021; Radnitz & Underwood, 2017). Specifically, De Coninck et al. (2021) and Heiss et al.'s (2021) use of structural equation modelling techniques to determine specific causal pathways between anxiety and belief in conspiracy theories. However, there are limitations with the measurement of conspiracy theories, as both studies use a three-item measure of conspiracy theories developed explicitly for each of their studies. Additionally, both studies did not make an explicit case for why the variables they chose are plausible confounding variables. While the measurement error has been accounted for in their model, the current research aims to build on this by using a larger measure of specific conspiracy theories to measure participants' belief in conspiracy theories more accurately. Lastly, Radnitz and Underwood (2017) provide a useful insight into the

possible role of anxiety on belief in conspiracy theories, but the use of ‘real world’ conspiracy theories may enhance the generalisability of the research.

Table 2

Summary of Studies Involving Anxiety and Conspiracy Beliefs

Authors	Country	*N*	Research Design	Statistical Method	Control Variables	Conspiracy Scale	Anxiety Scale	Relationship	Pre-registered
Bowes et al. (2020)	US	327	Cross-sectional	Bivariate correlation	-	BCTI	PROMIS	r = .01	No
De Coninck et al. (2021)	Eight Countries	8,806	Cross-sectional	Structural equation model	Age and education	Original Belief in conspiracy Theories Scale	GAD-7	β = .04	No
Green and Douglas (2018) Study 1	Majority US	246	Cross-sectional	Bivariate correlation	-	GCB	ECR-R	r = .24***	No
Green and Douglas (2018) Study 2	Majority UK	230	Cross-sectional	Multiple regression	Age, education level, and religiosity	SCP	ECR-R	β = .18*	No
Grzesiak-Feldman (2007)	Poland	118	Cross-sectional	Bivariate correlation	-	Conspiracy Beliefs Scale	STAI - Polish adaptation	State; r = .05 Trait; r = .02	No
Grzesiak-Feldman (2013) Study 1	Poland	87	Cross-sectional	Multiple regression	State anxiety and trait anxiety	Conspiracy Thinking about Jewish People	STAI - Polish adaptation	State; r = .27* Trait; r = .20	No
Grzesiak-Feldman (2013) Study 2	Poland	46	Experiment/ survey	One way ANOVA	-	Conspiracy Thinking about Jewish People	Anxiety Prime (pre-exam)	$F(1, 44) = 4.08$*	

Grzesiak-Feldman (2013) Study 3	Poland	67	Experiment/ survey	Least Significant Difference Test	-	Conspiracy Thinking about Jewish People	Anxiety Prime (pre-exam)	M_{exam} = 55.92 vs. $M_{control}$ = 49.24*	
Heiss et al. (2021)	Austria	1,024	Cross-sectional	Multiple regression	Age, gender, level of education and overall news consumption	Original Belief in COVID-19 Conspiracy Theories	Threat Perception	β = .16***	No
Heiss et al. (2021)	Austria	632	Longitudinal (two-time points)	Panel analysis	Age, gender, level of education and overall news consumption	Original Belief in COVID-19 Conspiracy Theories Scale	Threat perception	β = .05**	No
Leibovitz et al. (2021)	US	395	Longitudinal (two-time points)	Cross-lagged panel correlation	-	FICS	GAD-7	*r* = .07	No
Liekefett et al. (2021) Study 1	Germany	405	Longitudinal (four-time points)	Cross-lagged panel correlation	-	CMQ	GAD-7 (German)	β = .05	No
Liekefett et al. (2021) Study 2	Germany	1012	Longitudinal (four-time points)	Cross-lagged panel correlation	-	CMQ	GAD-7 (German)	β = .02	No
Peitz et al. (2021)	UK	1,579	Cross-sectional	Structural equation Model	Age, gender, political orientation, and personal exposure to COVID-19	COVID-19 Conspiracy Theories (1-item)	1-item Anxiety	β = .17***	Yes
Radnitz and Underwood (2017)	US	1,997	Experiment/ survey	Cohen's *d*	Income, education, African	Conspiracy vignette	MAP	*d* = 0.21	No

					American, age, gender				
Sallam et al. (2020)	Jordan	1,540	Cross-sectional	Mann-Whitney U test	-	Belief in COVID-19 conspiracy theories	GAD-7	M-W = 9.0 vs. 7.7**	No
Simione et al. (2021)	Italy	374	Cross-sectional	Bivariate correlation	-	BOC-19	STAI	r = .14**	No
Swami et al. (2016)	USA	420	Cross-sectional	Multiple regression	Age, Subjective social status	BCTI	STAI	Trait; r = .10* State r = .06	No

Note. BOC-19 = Beliefs on COVID-19 Conspiracy sub-scale; CMQ = Conspiracy Mentality Questionnaire; ECR-R = Experiences in Close Relationships-Revised (ECR-R) scale; Anxious + Avoidance scale; FICS = Flexible Inventory of Conspiracy Suspicions; GAD-7 = General Anxiety Disorder 7-Item; GCB = Generic Conspiracist Beliefs Scale (Brotherton et al., 2013); MAP = Macro-economic anxiety prime;; PROMIS = Patient-Reported Outcomes Measurement; SCP = Specific Conspiracy Beliefs (Douglas et al 2016); STAI = State-Trait Anxiety Inventory. The different studies used a variety of effect sizes measures, including correlations (*r*), unstandardised regression weights (B), standardised regression weights (β), analysis of variance (*F*), unstandardised means (*M*), and Mann-Whitney U test (M-W).

*p < .05, **p < .01 ***p < .001

Rationale for Research

While evidence suggests that perceived stress and anxiety are positively related to belief in conspiracy theories, it is still unclear whether the predictions made within the Existential Threat Model of Conspiracy Theories are valid.

Bivariate correlations were prominent in the research surrounding stress and belief in conspiracy theories, with seven out of the nine studies finding a bivariate correlation. While most of the research suggests an association between perceived stress and belief in conspiracy theories, it is an area that needs further research as correlation does not equal causation, and several limitations may apply to these findings. Using more complex multivariate statistical methods and controlling for plausible confounding variables are approaches by which we aim to improve on this area. This is an essential aspect of accounting for the unique variance perceived stress may impose on belief in conspiracy theories.

On the other hand, a large amount of research has considered anxiety and belief in conspiracy theories, which also consist of longitudinal and experiment designs; yet it is argued that ambiguity still remains. Of the reviewed studies, four are cross-sectional studies with no controls for confounding variables (Bowes et al., 2020; De Coninck et al., 2021; Grzesiak-Feldman, 2007; Simione et al., 2021). Six are cross-sectional studies where some variables are controlled for, but do not provide an explicit argument for why the controlled variables are the only plausible control variables (De Coninck et al., 2021; Green & Douglas, 2018; Grzesiak-Feldman, 2013; Heiss et al., 2021; Peitz et al., 2021; Swami et al., 2016). Furthermore, the longitudinal studies have found negligibly small effects and differ somewhat from the findings of the cross-sectional studies (De Coninck et al., 2021; Heiss et al., 2021; Liekefett et al., 2021). Additionally, experimental evidence by Grzesiak-Feldman (2013) was low on power and lacked key information about randomisation. Lastly, while

Radnitz and Underwood (2017) provide one of the most informative studies, it is a relatively contrived experiment potentially low on generalisability to beliefs about popular conspiracy theories. Therefore, a considerable amount of ambiguity remains about the effect of anxiety on belief in conspiracy theories.

An essential aspect of the Existential Threat Model of Conspiracy theories that do not form part of the current research design is a salient antagonistic outgroup. While it is indeed posited to be an influential aspect of the model (van Prooijen, 2019), it is not considered for various reasons. There is still limited evidence that stress and anxiety have main effects on belief in conspiracy theories. Detecting moderator effects require a substantially larger sample size to detect when compared to main effects within observational research (Dawson, 2014; Shieh, 2009). Therefore, with the current literature suggesting a relatively small effect of stress and anxiety on belief in conspiracy theories (i.e. $r = < .20$), the power to detect an interaction effect (of a salient antagonistic outgroup) would likely be much lower than that of the main effect (Dawson, 2014). The cost of a considerable sample size to test for an interaction effect was deemed inappropriate; rather, attempting to establish whether anxiety and stress affect belief in conspiracy theories is first necessary to understand. If evidence for the main effect is established, specific efforts to detect whether the salience of antagonistic outgroups moderates this effect can be completed.

Importantly, only indirect evidence is provided by van Prooijen (2019) to suggest salient antagonistic outgroups moderates the main effect of existential threat and belief in conspiracy theories. Two main studies were argued to be evidence for the claimed interaction effect. First, van Prooijen and Jostmann (2013) manipulated uncertainty and the perceived morality of an outgroup. Second, Marchlewska et al. (2018) experimentally considered the need for cognitive closure (i.e., intolerance of uncertainty) by making conspiratorial explanations about outgroups salient. Therefore, explicitly testing whether salient

antagonistic outgroups moderate the main effect may relate to uncertainty and belief in conspiracy theories. However, to our knowledge, the moderating effect has not been empirically tested within the relationship between stress and anxiety on belief in conspiracy theories. Thus, we aim to establish whether the main effect exists before establishing whether a salient antagonistic outgroup moderates this.

Hypotheses

The following hypotheses were designed to analyse the extent to which perceived stress and anxiety have a causal effect on belief in conspiracy theories:

H1: Perceived stress has a positive effect on belief in conspiracy theories.

H2: Anxiety has a positive effect on belief in conspiracy theories.

The hypotheses were tested using a cross-sectional observational design. While a longitudinal design may have provided stronger causal inferences, this was not feasible in a Master's project due to time and financial limitations. Similarly, experimentally manipulating stress and anxiety to a sufficient extent to plausibly affect belief in conspiracy theories presented significant ethical risks. While previous researchers have conducted experiments, due to the COVID-19 pandemic and cancellation of in-person exams at Massey University, Grzesiak-Feldman's (2013) procedure would have been impossible to carry out. Additionally, Radnitz and Underwood (2017) included a very mild manipulation of anxiety, whose effects may only have been detectable due to the measurement of belief in conspiracy theories relating to a fictional vignette, rather than conspiracy theories that are already discussed in popular discourse, where opinions are likely to be less vulnerable to modification. Therefore, a cross-sectional design that explicitly focused on causal inference was deemed most appropriate to test the hypotheses (Grosz et al., 2020).

Causal Inference

While correlation does not mean causation, advances in contemporary methodological literature provide an approach to making causal statements when only observational data is available (Grosz et al., 2020; Rohrer, 2018; Westfall & Yarkoni, 2016). Therefore, a unique feature of the current research is the use of a cross-sectional design to achieve explicit causal inferences. Drawing causal inferences from observational data is not within the current nonexperimental psychological research norms, with Grosz et al. (2020) suggesting a *taboo* against using causal language within nonexperimental research (e.g., cross-sectional designs). Thus, the following three key points suggested by Grosz et al. (2020) highlight the importance of making causal inferences explicit when causal inferences are sought from an observational design.

First, it is common for psychology studies to implicitly draw causal inferences based on observational data. Traditionally, nonexperimental psychologists approach making causal inferences from observational data with caution, and researchers commonly avoid explicitly addressing the causal objectives of the research (Grosz et al., 2020; Hernán, 2018). While nonexperimental psychologists often avoid using explicit causal language, causal inference is often the intention of such research. The issue arises for subsequent interpretation, where the original cross-sectional findings are often referred to as if the original research was designed to test for causal effects (Grosz et al., 2020). For example, even though the research by Grzesiak-Feldman (2013) refrained from making causal inferences, a disconnect has appeared with subsequent studies, which often refer to the findings by Grzesiak-Feldman (2013) as if causal effects were found. An example of this is seen in research by Swami et al. (2016), who inferred that Grzesiak-Feldman (2013) “found pre-exam anxiety increased conspiracist ideation about Jewish people” (p. 72). Therefore, it is arguably more beneficial to test for causal effects transparently, especially if such research may be interpreted as

involving causal effects anyway. Once the assumptions are articulated, readers can judge the plausibility of these assumptions.

Second, there are situations like the current research, where observational data is the best available data source since practical or ethical difficulties rule out an experiment. When this is the case, there is a need to demonstrate causal inference rather than simply using vague language that implies causal inferences without making them explicit (e.g., writing of one variable “predicting” another). Such implicit causal inference allows researchers to make such claims, but they then do not need to defend those causal claims because they have not directly stated that it was the intended goal of the research.

Finally, when a researcher’s goal is causal inference, it is better to be explicit and open. However, being open about such intentions is not enough; what is essential is then pursuing causal inference rigorously and transparently (Grosz et al., 2020). Such transparency allows a clear understanding of the causal effect's rationale, allowing such claims to be falsifiable and providing a more critical reflection of the proposed causality. Articulating the underlying assumptions is also necessary to treat the statistical estimates as accurate estimates of causal effects (Waldmann et al., 2006). In the current research, the estimates of the effects of perceived stress and anxiety on belief in conspiracy theories rely on three main assumptions. First, belief in conspiracy theories does not affect perceived stress or anxiety. Second, no other uncontrolled variables affect both stress or anxiety and also belief in conspiracy theories except for the four variables that have been controlled for. Lastly, the confounding variables that have been controlled for are not affected by stress or anxiety (i.e., they are not mediating variables). Thus, it is better to be transparent than to avoid explicitly discussing the problem of causality, then making only implied causal inferences and sending mixed messages.

In summary, like Grosz et al. (2020), we argue that in aiming to be as transparent as possible about the assumptions made, it is possible to make claims about the causal effect of stress and anxiety on belief in conspiracy theories. The transparency of such assumptions will allow the reader to develop their own opinion on the strength of the causal effects. A crucial step in this process is articulating what variables may be plausible confounding variables, as discussed in the following section.

Confounding Variables

A confounding variable is a factor that affects both the independent variable and the dependent variable. Identifying and controlling for plausible confounding variables is essential when attempting to derive causal inferences from observational data (Grosz et al., 2020; Hernán, 2018; Rohrer, 2018; Westfall & Yarkoni, 2016). In line with methodological advances, we aimed to be careful and transparent in making such causal inferences, particularly with a clear rationale of why it is believed the following are plausible confounding variables that affect the independent and dependent variables of stress, anxiety and belief in conspiracy theories.

Controlling for plausible confounding variables aims to provide evidence for incremental validity claims. For example, if the regression coefficient for perceived stress and belief in conspiracy theories is positive and statistically significant, even when controlling for plausible confounding variables, then perceived stress may be a unique predictor of belief in conspiracy theories, over and above that of the proposed control variables (Westfall & Yarkoni, 2016). Thus, quantifying the incremental contribution of possible psychological antecedents of belief in conspiracy theories after controlling for these differences provides an added level of confidence in the ability to draw causal inferences (Westfall & Yarkoni, 2016). This applies particularly to the ability to account for the unique contribution perceived stress and anxiety may have on predicting belief in conspiracy theories. When statistically

controlling for confounding variables, issues are addressed using structural equation modelling and explained later in the following chapter.

Stating why certain control variables have been included and justified in the literature context adds clarity in interpreting the results and in ensuring that the direct effect is not due to the effects of a plausible confounding variable (Hernán, 2018). Thus, the control variables in this study were carefully selected. Education, political orientation, subjective social status and age were identified as plausible confounding variables that may influence belief in conspiracy theories, anxiety and stress. The following section explains why it is believed these may act as plausible confounding variables.

Education: Numerous studies have found that educational level affects belief in conspiracy theories (Braud et al., 2021; Lantian et al., 2017; van Prooijen, 2017; van Prooijen et al., 2021). Notably, higher levels of education predict lower beliefs in conspiracy theories, and lower levels of education predict higher levels of belief in conspiracy theories (van Prooijen, 2017). An individual's educational attainment may also be associated with differing stress and anxiety levels. Having a higher level of education may lead to lower stress and anxiety levels due to having more career prospects and resources to cope with stressful and challenging conditions (Nilsen et al., 2014). Thus, education is a plausible confounding variable possibly influencing belief in conspiracy theories, perceived stress and anxiety.

Political Orientation: Political orientation has been the subject of a wealth of research indicating an effect on belief in conspiracy theories (Garrett & Bond, 2021; Hornsey et al., 2021; Imhoff et al., 2022; Swami & Furnham, 2014; Uscinski & Parent, 2014; van Prooijen et al., 2015; Winter et al., 2021). Indirect evidence obtained by Garrett and Bond (2021) found that individuals with a right-wing orientation were more susceptible to believing misinformation than those with a left-wing orientation in the US. Similarly, US

individuals with a right-wing political orientation were more likely to endorse conspiracy theories (Winter et al., 2021). While most research suggests that right-wing political orientation research is associated with greater belief in conspiracy theories, some research suggests the opposite (Peitz et al., 2021). Notably, van Prooijen et al. (2015) found that political extremism at both sides of the political spectrum is strongly associated with belief in conspiracy theories. More definitively, Imhoff et al. (2022) found in a study of 26 countries ($N = 104{,}253$) that political orientation on the extreme left and right predicted a conspiracy mentality but was more pronounced for extreme right-wing beliefs.

Different political orientations have also been found to affect anxiety symptoms (Helminen, 2018). However, the relationship between political orientation and stress and anxiety is not consistent between countries (Brandt et al., 2021). The majority of evidence suggests a relationship between right-wing political orientation and stress and anxiety, with evidence from Rigoli (2020) indicating that right-wing political orientation predicts higher levels of COVID-19 anxiety in the US. However, in the UK, left-wing orientation predicts higher anxiety and stress levels, which Helminen et al. (2021) suggested is due to social inequality and environmental factors.

Subjective Social Status: Research suggests lower social status affects belief in conspiracy theories (Douglas et al., 2017; Goertzel, 1994; Mao et al., 2020; Swami et al., 2016; van Prooijen, 2017). In those who identify as having lower social status, it is plausible that they feel marginalised from society, which is a prominent predictor of belief in conspiracy theories (van Prooijen, 2017). Thus, feelings of being marginalised may be blamed on malevolent groups which are closely aligned with conspiracy theories. Moreover, social status has also been found to affect stress and anxiety, indicating that individuals of lower social status have higher levels of stress and anxiety (Morrissey & Kinderman, 2020; Ursache et al., 2015). Biological research affirms this, finding that lower socioeconomic

status affects stress hormones (Cohen et al., 2006). Additionally, Baum et al. (2006) posit that lower SES predicts higher distress levels. Thus, social status could plausibly be a confounding variable in the current research.

Age: Age is often found to negatively affect belief in conspiracy theories, meaning younger individuals are more likely to believe in conspiracy theories (De Coninck et al., 2021; Green & Douglas, 2018; Swami et al., 2016; van Prooijen, 2017). In fact, of the ten identified studies on stress and anxiety which controlled for plausible confounding variables, eight controlled for age and found an effect of younger age influencing belief in conspiracy theories. Furthermore, compared to middle-aged and older-aged adults, younger individuals have been found to have higher stress and anxiety levels (Knepple Carney et al., 2021). Thus, younger participants are likely to endorse conspiracy theories at a higher rate and respond with higher perceived stress and anxiety scores, making age a plausible confounding variable.

Study 1

Method

Preregistration

Study 1 was preregistered on the Open Science Framework before data collection. The preregistration included a theoretical background, the study hypotheses, the data analysis plan and inferential criteria. In addition, the sample size and power analysis were made transparent. The preregistration was made public (https://osf.io/rt6ub), along with a copy of the de-identified data, code and materials to enable other researchers to replicate the findings (https://osf.io/sfuz9/?view_only=495a049c99df46579ceb52a32d0771fe).

Preregistration has gained popularity as a practical response to the *replication crisis* within psychology and a helpful approach to identifying questionable research practices (Nosek et al., 2018, 2019). Preregistering a study means openly registering the predicted hypotheses, methods and analyses before the study begins. In the reviewed literature of belief in conspiracy theories with anxiety and perceived stress, there were only three preregistered studies in the current literature (Braud et al., 2021; Peitz et al., 2021; Williams et al., 2022). While the non-preregistered research is not necessarily flawed, it does allow researchers with a large amount of freedom when analysing their data (see Head et al., 2015; Kerr, 1998; Simmons et al., 2011). Therefore, the current research aims to explicitly specify what decisions were made *a-prori* (i.e., before data collection) and what was decided after data collection.

Design

The current research used a cross-sectional survey design using hypotheses to draw causal inferences based on observational data. As previously discussed, experimentally manipulating people's levels of stress and anxiety could have been possible; however, this

has practical and ethical implications, which ultimately was deemed unethical. Therefore, observational data were selected to overcome such issues.

Another aspect of making causal inferences is ensuring the accuracy of the measured variables. Measurement errors in the predicting variables and confounding variables can bias the validity of causal inferences (Rohrer, 2018). Thus, the current research uses a latent variable approach for the main predictors, which explicitly accounts for measurement error. In contrast, while regression models estimated via ordinary least squares allow for potential confounds to be controlled, they assume that the independent and confounding variables are measured without error. When this assumption is breached, the model will produce biased estimates of causal effects (Westfall & Yarkoni, 2016). The structural equation model (SEM) accounts for measurement error and is explicitly modelled, giving confidence in the ability to account for plausible confounding variables and provide appropriate evidence for incremental validity. Further discussion regarding SEM is provided later in the data analysis section.

While making causal inferences using observational data can be challenging (Rohrer, 2018), convincing arguments can be made when appropriate assumptions and knowledge are used. The assumptions have been articulated in the previous section to ensure that the issues which may arise when making causal inferences are transparent. Additionally, a strong rationale has been provided to aid understanding of the selection and inclusion of certain control variables.

Participants

Sample Size Determination. The shinyapp pwrSEM was used to determine the precise sample size needed to provide adequate power to estimate the hypothesised effects (Wang & Rhemtulla, 2021). The parameter values were estimated according to the specified structural model (see Figure 3). The first factor loadings were fixed at 1 for the latent

variables, and the remaining latent variable factor loadings were set at $B = .59$ for the Belief in Conspiracy Theories (BCT) measure, $B = .66$ for the Perceived Stress Scale (PSS) and $B = .75$ for the General Anxiety Disorder 7 (GAD-7) measure. The factor loading estimates were completed using the Spearman-Brown prophecy formula in the pwrSEM app. The formula uses a known reliability estimate of the measure and the number of items to estimate each item's average factor loading strength. The belief in conspiracy reliability estimate was estimated to be $\alpha = .89$, an average of what was found in previous research by Swami et al. (2016) and Williams et al. (2022) ($\alpha = .92$ and .87). The reliability of responses to the PSS was estimated to be $\alpha = .88$, slightly less than $\alpha = .90$, as indicated in prior research by Swami et al. (2016). Similarly, the reliability of responses to the GAD-7 was estimated to be $\alpha = .90$, slightly less than $\alpha = .91$ found by Dear et al. (2011). The parameter values were set to a regression coefficient of $B = .15$ for the target effects (perceived stress and anxiety). This value was set as it was the size of the partial correlation that Swami et al. (2016) found between perceived stress and belief in conspiracy theories ($r = .15$). The covariance between perceived stress and anxiety was set at $r = .20$. As a simplifying assumption, the remaining regression coefficients and covariances for the control variables on perceived stress, anxiety, belief in conspiracy theories were set to zero, and the app then calculated residual variance. The power analysis necessarily involved some arbitrary decisions regarding parameter estimates, but interested readers may examine the robustness of the power analysis to alternative specifications by using the pwrSEM app (see Wang & Rhemtulla, 2021).

After 1000 simulations, the results suggest that with 500 participants, the model will have .92 power to detect the target effects of $B = .15$ in the model with an alpha of 0.05 or less. After accounting for potential exclusions of participants, the final sample size was set at 526 on the crowdsourcing platform Prolific, which enabled up to 5% of participants to be excluded while maintaining adequate power.

Recruitment and Inclusion Criteria. The participants for the study were a convenience sample of 526 participants recruited from the crowdsourcing platform Prolific. The participants were subject to a pre-screening criterion on Prolific, which allowed a specific group to be targeted in the advertisement. The first pre-screening criterion was that participants were to be currently residing in New Zealand and Australia. Ensuring the sample was Australasian-based was essential for two reasons. First, most research regarding conspiracy theories consists of studies from the US and Europe, and it is important to develop knowledge around the psychological antecedents for belief in conspiracy theories within Australasia. Second, this research provides insight into whether the findings of Swami et al. (2016) apply to an Australasian sample.

An additional pre-screening criterion excluded 754 participants who had previously completed two similar conspiracy theory-related studies within Australia and New Zealand (see Williams et al., 2022, and Williams et al. in preparation) on Prolific conducted by my supervisor, Matt Williams. As the sample on Prolific draws from a pool of around 4500 New Zealanders and Australians, the participants will likely have completed prior surveys with similar content. The decision was made to exclude these participants, reducing the chance that boredom or fatigue would affect the results.

The participants also needed to have at least a 95% approval rate on prior tasks they had completed on Prolific to ensure high-quality responses. Prolific only allows participants aged at least 18 to sign up for their platform, so all participants were aged 18 or over. The inclusion criteria determined the possible participants who would view the advertisement for the study.

Exclusion Criteria. In addition to the pre-screening criteria, eight exclusion criteria were specified in the preregistration before data collection:Participants who answered “no” to the informed consent question were directed out of the survey.

2. Participants who typed an age under 18 were directed out of the survey.
3. Participants were asked which country they currently reside in, with New Zealand, Australia, or "other" options. Those who chose "other" were directed out of the survey.
4. Participants who missed more than 75% (missing eight or more) of the main three study measures were excluded from the study. The rationale for excluding such participants was that if eight or more items were missed, it was assumed they were answering carelessly, and their responses would not be of any value.
5. Participants who missed any of the four control items (age, subjective social status, education level and political orientation) were excluded. Due to the control variables only consisting of one item, imputing missing responses was deemed inappropriate.
6. Participants who either missed or did not answer "strongly agree" to the attention check item were excluded.
7. Responses identified as a preview, test or duplicate response by Qualtrics were excluded.
8. The most recent response was included if additional duplicate responses were found (checked via participants Prolific IDs).

Attention Check Rationale. An attention check was included in the current study as an attempt to identify whether participants were rushing through the study without paying attention (Hauser et al., 2018). Oppenheimer et al. (2009) suggest using an attention check as it is helpful to ensure participants read instructions carefully, and reduces random answering. They suggest that excluding participants who fail such checks may also increase the

statistical power of the data due to the exclusion of participants who appear to be answering at random (Oppenheimer et al., 2009). By excluding participants who fail the attention check, an assumption is made that the participant will fail to read other instructions in the remainder of the survey. The question stated, "*Please select "Strongly agree" for this item if you're paying attention."*, and was placed after item ten of the belief in conspiracy theory measure. The response options to the attention check were the same as those for the BCT to ensure there were no discrepancies in the response options.

Sample After Exclusion Process. Due to discrepancies between Prolific and Qualtrics counting of uncomplete surveys, the final sample size before the exclusion process was 529. Within the exclusion process, three participants missed more than 75% of the items in the main study measures, one participant missed the age item, one participant answered "no" to the consent question, and 23 participants either failed or missed the attention check item with 27 participants in total excluded. Therefore, after the exclusion process, 502 participants remained, which exceeded the target implied by the power analysis. Fortunately, after the exclusion process was completed, no other missing data were found in the responses, and the preregistered imputation process (expectation-maximisation) was not needed.

Demographic Characteristics of Participants. Demographic information is provided in Table 3 for the final sample size of 502 participants. Participants ranged in age from 18 to 69 years, with a mean age of 26.5 (SD = 9.73), and the largest age bracket of 56.2% being for ages 18 to 24. Of the participants, 80.7% were currently residing in Australia, and the remaining 19.3% were currently residing in New Zealand. Females were substantially over-represented, with 73.3% of participants being female compared to 24.3% male, 2.3% non-binary or third gender and 0.2% who preferred not to say.

The skewed gender distribution in the sample appears to have been affected by an influential TikTok video that went viral on July 24, 2021, promoting the use of the crowdsourcing platform Prolific (Charalambides, 2021). Before this TikTok video, according to Prolific, the gender distribution was relatively balanced; however, following the viral video, researchers' samples were heavily skewed towards women. Prolific has reported that they gained 30,000 new participants, who were predominantly young and female. As the current study was published on July 30, 2021, the current study was implicated in this situation.

Table 3

Demographics Statistics for Study 1

Demographic Item	Frequency	Percentage
Country		
New Zealand	97	80.7
Australia	405	19.3
Gender		
Male	122	24.3
Female	368	73.3
Non-binary / third gender	11	2.3
Prefer not to say	1	0.2
Age		
18 – 24	282	56.2
25 – 34	140	27.9
35 – 44	44	8.8
45 – 54	22	4.4
55 – 64	12	2.4
65 – 74	2	0.4
75 or older	0	0
Education level		
Doctoral degree (e.g., PhD)	6	1.2
Postgraduate degree (e.g., Masters)	52	10.4
Undergraduate degree (e.g., Bachelors)	175	34.9
Trade course or other tertiary qualification	64	12.8
Completed high school	190	37.9
Some high school (without completing)	15	3
No high school	0	0

Note. The total sample size was 502.

Measures

Belief in Conspiracy Theories. An adapted Belief in Conspiracy Theories measure (BCT) was designed to measure people's belief in specific conspiracy theories. The BCT was adapted from the Belief in Conspiracy Theories Inventory (BCTI; Swami et al., 2017) for the current study, as the BCTI was designed for a US-based demographic, which consisted of theories that were not as relevant for participants from New Zealand and Australia. The adapted version consisted of seven original BCTI items and one additional BCTI item, which was slightly re-worded for contemporary relevance (e.g., changing from SARS to COVID-19 for question two). Question 14 was drawn from an Australasian-based conspiracy study by Marques et al. (2021), and question three was an original item based on the simulation hypothesis (Thomas, 2021). The remaining five items were drawn from a study by Williams et al. (in preparation), in which a research team of six members completed an iterative process of deciding upon specific theories which may comprise their final conspiracy measure. The following conditions were deemed essential for each research team to agree upon:

1. The item aligns with the standard definition of a conspiracy theory (e.g., multiple actors plotting together, malevolence and secrecy).
2. The conspiracy theory is well known; this can mean online (e.g., a Wikipedia page) or within mainstream media.
3. The event is either ongoing or has occurred in the last 20 years.
4. The item needs to be easy to read and understand.

If all research team members agreed the theory met these criteria, then the item was accepted. The adapted BCT measure included five of the agreed-upon items by Williams et al. (in preparation) (questions 4, 8, 12, 13 & 15).

In a further adaption of the BCTI, the BCT was measured on a five-point Likert scale, with options of *strongly disagree, somewhat agree, neither agree nor disagree, somewhat disagree and strongly disagree.* The responses differ from those used on the BCTI, as the BCTI was measured on a nine-point Likert scale with responses ranging from *completely false* to *completely true*. Including truth values conflicts with the standard interpretation of "truth" in philosophy, in which a statement can only be either true or false (Shramko & Wansing, 2020). Thus, ambiguity for the participant may arise when responding to how true a conspiracy theory could be when rating it out of nine. The change in measurement was used as it was a more familiar format for the participants (e.g., *disagree* and *agree*) and aligned better with the response options of the other main measures.

Scores were obtained by calculating the average response to the 15 items in the BCT with a possible score of 1 to 5 for each item, with higher scores indicating higher belief in conspiracy theories. The current study found adequate reliability at $\alpha = 0.88$. The items included in the final BCT measure are included in Table 4.

Table 4

Items in the Belief in Conspiracy Theories Measure

Item	Question
1.	A powerful and secretive group, known as the New World Order, are planning to eventually rule the world through an autonomous world government, which would replace sovereign government.
2.	COVID-19 is a biological weapon intentionally created and released by China.
3.	The whole universe is an artificial simulation, and life as we know it is just a detailed simulation run in someone's supercomputer.
4.	Pharmaceutical companies ("Big Pharma") have suppressed a cure for cancer to protect their profits.
5.	The assassination of Martin Luther King, Jr., was the result of an organised conspiracy by US government agencies such as the CIA and FBI.
6.	The Apollo moon landings never happened and were staged in a Hollywood film studio.
7.	Area 51 in Nevada, US, is a secretive military base that contains hidden alien spacecraft and/or alien bodies.
8.	The collapse of the World Trade Centre on Sept 11, 2001 was caused by controlled demolitions arranged by US government insiders.
9.	The assassination of John F. Kennedy was not committed by the lone gunman, Lee Harvey Oswald, but was rather a detailed, organised conspiracy to kill the President.
10.	In July 1947, the US military recovered the wreckage of an alien craft from Roswell, New Mexico, and covered up the fact.
11.	Princess Diana's death was not an accident, but rather an organised assassination by members of the British royal family who disliked her.
12.	Telecommunication companies are covering up the health risks of the new 5G cellular network.
13.	Vaccines are harmful, and this fact is covered up by governments and pharmaceutical companies.
14.	Scientists are creating panic about climate change because it is in their interests to do so.
15.	Fluoride is added to the water supply by governments to make people less intelligent and easier to control.

Note. Items 1, 5, 6, 7, 9, 10, 11 are original items from the BCTI by Swami et al. (2016), and item 2 is a re-worded BCTI item. Item 3 was an original item developed for this measure. Item 14 was from Marques et al. (2021), and items 4, 8, 12, 13 & 15 were from Williams et al. (in preparation).

Perceived Stress Scale. Perceived stress was measured using the 10-item Perceived Stress Scale (PSS; Cohen et al., 1983). The PSS is one of the most popular measures of psychological stress (i.e., perceived stress), with a myriad of psychometric validations completed within different cultures (see Lee, 2012). The shortened 10-item measure of perceived stress generally shows better psychometric properties than the original 14-item version (Lee, 2012). The PSS was intended by Cohen and Williamson (1988) to be used with participants who had at least a middle school education and was validated initially within a US-based community sample. The PSS has demonstrated adequate reliability in psychometric analyses of the measure, with a Cronbach alpha of .84 (Taylor, 2015) and .91 in an Australasian sample (Williams et al., 2022). The reliability in the current study was adequate at $\alpha = .89$. The 10-item measure asks questions regarding the subject's thoughts and feelings over the past month. An example item is "In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?" Responses were measured on a five-point Likert scale ranging from 0 = never to 4 = very often, and a total score was created by calculating the average of each participant's responses to the PSS. The measure included negatively worded items (items 4, 5, 7, and 8) which were reverse coded in the data analysis process.

Generalised Anxiety Disorder 7. Anxiety was measured using a brief 7-item Generalised Anxiety Disorder questionnaire (GAD-7; Spitzer et al., 2006). The 7-item measure is an efficient research tool for screening and assessing generalised anxiety disorder within clinical and general population samples (Löwe et al., 2008; Spitzer et al., 2006), although, in this study, it was used as a general measure of anxiety rather than to screen for generalised anxiety disorder in specific. Reliability estimates within a general non-clinical population indicate a Cronbach alpha of 0.89, with a value of 0.91 for clinical populations (Dear et al., 2011; Löwe et al., 2008). Similar to previous estimates, the reliability for the

current study was excellent at α = .91. It also demonstrated adequate construct validity with the GAD-7 correlating (r = .70) with the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990), which is a widely used and more comprehensive measure of the worry characteristic of a generalised anxiety disorder (Dear et al., 2011). The measure asks participants about the degree of anxiety symptoms (e.g., feeling nervous, anxious, or on edge) over the previous two weeks. The responses were measured on a 4-point Likert scale ranging from 0 = not at all, 1 = several days, 2 = more than half the days and 3 = nearly every day. The score was created by summing the total score and ranging from 0 to 21.

Control Variables. The following is how the plausible confounding variables of education, political orientation, subjective social status and age were measured.

Education. Education was measured using a 1-item measure with seven categories of differing levels of educational attainment relevant to Australian and New Zealand-based participants. Participants were asked, "*What is the highest level of education you have completed?".* The options included doctoral degree (e.g., PhD), postgraduate degree (e.g., Masters), undergraduate degree (e.g., Bachelors), trade course or other tertiary qualification, completed high school, some high school (without completing) and no high school. Scores ranged from one to seven, with lower scores indicating lower educational attainment.

Political Orientation. Political orientation was measured using a one-item measure adapted from similar political orientation measures by Klein et al. (2019) and Rigoli (2020). Similar to Klein et al., the question asks participants, "*If you had to place yourself on the political spectrum, where would you place yourself?".* The response options were strongly left, moderately left, no preference, moderately right, and strongly right. The emphasis on the spectrum here was to enable a continuum of political attitudes. The response options were drawn from the study by Rigoli (2020). Lower scores were associated with left wing-based

political orientation, and higher scores were associated with right wing-based political orientation. The use of a single-item measure was selected as it is common for applied research that considers political orientation to use single-item left and right-wing measures (Kroh, 2007). More complex multidimensional political orientation measures were deemed unnecessary given the evidence for the strong reliability and validity of single-item political orientation measures and having a solid theoretical connection to the construct of political orientation (Kline, 2015; Kroh, 2007).

Age. Age was measured by participants typing their age directly into a textbox. No grouping of ages was conducted when using age as a control variable.

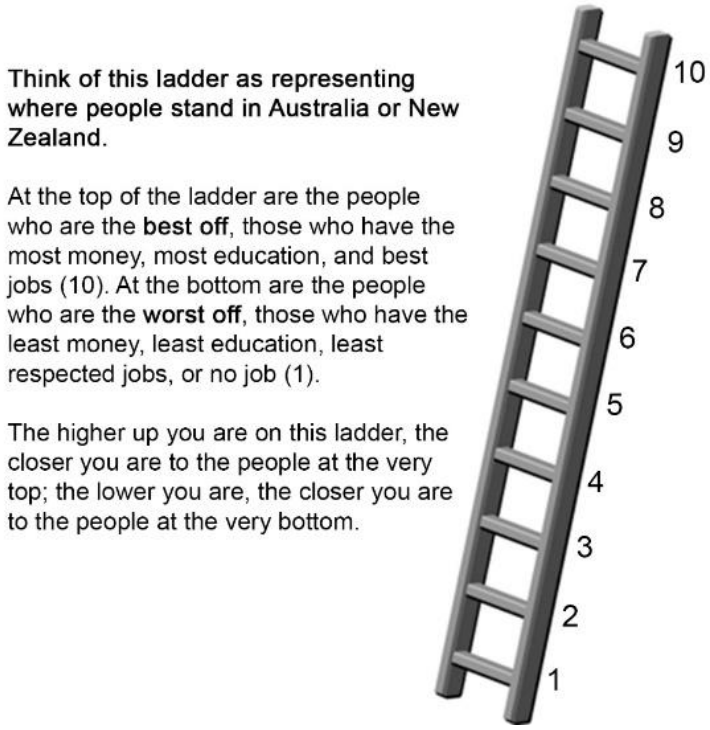
Subjective Social Status. Subjective social status was measured using The MacArthur Ladder of Subjective Social Status (MLSSS; Adler & Stewart, 2007). The MLSSS is one of the most widely used measures of subjective social status and aims to capture broader social standing from the participants' subjective appraisal (Ferreira et al., 2018). The measure, in a nationally representative sample of US participants has been demonstrated to have adequate test-retest reliability ($\rho = .62$, $p < .01$) (Operario et al., 2004). Evidence for criterion validity was demonstrated by Operario et al. (2004) with the measure positively correlating ($r = .39$, $p < .01$) with income. The presentation of the MLSSS is displayed in Figure 2, with lower scores indicating lower subjective social status.

A subjective measure of social status was used instead of an objective measure such as income or Economic Living Standard Index (ELSI; Jensen et al., 2005) as the participants' own perspectives of their socio-economic status were desired. The rationale behind using a subjective measure is that it is posited to more accurately measure aspects of social status and the intricacies of socio-economic factors, over and beyond that which wealth measures may capture (Howe et al., 2011; Operario et al., 2004). Research comparing the measures of

subjective social status and wealth indices such as income or ELSI found that subjective measures resulted in considerably different classifications of social status, with Howe et al. (2011) suggesting they may be capturing different concepts. Thus, subjective social status allows participants to rank their social status standing based on their understanding of their socio-economic conditions, which may provide a richer understanding, rather than determining socio-economic status through objective data (Howe et al., 2011).

Figure 2

Image Used for Subjective Social Status in Survey



Procedure

Participants were recruited for the study through the crowdsourcing platform Prolific, under the title of "Conspiracies, Stress and Anxiety" on 30 July 2021. The survey was advertised to all eligible participants on Prolific who met the pre-screening criteria, and the survey itself was hosted on Qualtrics. A brief description of the survey was provided in the advertisement on Prolific, asking potential participants if they wanted to participate in a study

investigating perceptions about claims regarding current and historical events, and how they had been emotionally feeling in the last month. In addition, the advertisement stated that the survey would consist of 42 questions, take four to seven minutes to complete, and participants would receive a reward of GBP0.88 (~1.75NZD). Those who agreed to complete the survey were provided with an information sheet that included a more in-depth study description (See Appendix A). The participants were only able to proceed with the study if they provided informed consent.

Participants were first surveyed about basic demographics of age and country of residence and ensuring the Prolific ID was correct. They were then shown the BCT items, completing an attention check after item ten of the BCT, followed by the PSS and GAD-7. The last page consisted of additional items on gender, educational attainment, political orientation and whether they would like a summary of the findings. Participants generally completed the survey within the estimated time (median = 4 minutes 52 seconds). At the end of the survey, a written debriefing section was included (See Appendix B). Upon completion, participants were redirected to the Prolific website, where they received a completion code and were paid their reward.

Ethics. The study was peer-reviewed by Dr Matt Williams and another faculty member from the School of Psychology who was not involved in the study, and was deemed to be low risk according to the criteria set by Massey University (See Appendix C). A low-risk notification was therefore submitted to the Massey University Human Ethics Committees (notification #4000024597). The following is a discussion about the ethical issues that were considered and how these were mitigated.

Firstly, the main ethical issue was that the research contained questions about psychological distress and the possibility that it may increase distress after completing the

associated items. The current literature is limited on the effects of completing survey questions on distress; however, in research by Dazzi et al. (2014), questions about sensitive mental health topics such as suicide did not cause further distress, which gives confidence that the current research questions are unlikely to harm the participant. This said, out of an abundance of caution, we emphasised that the anxiety and stress items were only included for research purposes and provided links to mental health resources specifically related to New Zealand and Australia if a participant required further support.

Second, participants were provided with adequate information to make an informed decision when consenting to complete the research. It was made clear to potential participants in the information sheet that they had no obligation to accept the invitation to participate in this research and that if they did participate, they had the right to decline any questions throughout the survey or stop answering questions at any time. Additionally, the information sheet specified that the survey data would be uploaded to the Open Science Framework after carefully removing plausible identifying pieces of information such as Prolific ID and IP address.

Third, an aspect of ethical consideration was not to contribute to stigmatising or marginalising those who believe in conspiracy theories. In mitigating such a risk, we aimed to respect those who endorse belief in conspiracy theories by not dismissing conspiracy theories as irrational by definition. We aimed to maintain respect when discussing individuals who believe in conspiracy theories. We aimed to focus on the factors that may cause such beliefs rather than focus on the possible negative characteristics and reputations of people who believe in conspiracy theories.

Lastly, we ensured justice for participants. Participants provided a small quantity of their time and received a small financial payment in return, ensuring fair distribution of burden and reward.

Data Analysis

All analysis procedures were conducted using RStudio and the R programming language (R Core Team, 2021) and seven packages were used to run the analysis. For correlations, reliability and descriptive statistics, the psych package was used (Revelle, 2021). The moments package was used for descriptive statistics to find the skewness of the three main measures (Komsta & Novomestky, 2015). The lavaan package was used for structural equation modelling (Rosseel, 2012) and semPlot for visual depictions of the structural models (Epskamp et al., 2019). The plyr package was used to assist in splitting and combining data (Wickham, 2011). Figures were produced using the packages Likert and ggplot2 (Bryer & Speerschneider, 2016; Wickham, 2009). For the power analysis, the shinyapp pwrSEM was used (Wang & Rhemtulla, 2021).

All data collection, processing steps and analyses were completed after the preregistration was published. Once the data collection was complete, the data were exported from Qualtrics, and two superfluous header rows were deleted on Microsoft Excel. The data were loaded into RStudio, where the remaining analyses were conducted. The first of the analyses was to identify any duplicate Prolific IDs. Then any identifying columns were deleted, including participants' latitude and longitude, Prolific ID and IP address. Other columns that provided no relevant information were deleted for data cleanliness (e.g., Recaptcha score). The data set was saved as a deidentified file (attach file) and was used for the remainder of the analyses.

Next, the exclusions were applied, including checking for those who breached the exclusion criteria and deleting those participants. The specified PSS items were reverse coded, with the non-reversed columns removed to avoid confusion. The indices were then created to establish mean scores for the BCT and PSS and summed scores for the GAD-7. Reliability estimates and descriptive statistics were calculated, and the data were then ready to use in the structural equation model. The remainder of the analyses involved generating visuals to display the data.

Descriptive Analyses. The three main scales used in the study (BCT, PSS, GAD-7) were analysed individually, including age, political orientation, education, and subjective social status. Other demographic variables of gender and country were also analysed. Multiple scale analyses were last to be analysed, and the following were completed to produce:Descriptive statistics for the three main scales and four control variables, including the mean, median, standard deviation, skewness, minimum and maximum scores.

- The Cronbach's alpha reliability for the BCT, PSS and GAD-7.
- A correlation matrix for all seven variables.
- The relationships between the BCT, PSS and GAD-7, which were examined using Pearson product-moment correlations.

Confirmatory Analysis. Structural equation modelling (SEM) was used as the primary analysis to answer the proposed hypotheses. The central part of the structural equation model is the distinction between observed variables and latent variables. The observed variables within the current model represent the specific items participants responded to in the survey. The latent variables refer to hypothetical constructs, such as belief in conspiracy theories, which cannot be measured directly. The observed variables are indirect measures presumed to reflect the hypothetical latent construct. SEM was used to test the hypotheses, as it is a practical approach to answering questions about causal relations

between variables of interest after controlling for plausible confounding variables (Kline, 2015; Westfall & Yarkoni, 2016). A unique feature within SEM is representing and accounting for measurement error (Kline, 2015). By accounting for measurement error, this accounts for a major assumption of ordinary least squares (OLS) regression which assumes all predicting variables are measured without error (Mai et al., 2018). Accounting for measurement error is valuable, as it allows for greater power to detect an effect and lower Type I error rates (Sardeshmukh & Vandenberg, 2017; Westfall & Yarkoni, 2016).

Structural equation modelling is a novel contribution to the literature on perceived stress and belief in conspiracy theories. While anxiety and belief in conspiracy theories have been analysed with an SEM, this study is the first to consider perceived stress and anxiety within the same structural equation model. The reason for including both variables come from the findings by Swami et al. (2016) and the predictions made by the Existential Threat Model of Conspiracy Theories. The hypotheses can be explicitly tested with causal paths pre-specified a-prori, to add confidence to any inferences made.

The model specifies the prediction that perceived stress and anxiety have a causal effect of increased belief in conspiracy theories after controlling for education, subjective social status, political orientation, and age. Figure 3 depicts this with single-headed arrows leading from perceived stress and anxiety to belief in conspiracy theories. The control variables are correlated with each other along with the two predicting latent variables of perceived stress and anxiety. A causal regression path is set from the control variables to the conspiracy beliefs latent variables. Finally, the two main predictor variables of perceived stress and anxiety were correlated together, given that they are known to correlate with each other. The specified model is based on theory, and information is provided a priori about the direction of causal effects in the specified hypotheses (Kline, 2015).

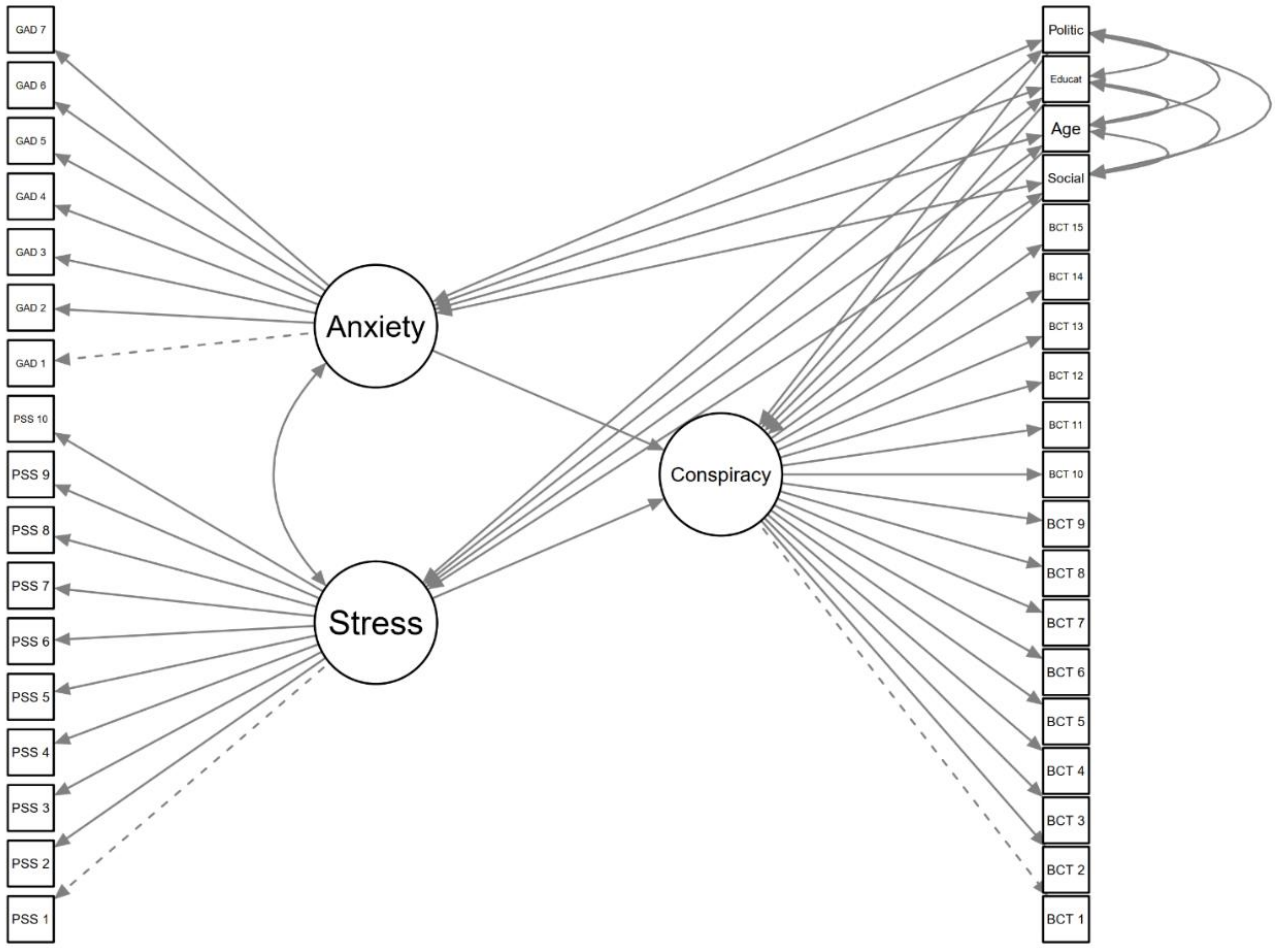
As preregistered, the estimation method used to estimate the structural equation model was diagonally weighted least squares (DWLS). This was chosen over the more common maximum likelihood estimation method because DWLS does not assume a multivariate normal distribution and has demonstrated robustness when estimating non-normally distributed ordinal data (Brown, 2006; Li, 2016).

The following DWLS estimation method fit statistics were reported as per the preregistration*:*

- The root mean square error of approximation (RMSEA) and associated 90% confidence intervals.
- The standardised root mean square residual (SRMR)
- The comparative fit index (CFI)
- Satorra–Bentler scaled chi-squared test and its associated p-value

Figure 3

Structural Model Depicting Causal Pathways



Note. The circles contain each latent variable: belief in conspiracy theories, perceived stress and anxiety. The squares depict observed variables, which are the items of each latent variable, along with four control variables, which are also treated as observed variables. Dotted arrows indicate factor loadings constrained to 1 to scale the variances of the latent factors 1. Double-headed arrows indicate correlations, and single-headed arrows indicate causal paths. Error terms are not displayed for the sake of brevity.

Results

Descriptive Statistics

The means, medians, standard deviations, skewness, and Cronbach alpha values for the three main scales are shown in Table 5. Scores on the BCT and GAD-7 were moderately positively skewed, and the PSS was reasonably symmetrical (see Figure 4). The Cronbach's alpha values for responses to all three scales were relatively high. The median value of 1.93 for the BCT indicates that participants generally disagreed with the conspiracy theory items. Per country, Australian participants had a median score of 1.93 compared to 1.87 for New Zealand participants, indicating similar scores for each country, both below the neutral midpoint. The median value of 2 for the PSS indicates a nearly symmetrical distribution for the participants' responses, supported by the skew of -0.05. It also suggests moderate stress in general for the sample. The median values of 7 for the GAD-7 scale indicate mild anxiety when considering cut-off points for the scale.

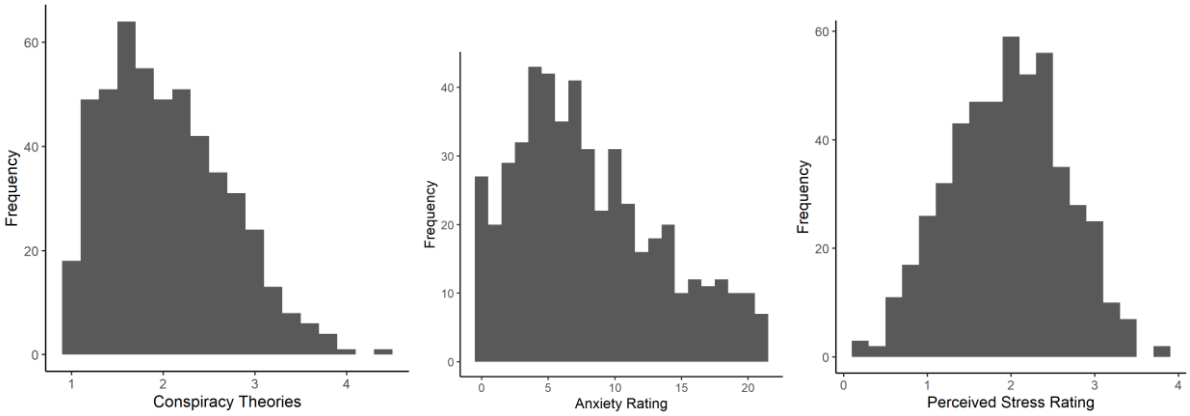
Table 5

Descriptive Statistics for Main Variables in Study 1

Measure	*M*	Median	*SD*	Skew	Range
Belief in Conspiracy Theories (BCT)	2.04	1.93	0.65	0.6	1-5
Perceived Stress Scale (PSS)	2.00	2.00	0.68	-0.05	0-4
General Anxiety Disorder 7-item scale (GAD-7)	8.07	7.00	5.43	0.57	0-21

Figure 4

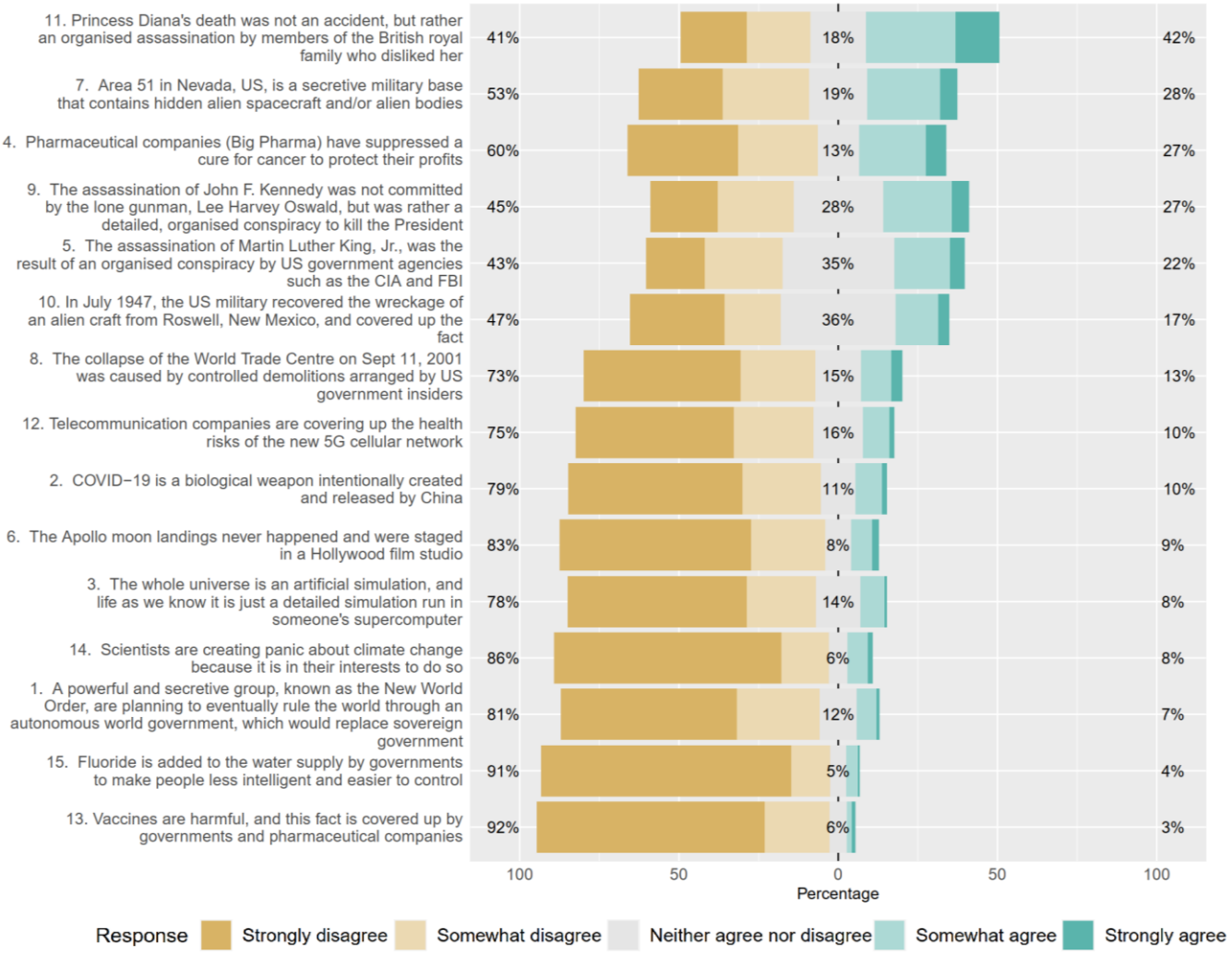
Histogram Plots of Participants Scores in Study 1



The distributions of responses to individual items with the BCT scale are displayed in Figure 5. Three theories were endorsed by over a quarter of the sample. Item 11 was particularly highly endorsed, with 42% of participants agreeing "*Princess Diana's death was not an accident, but rather an organised assassination by members of the British royal family who disliked her*". The remaining items were only endorsed by less than a quarter of the sample.

Figure 5

Distribution of Responses to BCT Items in Study 1



Note. Percentages to the left of the figure indicate the disagree responses, those in the middle indicate neither agree nor disagree, and those to the right indicate the number of responses that agreed.

Control Variables. The participants were moderately left leaning on the political orientation scale with a median of 2, with 61.2% endorsing a strongly or moderately left political orientation, 30.7% with no preference and 8.2% indicating a preference for strongly or moderately right political orientation (see Table 6). The median value of 6 indicates that the participants' subjective social status is above the midpoint of 5, with 52% of the sample endorsing a subjective social status of 6 or 7 (see Figure 6). The remaining control variables of age and education level can be found in Table 3.

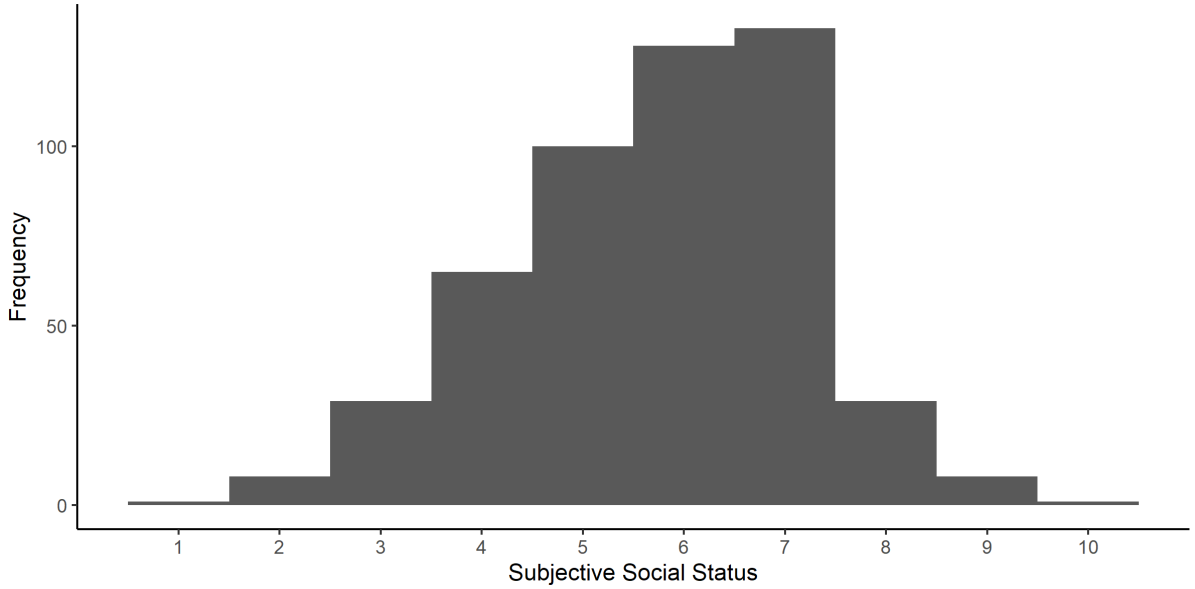
Table 6

Frequency Table for Political Orientation in Study 1

Political Orientation	Frequency	Percentage
Strongly left	122	24.30
Moderately left	185	36.85
No preference	154	30.68
Moderately right	34	6.77
Strongly right	7	1.39

Figure 6

Participants Subjective Social Status in Study 1



Note. 1 = lowest subjective social status and 10 = highest subjective social status.

Correlational Analysis. The intercorrelations among the seven measured variables included in the SEM are presented in Table 7. Increased belief in conspiracy theories was associated with higher perceived stress and anxiety, a lower level of education, and a preference for a right-wing political orientation. Conspiracy theories were not strongly associated with a lower level of subjective social status or younger age. In terms of control items, increased perceived stress and anxiety were associated with younger age, lower education, and lower subjective social status. In addition, participants with a right-wing political orientation were associated with lower levels of perceived stress and anxiety. Lastly, perceived stress and anxiety were strongly correlated.

Table 7

Correlation Matrix: Main and Control Variables

Measure	1	2	3	4	5	6	7
1. BCT	–						
2. PSS	.17**	–					
3. GAD-7	.16**	.76**	–				
4. Subjective Social Status	-.06	-.28**	-.18**	–			
5. Education	-.17**	-.19**	-.16**	.09	–		
6. Political Orientation	.23**	-.12*	-.15**	-.01	.04	–	
7. Age	-.12*	-.27**	-.22**	.02	.42**	.12*	–

Note. Lower scores reflect lower levels of the measured construct of BCT, PSS, GAD-7 and age. For political orientation, higher scores indicate right-wing political orientation. For subjective social status, lower scores indicate lower subjective social status. For education, lower scores indicate lower educational levels.

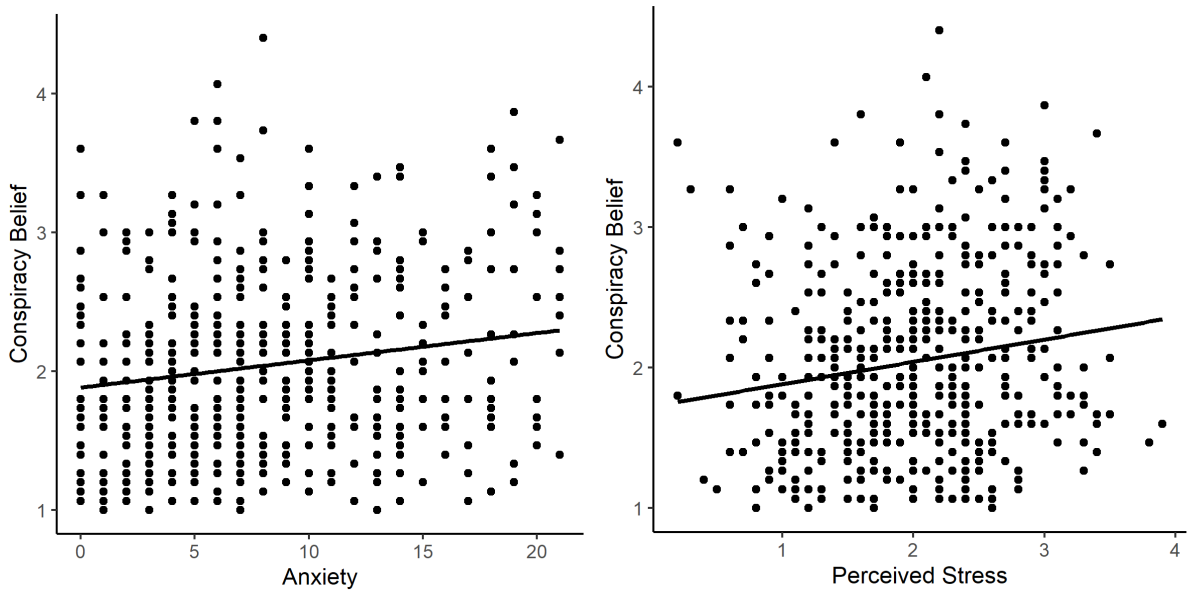
Pearson correlation coefficient. *$p < .05$, **$p < .001$.

Scatter Plots. Figure 7 shows two scatterplots with perceived stress and anxiety, each with superimposed trendlines. Outliers also appear in both plots. There was a positive

association (r = .16, p < .001) between anxiety and belief in conspiracy theories and a similar association between perceived stress and belief in conspiracy theories (r = .17, p < .001).

Figure 7

Scatter Plots of Main Variables in Study 1



Structural Equation Model Analysis

Structural equation modelling was used to estimate whether perceived stress and anxiety have a positive effect on belief in conspiracy theories (see Figure 8). The critical aspects of the SEM are the regression paths, as these directly test the predictions made in the study hypotheses. The preregistration suggests that the regression paths need to be positive and statistically significant for the hypotheses to be supported.

The first hypothesis was not supported: The standardised effect of perceived stress on belief in conspiracy theories after controlling for anxiety, age, education, political orientation and subjective social status was positive but not statistically significant (β = .07, 95% CI [-.06, .20], p = .295).

No significant positive effect for Hypothesis 2 was found: the standardised effect of anxiety on belief in conspiracy theories after controlling for perceived stress, age, education, political orientation and subjective social status was positive but not statistically significant (β = .12, 95% CI [-.01, .24], p = .063).

In terms of the control variables, two observed variables of political orientation and education were found to be statistically significant predictors of belief in conspiracy theories (see Table 8). This indicates that participants who scored higher on the political orientation scale (i.e. endorsed more right-wing views) tended to have a higher belief in conspiracy theories (β = .28, 95% CI [.24, .33], p < .001). Similarly, those participants with lower levels of education tended to have a higher belief in conspiracy theories, but only a weak negative effect (β = -.15, 95% CI [-.21, -.08], p < .001).

Table 8

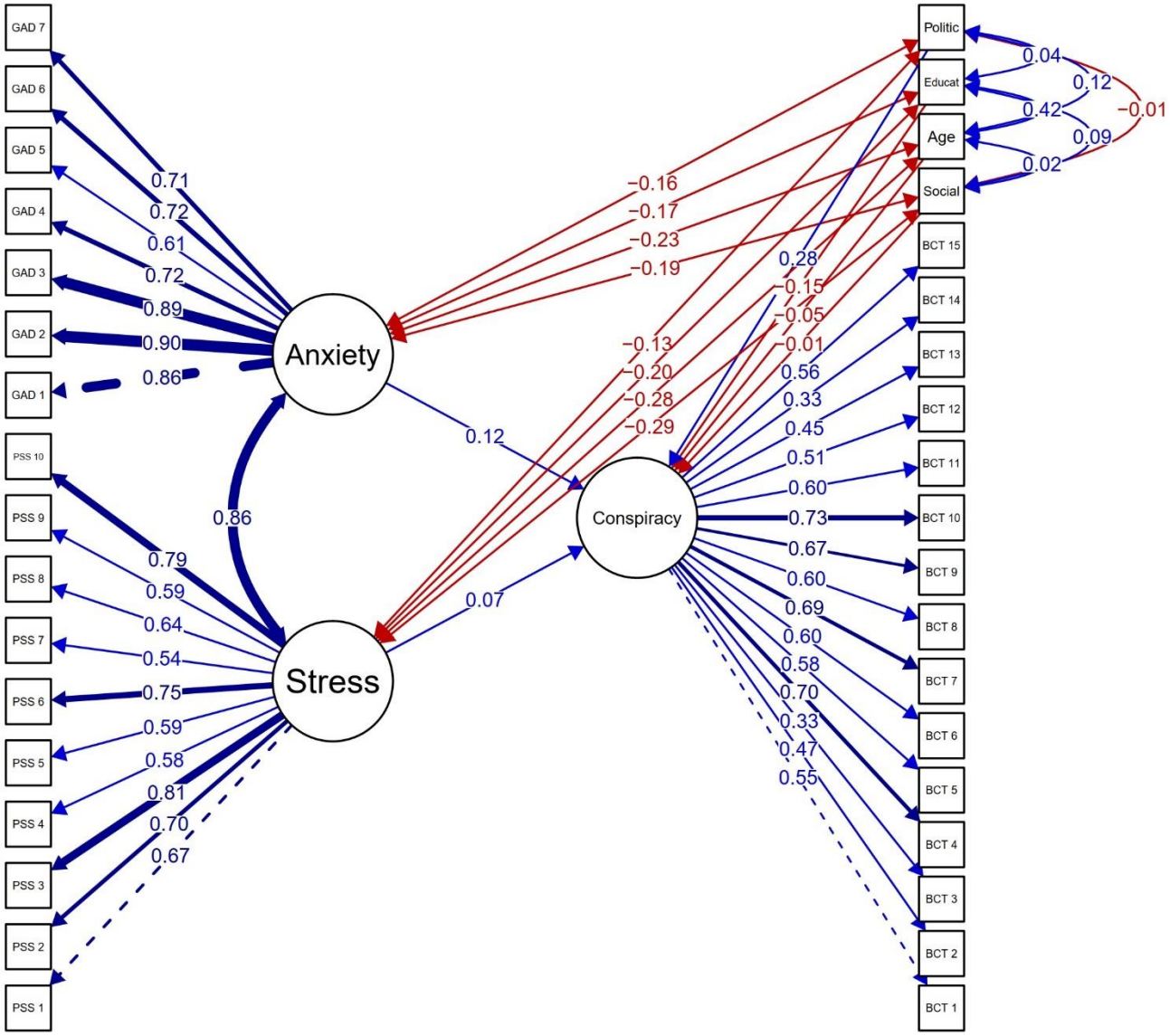
Regression Paths for Study 1

Measure	B	β	*p*	95% CI
Perceived Stress	.06	.07	.295	[-.06, .20]
Anxiety	.07	.12	.063	[-.01, .24]
Subjective Social Status	.00	-.01	.789	[-.07, .05]
Age	.00	-.05	.186	[-.12, .02]
Education Level	-.07	-.15	.000	[-.21, -.08]
Political Orientation	.16	.28	.000	[.24, .33]

Note. B = unstandardised; β = standardised; 95% CI = confidence interval for the standardised β. All measures are regressed onto the belief in conspiracy theories measure.

Figure 8

Structural Equation Model for Study 1



Note. This structural equation model predicts that anxiety and perceived stress levels will have a causal effect on belief in conspiracy theories. Statistics are standardised regression coefficients. Blue lines indicate positive coefficients, and red lines indicate negative coefficients.

Fit Statistics. Several global goodness of fit indices were preregistered and reported. Lavaan produces three outputs for the RMSEA and CFI, including standard, sample-

corrected, and population-corrected. The preregistration did not include which output would be reported; however, the sample-corrected robust outputs were reported as they are more suitable for non-normal data and are suggested to be superior to the standard population-corrected values (Brosseau-Liard et al., 2012; Brosseau-Liard & Savalei, 2014).First, the Satorra-Bentler chi-square statistic was large and statistically significant $SB\ \chi^2\ (577) = 1938.24$, $p < .001$, indicating that the null hypothesis of exact fit of the model in the population can be rejected. However, the chi-square tests a null hypothesis that the model fits perfectly in the population, which may not be particularly plausible (Brown, 2006). Second, the robust RMSEA indicated good fit (.052 [.049, .054]), and was below the preregistered threshold of 0.06 for adequate model-data fit, suggesting that the quantity of error in the approximation of the sample covariance matrix is small (Hu & Bentler, 1999). Third, the CFI reached an acceptable threshold with the estimate of .96 above the preregistered threshold of .95 suggested as an indicator of good model fit by Hu and Bentler (1999). Lastly, the model reached the acceptable threshold with a robust SRMR estimate of 0.06, which is below the threshold of 0.08 or lower, indicating only a slight difference between the sample correlation matrix and that implied by the model.

The preregistration specified that the model would be deemed a good fit only if all the fit statistics met the criteria. However, while the RMSEA, CFI, and SRMR indicated a good model fit, the Satorra-Bentler chi-square did not indicate a good fit. Therefore, the overall fit of the model is considered ambiguous. It is important to reinforce, however, that these fit statistics were not aimed to test the validity of the hypotheses. Instead, they indicate that the model may have been exactly correctly specified. The uncertainty does imply additional ambiguity surrounding the estimates of the direct effects found in the model.

An area that may provide further ambiguity is that the diagonally weighted least squares (DWLS) estimation method had a warning message, which indicated that the number

of observations (N = 502) was too small. DWLS was used as it is designed explicitly for ordinal data, which does not assume a multivariate normal distribution (Li, 2016), but requires a larger sample size than initially determined. A supplementary analysis was conducted to ensure that the estimation method did not substantially affect the results (see Appendix G). The maximum likelihood (ML) estimation method was used to compare the results; although ML is not appropriate for ordinal data due to the assumption of a multivariate normal distribution (Li, 2016), the sample size was adequate to run the analysis with no warning message. Similar to the DWLS estimation method, the regression paths remained negligible and non-significant. The only changes were that two fit indices (robust RMSEA and CFI) were not within an acceptable threshold of good model fit.

The discussion of findings of Study 1 will be deferred until after the section for Study 2, where a combined discussion section will occur.

Study 2

The rationale for doing an additional study involved four main reasons. The first is that Study 1 used convenience sampling, which was disrupted by the issues previously mentioned regarding the viral TikTok video and Prolific. This resulted in an overrepresentation of younger people and females. Second, the additional replication provides further confidence that the findings were not due to sampling error. Third, using a representative US sample helps to provide generalisability to a different population, particularly drawing the sample from the same country as Swami et al. (2016). Lastly, the sample size of Study 1 was only sufficient to detect effects larger than $B = .15$ at 80% power, and conducting a second, larger study afforded the opportunity to conduct analyses powered to detect smaller effects.

Method

Preregistration

Before data collection, the current research was preregistered on the Open Science Framework (https://osf.io/2f8x7). The preregistration was made public, along with a copy of the de-identified data, code and materials to enable other researchers to replicate the findings (https://osf.io/sfuz9/?view_only=495a049c99df46579ceb52a32d0771fe).

Design

The current research used the exact same cross-sectional survey design and control variables as Study 1.

Participants

Sample Size Determination. Similar to Study 1, the shinyapp *pwr*SEM was used to determine the sample size needed to have adequate power to estimate the hypothesised effect. The following changes were made from the power analysis conducted in Study 1. First, a

smaller target effect of $B = .10$ for perceived stress and anxiety was specified. Second, changes were made to the estimation of the control variables based on the regression paths found in Study 1. The regression paths for the control variables were inputted as $B = .10$ for subjective social status, $B = .15$ for education, $B = .25$ for political orientation, and $B = .10$ for age. Lastly, the covariance between perceived stress and anxiety was larger than estimated in the power analysis for Study 1, at $r = .45$.After 2000 simulations, the results suggest that with 1000 participants, the model would have 80% power to detect the target effects of $B = .10$ in the model with an alpha of 0.05 or less. The final sample was set at 1053 to account for up to 5% of exclusions while maintaining adequate power.

Recruitment and Inclusion Criteria. The participants for the study were a representative sample of 1053 participants recruited from the crowdsourcing platform Prolific. The representative sample on Prolific provides a pre-screening criterion for potential participants. The pre-screening criterion considers the intended sample size and the US Census Bureau data to stratify participants over age, sex and ethnicity demographics. When conducting representative sampling from the US population, Prolific stratifies participants into just five simplified ethnicity categories: Asian, Black, Mixed, Other and White. Five age groups were included: 18-27, 28-37, 38-47, 48-57 and 58+. Lastly, two groups – male and female – were used for sex. Based on the census data, Prolific then divides the sample into subgroups to create representative proportions of the national population (Prolific Team, 2021). It is important to note that Prolific uses its own operationalisation of ethnicity based on the UK Office for National Statistics (2015). The US Census ethnicity categories differ to what Prolific use, and limited information is provided in how Prolific match this to the US census categories.

When collecting a representative sample with Prolific, the age bracket restrictions are removed if the study is not complete after 48 hours. Loosening restrictions were applied to

the current data collection; however, the demographic characteristics of the sample remained reasonably similar to those of the adult population of the US (see Table 9).

Exclusion Criteria. In addition to the pre-screening criteria, an exclusion criterion was applied. The only change to the eight specified exclusions in Study 1 was criterion three. The modification consisted of excluding participants who chose “other” when given the option of whether they resided in the United States of America. Those who chose "other" were directed out of the survey. The sample after data collection was 1067, which was larger than the specified 1053 participants due to Qualtrics including incomplete surveys. After completing the exclusion process, three participants missed the age item or were younger than 18, nine participants missed more than 75% of the main study measures, 41 participants failed or missed the attention check, nine participants missed at least one of the control variables, and two participants submitted duplicate responses for a total of 47 participants. No further missing data was found once these exclusions were applied.

Demographic Characteristics of Participants. The final sample consisted of 1020 participants once the exclusions were complete. Demographic information for the study is provided in Table 9 and compared with the overall US population in 2018 (US Census Bureau, 2018). The mean age of participants, 44.63 years, was slightly younger than the mean US population of 47 years. Compared to the latest US Census Bureau statistics in 2018, older adults aged over 65 were somewhat under-represented in the study sample, forming 20.5% of the US population but just 12.6% of the sample. The distributions for gender and ethnicity were otherwise similar to the US population. Participants with higher levels of educational attainment were substantially over-represented, with 63.73% of the study sample having a bachelor’s degree or higher, compared to 32.3% of the US population. However, unlike age, gender and ethnicity, participants were not stratified on education level during the sampling process, so this over-representation of higher education levels was not surprising.

Table 9

Demographic Characteristics of Participants in Study 2

Demographic Item	Frequency	Sample %	% of US Population
Gender			
Male	501	49.12	48.44
Female	505	49.51	51.56
Non-binary / third gender	13	1.27	-
Prefer not to say	1	0.1	-
Age			
18 – 24	127	12.45	11.8
25 – 34	214	20.98	18
35 – 44	174	17.06	16.3
45 – 54	174	17.06	16.7
55 – 64	204	20	16.7
65 – 74	105	10.29	12.2
75 or older	22	2.16	8.3
Ethnicity			
Asian	67	6.57	6.46
Black	128	12.55	13.30
Mixed	29	2.84	2.66
Other	24	2.35	2.28
White	767	75.29	75.31
Not specified	5	0.49	-

Note. Ethnicity percentages are based on how Prolific matched these five options to the US census data. The current study collected data on what the participants preferred gender was, but the US census collects data using sex (e.g., Male / Female). This is the reason for the zero percentage for non-binary.

Measures

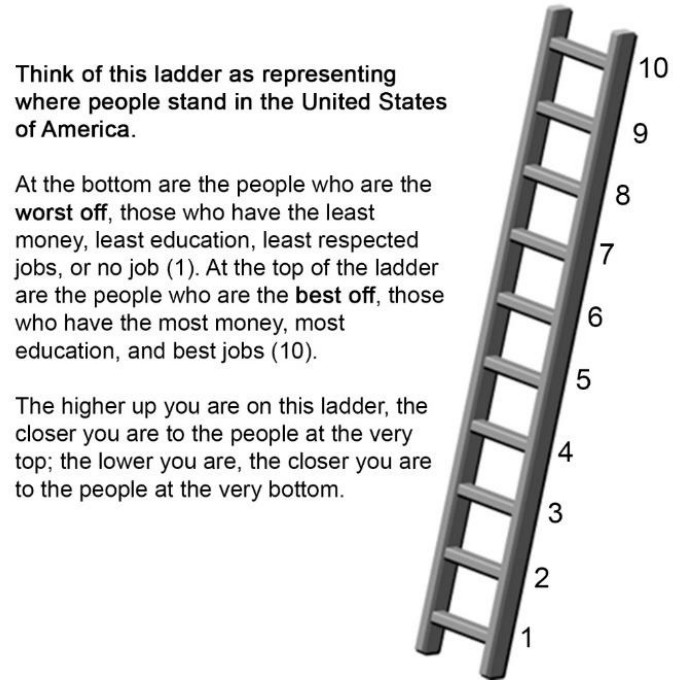
The main measures were all the same as in Study 1, except item 14 in the BCT was changed. The item was slightly revised for clarity after a participant in Study 1 provided

feedback that the item could be interpreted that it is in the scientist's best interest to cause a panic about climate change for non-malevolent reasons (i.e., because panic about climate change might be justified). Therefore, a slight adjustment was made to ensure it was clear to the participants to convey in the item that the scientists were purposely spreading panic with malevolent intentions. This comprised the addition of the word "financial" in the item: "scientists are creating panic about climate change because it is in their financial interests to do so". The reliability of responses to the BCT in Study 2 was excellent at $\alpha = .92$. The same measures for perceived stress and anxiety were used, with both demonstrating excellent reliability of $\alpha = .91$ for the PSS and $\alpha = .92$ for the GAD-7.

Control Variables. The control variables were all the same as in Study 1, except for a slight adjustment to the wording of the education and subjective social status. To ensure US relevance, a response on the education item was changed, with the term "vocational school" used rather than "trade school or other tertiary qualification". Additionally, the description for the subjective social status measure was changed to include "the United States of America", along with a slight adjustment to the presentation of Figure 9.

Figure 9

Image used for Subjective Social Status in Study 2



Procedure

The procedure was similar to the first study. Participants were recruited for the study through the crowdsourcing platform Prolific, with a study title of "Conspiracies, Stress and Anxiety" on 24 September 2021. The payment was slightly less at GBP0.75 (~NZD1.45); this is because, in the first study, the completion time was a median of five minutes, which was quicker than the expected completion time of seven minutes. Thus, in line with Prolific's suggested time, an estimated six minutes was used to determine the payment amount.

The survey itself was hosted on Qualtrics. The same information sheet used in the first study was provided to participants (see Appendix D), with the only adjustments relating to the current country, change in payment and estimated completion time (4-6 minutes). Participants generally completed the survey within the estimated time (median = 5:37 minutes). Additionally, the debriefing section was updated to ensure US-related mental health

resources were available (See Appendix E). Finally, participants were redirected back to Prolific upon completing the survey and were paid their reward.

Ethics. The Massey University Human Ethics Office was notified of the variation of the previously submitted notification, which was approved (notification #4000024597). The variation provided information regarding the changes, as identified in the procedure section above (See Appendix F). This variation was subject to further peer review by Dr Matt Williams.

Data Analysis

Analyses were conducted using RStudio, using the R programming language (R Core Team, 2021) for all data analyses procedures. The script used in the first study was slightly adjusted for the analysis in the second study. The script and de-identified data are available on the Open Science Framework (https://osf.io/sfuz9/?view_only=495a049c99df46579ceb52a32d0771fe).

All data processing steps and analyses were completed after the preregistration was published. As with the previous study, two superfluous header rows were deleted before importing the data set into RStudio. Once imported into RStudio, a check for duplicate Prolific ID was completed, and two duplicate responses were removed. After this check, any identifying data was removed, and a de-identified file was saved. The remaining data analysis were the same as the first study.

Descriptive Analyses. The three main scales used in the study (BCT, PSS, GAD-7), control variables and gender were analysed individually. The response distribution within each variable was analysed.

Confirmatory Analyses. The structural equation model (SEM) was the same in this study, except for the preregistered addition of reporting the sample corrected robust fit indices for the CFI and RMSEA.

Results

Descriptive Statistics

The means, standard deviations, medians, skewness, and score ranges for the three main scales are shown in Table 10. The median value of 2.13 indicates that participants, on average, tended to somewhat disagree with the presented conspiracy theories. The distribution of the scores on the BCT was positively skewed (0.59) and is displayed in Figure 10, with most scores tending to lean towards the disagreement values. The distribution of the scores on the GAD-7 was positively skewed (0.86), and a spike of participants (17.94%) had scores of zero on the GAD-7 anxiety measure (see Figure 10). The median value of 5 on the GAD-7 indicates participants on average had mild anxiety levels. The PSS had a median of 1.60, indicating on average moderate stress levels, with a slightly positively skewed distribution (0.09) of scores (see Figure 10). Scores on the BCT, PSS appear similar for males and females; however, females on average had higher average GAD-7 scores compared to males (see Table 11). Supplementary analyses are provided in Appendix H, suggesting that gender was not a confounding variable.

Table 10

Descriptive Statistics for Main Variables in Study 2

Measure	*M*	Median	*SD*	Skew	Range
Belief in Conspiracy Theories (BCT)	2.21	2.13	0.84	0.59	1-5
Perceived Stress Scale (PSS)	1.59	1.60	0.77	0.09	0-4
General Anxiety Disorder 7-item scale (GAD-7)	5.77	5.00	5.22	0.86	0-21

Figure 10

Histogram Plots of Participants Scores in Study 2

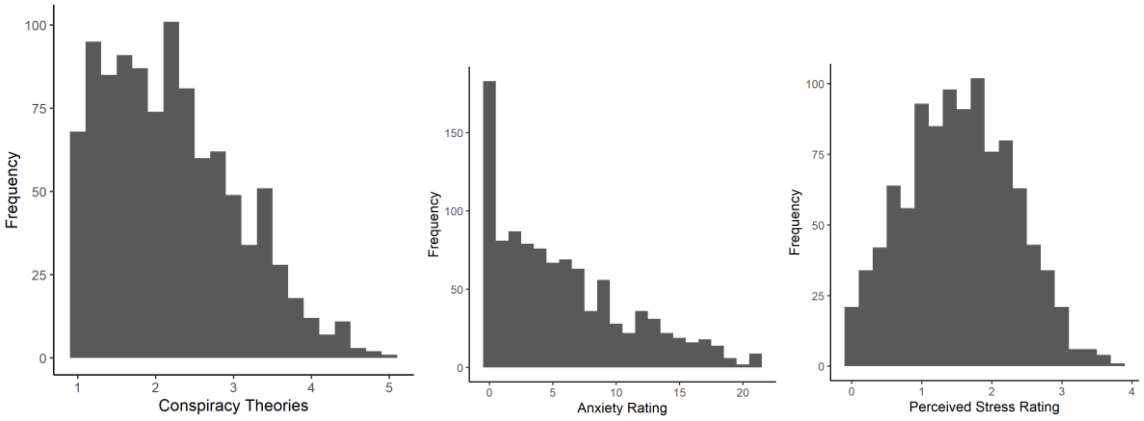


Table 11

Median Gender Responses in Study 2

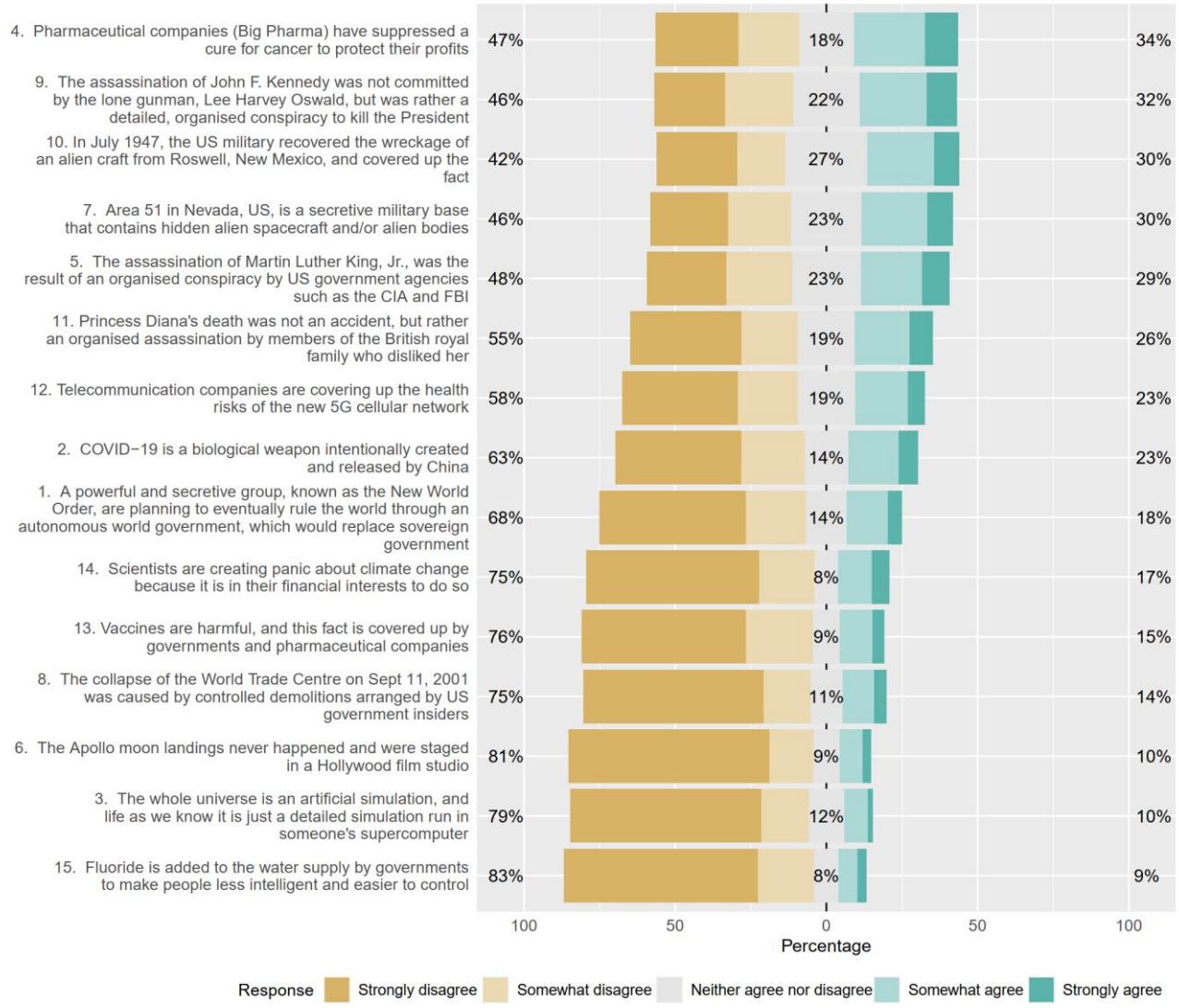
Gender	BCT	PSS	GAD-7
Male	2.27	1.50	4.00
Female	2.00	1.70	5.00
Third gender/non-binary	1.87	2.40	13.00

Note. 1.27% of the sample were third gender/non-binary.

The responses to individual items with the BCT scale are displayed in Figure 11. Six conspiracy theories were endorsed by over a quarter of the sample. Item 4 had the highest endorsement rate, with 34% of participants either somewhat or strongly agreeing "*Pharmaceutical companies ("Big Pharma") have suppressed a cure for cancer to protect their profits*". The remaining items were endorsed by less than a quarter of the participants.

Figure 11

Distribution of Responses to BCT Items in Study 2



Note. Percentages to the left of the figure indicate the disagree responses, those in the middle indicate neither agree nor disagree, and those to the right indicate the number of responses that agreed.

Control Variables. Descriptive statistics for the remaining three control variables are included in Table 12 and Figure 12. The subjective social status for participants was a median of 6, with 45% of participants rating their social status as a 6 or 7 (see Figure 12). The political orientation median was 2, indicating, on average, a moderately left political orientation, with 51.18% of participants indicating a strong or moderate left-wing orientation, 18.53% no preference and 30.3% with a strong or moderate right-wing orientation.

Table 12

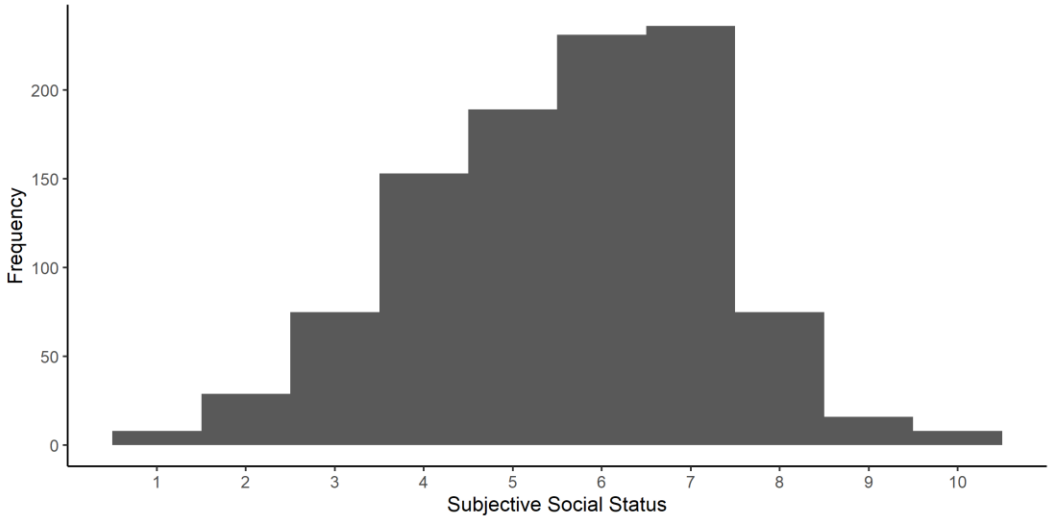
Frequency Table for Political Orientation and Education in Study 2

Control Variable	Frequency	Percentage
Political Orientation		
Strongly left	178	17.45
Moderately left	344	33.73
No preference	189	18.53
Moderately right	237	23.24
Strongly right	72	7.06
Education		
Doctoral degree (e.g., PhD)	59	5.78
Postgraduate degree (e.g., Masters)	215	21.08
Undergraduate degree (e.g., Bachelors)	376	36.86
Trade course or other tertiary qualification	103	10.1
Completed high school	258	25.29
Some high school (without completing)	9	0.88
No high school	0	0.00

Note. Descriptive statistics for age are in the participants' subsection in Table 9.

Figure 12

Participants Subjective Social Status in Study 2



Correlational Analysis. Intercorrelations between belief in conspiracy theories and predicting variables are presented in Table 13. Increased belief in conspiracy theories was associated with higher perceived stress and anxiety, younger age, and a preference for a right-wing political orientation. Conspiracy theories were not strongly associated with subjective social status and education level. In terms of control items, increased perceived stress and anxiety were associated with younger age, lower education, lower subjective social status. In addition, right-wing political orientation was associated with lower levels of perceived stress and anxiety. Lastly, perceived stress and anxiety were strongly correlated.

Table 13

Correlation Matrix: Main and Control Variables

Measure	1	2	3	4	5	6	7
1. BCT	—						
2. PSS	.14***	—					
3. GAD-7	.10**	.80***	—				
4. Subjective Social Status	.00	-.27***	-.21***	—			
5. Education	.00	-.16***	-.14***	.43**	—		
6. Political Orientation	.37***	-.08**	-.10***	.10***	.10***	—	
7. Age	-.22***	-.37***	-.34***	.05	.06	.06*	—

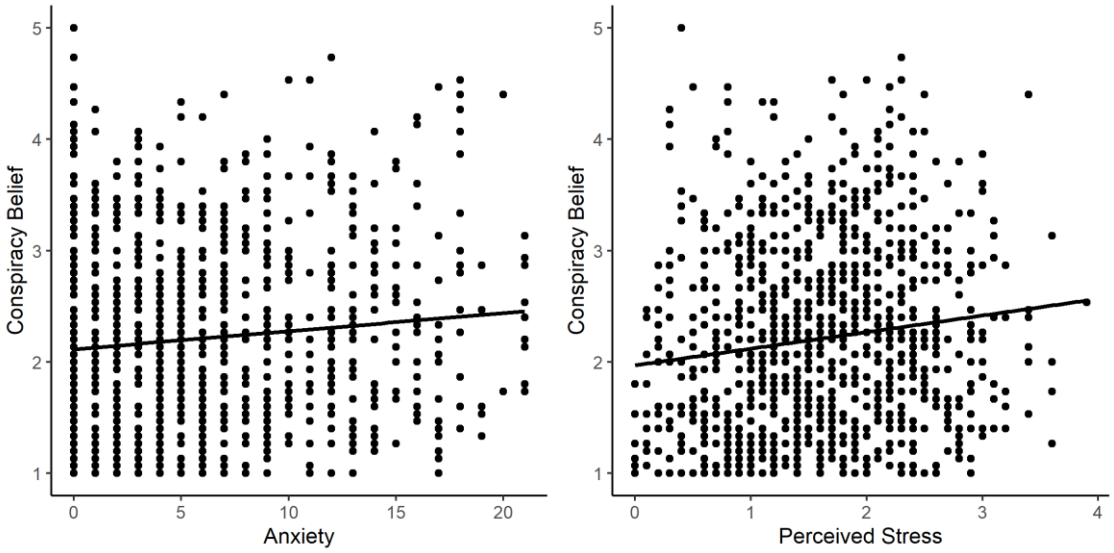
Note. Lower scores reflect lower levels of the measured construct of BCT, PSS, GAD-7 and age. For political orientation, higher scores indicate right-wing political orientation. For subjective social status, lower scores indicate lower subjective social status. For education, lower scores indicate lower education.

Pearson correlation coefficient. *$p < .05$, **$p < .01$, ***$p < .001$

Scatter Plots. The scatter plot between anxiety and belief in conspiracy theories shows a weak, positive association ($r = .10$, $p = .001$) in Figure 13. There appear to be outliers in the data, situated around low anxiety levels but high belief in conspiracy theories. The scatter plot between perceived stress and belief in conspiracy theories shows a weak, positive association ($r = .14$, $p < .001$). Outliers also appear in this data, particularly participants with high beliefs in conspiracy theories and low levels of perceived stress.

Figure 13

Scatter Plots of Main Variables in Study 2



Structural Equation Model Analysis

Structural equation modelling was used to predict whether perceived stress and anxiety have positive effects on belief in conspiracy theories (see Figure 14). The preregistration suggests that the regression paths need to be positive and statistically significant for the hypotheses to be supported.

The first hypothesis was supported: The effect of perceived stress on belief in conspiracy theories after controlling for anxiety, age, education, political orientation and subjective social status was positive and statistically significant (β = .12, 95% CI [.02, .23], *p* = .024).

No significant positive effect for Hypothesis 2 was found: the effect of anxiety on belief in conspiracy theories after controlling for perceived stress, age, education, political orientation and subjective social status was negative and not statistically significant (β = -.05, 95% CI [-.15, .06], *p* = .373).

In terms of the control variables, two observed variables of political orientation and age were found to be positive and statistically significant predictors of belief in conspiracy theories (see Table 14). Participants who scored higher on the political orientation scale (i.e. endorsed more right-wing views) tended to have a higher belief in conspiracy theories β = .41, 95% CI [.38, .44], $p < .001$) after controlling for perceived stress, anxiety, age, education and subjective social status. Younger participants had higher belief in conspiracy theories (β = -.24, 95% CI [-.28, -.20], $p < .001$) after controlling for perceived stress, anxiety, subjective social status, education and political orientation. Surprisingly, education did not appear to have any association with belief in conspiracy theories, along with subjective social status. Lastly, perceived stress and anxiety were highly correlated ($r = .87$, $p < .001$).

Table 14

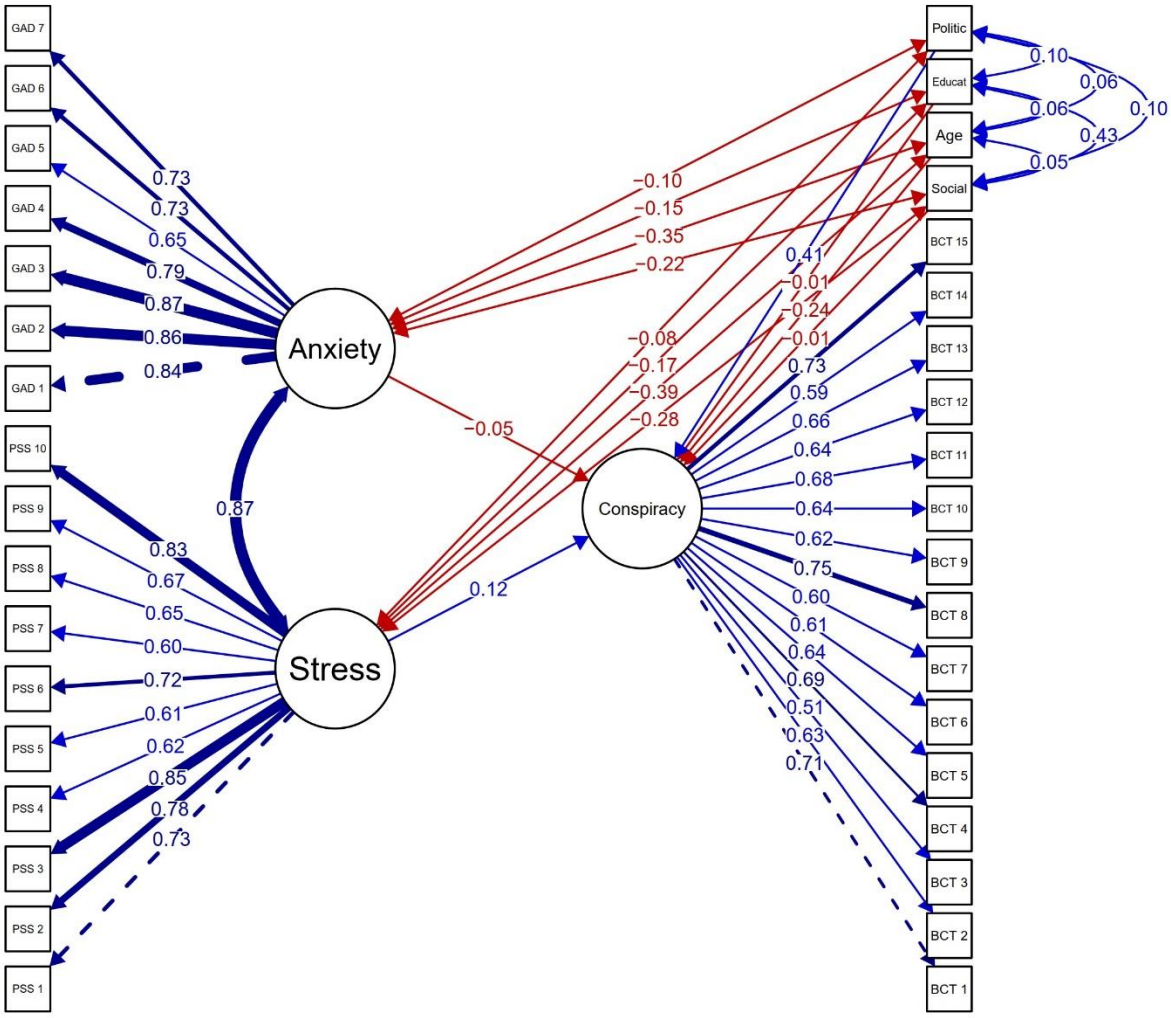
Regression Paths for Study 2

Measure	B	β	*p*	95% CI
Perceived Stress	.16	.12	.024	[.02, .23]
Anxiety	-.05	-.05	.373	[-.15, .06]
Subjective Social Status	.00	-.01	.825	[-.06, .05]
Age	-.01	-.24	.000	[-.28, -.20]
Education	-.01	-.01	.673	[-.06, .04]
Political Orientation	.30	.41	.000	[.38, .44]

Note. B = unstandardised; β = standardised; 95% CI = confidence interval for the standardised β. All measures are regressed onto the belief in conspiracy theories measure.

Figure 14

Structural Equation Model for Study 2



Note. This structural equation model predicts that anxiety and perceived stress levels will have a causal effect on belief in conspiracy theories. Statistics are standardised regression coefficients. Blue lines indicate positive coefficients, and red lines indicate negative coefficients.

Fit Statistics. The preregistration specified that the Satorra-Bentler chi-square statistic, RMSEA with 90 percent confidence interval and the sample-corrected robust RMSEA and CFI would be reported. The Satorra-Bentler chi-square statistic was large and statistically significant *SB* χ^2 (577) = 5214.33, $p < .001$, indicating that the null hypothesis of

exact fit in the model to the population can be rejected. The sample-corrected robust CFI of 0.96 reached an acceptable threshold, above the preregistered threshold of .95 suggested as an indicator of good model fit by Hu and Bentler (1999). The sample-corrected robust RMSEA was slightly above the cut off of 0.06, at .064 [.062, .066], which indicates that there was not adequate model-data fit, suggesting that the quantity of error in the approximation of the sample covariance matrix was substantial (Hu & Bentler, 1999). However, the SRMR reached the acceptable threshold with a robust SRMR estimate of 0.07, which is below the threshold of 0.08 or lower, indicating only a slight difference between the sample correlation matrix and that implied by the model. Thus, as only two fit statistics met the criteria specified in the preregistration, the model's overall fit is considered ambiguous. This said, as specified in the preregistration, the results of the fit statistics do not determine whether the hypothesis is supported. Instead, the fit statistics indicate if the model has been exactly correctly specified. Thus a lack of support for the overall fit implies additional uncertainty surrounding the direct effects found in the model.

Discussion

Prior research has provided some evidence that anxiety and stress are positively correlated with belief in conspiracy theories, but so far, there have been limited attempts to test whether these relationships represent causal effects. This study estimated the effects of anxiety and stress on belief in conspiracy theories while controlling for plausible confounding variables (political orientation, education, subjective social status, and age). These hypotheses were tested using two cross-sectional studies: Study 1, an Australasian sample and Study 2, a US-based sample.

Summary of Findings

The first hypothesis was supported in Study 2; higher perceived stress levels significantly predicted an increased belief in conspiracy theories. In contrast, in Study 1, higher perceived stress levels did not predict increased belief in conspiracy theories. The second hypothesis was not supported; anxiety was not a significant predictor of belief in conspiracy theories in either study. An interesting non-hypothesised finding was that a right-wing political orientation was found to significantly predict belief in conspiracy theories in both studies. While this regression coefficient was larger in the US sample, the magnitude of the effect was surprisingly large in both studies. Additional findings include that younger age significantly predicted a higher rate of belief in conspiracy theories in Study 2, but not in Study 1. In Study 1, lower educational levels significantly predicted higher belief in conspiracy theories, whereas this was not found in Study 2. Lastly, subjective social status was not found to significantly predict belief in conspiracy theories in either study.

Explanation of Findings

Perceived Stress

The estimated effects of perceived stress on belief in conspiracy theories only tentatively supported hypothesis 1, with only Study 2 showing a significant effect and the

estimated effects being small in both studies. Several factors could explain why this may have occurred.

The first is to understand why evidence for an effect was found in Study 2, but not in Study 1. The inconsistency may be due to the true effect of perceived stress on belief in conspiracy theories being positive, but so small that only Study 2, but not Study 1, was adequately powered to detect an effect. Prior research has indeed identified small bivariate correlations between stress and belief in conspiracy theories, and the few studies that have included the addition of control variables have also indicated an effect similar to that found in Study 2 (Braud et al., 2021; Swami et al., 2016). Thus, the power to detect a small effect requires a substantial sample size, and Study 1 may not have been sufficiently powered to detect very small effects. For example, in Study 1, the sample size was only large enough to detect a true effect size of $B > .15$ with 90% power, thus failing to find an effect. Study 2 had a larger sample size to detect a true effect size of $B > .10$ with 80% power, which suggests it was adequately powered to detect the standardised effect of $B = .12$. Additionally, this explanation could be why previous studies by Georgiou et al. (2020) and Ferreira et al. (2020) found a non-significant bivariate relationship in their research with sample sizes of $N = 640$ and 438, respectively. Therefore, finding an effect only in Study 2 may suggest that this effect is positive but small.

Another possible alternative explanation for why evidence for an effect was found in Study 2 may be associated with the sample's country of origin. Particularly, antagonistic outgroups may be more salient in the US, which means the effect should be stronger according to the Existential Threat Model. Indirect evidence for antagonistic outgroups being more salient in the US is seen in research surrounding national narcissism. National narcissism has been posited to predict belief in conspiracy theories (Sternisko et al., 2021), and it is no surprise that the US has been associated with higher levels of national narcissism

(Cai & Gries, 2013; Young & Pinsky, 2006). Groups that threaten the national image represent a clear antagonistic outgroup. Thus, antagonistic outgroups may be *more* salient in the US (compared to Australasia), potentially leading to a stronger effect of perceived stress on belief in conspiracy theories and ultimately allowing this effect to be statistically significant.

The second key point for why we found an effect only in Study 2, not Study 1, could be due to confounding variables. While the previous literature appears to be reasonably consistent (seven out of nine studies) in showing at least a bivariate relationship between stress and belief in conspiracy theories (see Table 1), we also found evidence of this bivariate relationship, but only in Study 2 did it remain significant after controlling for plausible confounding variables. A possible explanation for this might be that at least part of the observed zero-order relationship between perceived stress and belief in conspiracy theories is due to confounding variables that were controlled for in both studies. Two previous studies have attempted to control for plausible confounding variables: Swami et al. (2016) with age and subjective social status and Braud et al. (2021) with educational level. Interestingly, while age predicted belief in conspiracy theories, subjective social status and educational level did not in Study 2. However, an additional control variable of political orientation was included, which substantially predicted belief in conspiracy theories and was significantly associated with perceived stress. Thus, outside of what these two prior studies controlled for, important confounding variables may explain a significant aspect of variance, which has been accounted for in the current study. That said, the bivariate correlation found in Study 2 was similar to that found in the SEM regression path. Therefore this slightly contradicts the current explanation, and other reasons may point towards only finding tentative evidence of an effect.

Anxiety

While stress was a significant predictor in Study 2, anxiety did not have a significant estimated effect on beliefs in conspiracy theories in either study (although bivariate correlations were significant). The present research might help to resolve the ambiguity of past findings showing different effects of anxiety and conspiracy belief. Compared to stress, a larger number of studies examine the relationship between belief in conspiracy theories and anxiety. The current findings add to the literature, which indicates the ambiguous role of anxiety in belief in conspiracy theories.

Interestingly, we found similarities to De Coninck et al. (2021), who found a significant bivariate correlation between anxiety and belief in conspiracy theories in a large sample across eight countries. However, a negligible non-significant relationship was found in a structural equation model where age and education were controlled for. Of the research surrounding anxiety and conspiracy theories, the study by De Coninck et al. (2021) was conceptually aligned the best with the current study, using the same statistical method, similar controls and the same measure of anxiety, with the main difference being that De Coninck et al. used a three-item measure of belief in conspiracy theories. The similarities of the results provide some evidence that it is indeed stress, not anxiety, which may influence belief in conspiracy theories.

While these non-significant regression coefficients echo what was found in a small number of prior studies (Bowes et al., 2020; Swami et al., 2016), the vast majority of evidence suggests an effect of anxiety on belief in conspiracy theories (see Green & Douglas, 2018; Grzesiak-Feldman, 2013; Radnitz & Hsiao, 2020; Sallam et al., 2020). One potential explanation may be the content of the proposed conspiracy theories. A common feature of recent studies that found a relationship between anxiety and belief in conspiracy theories is the use of COVID-19-related conspiracy theories. Elevated anxiety due to the COVID-19

pandemic (see Gamonal-Limcaoco et al., 2021) may indicate that COVID-19-specific conspiracy theories may be better suited to tapping into feelings associated with societal crises. That is, COVID-19 conspiracy theories may be more anxiety-provoking given the lived experience of individuals.

Prior research on COVID-19 conspiracy theories has found that the conspiracy theories' content when studying their effects and causes is particularly important (Oleksy et al., 2021). This may be why recent studies by Peitz et al. (2021) and Leibovitz et al. (2021) found the opposite of the hypothesised effects – belief in COVID-19 conspiracy theories predicting increased anxiety. It is plausible that this may be the case here since the specific conspiracy theories that were included in both studies, for the most part, did not focus on COVID-19 conspiracy theories. This may explain why anxiety was not found to have a significant effect on belief in conspiracy theories; however, it is also an important limitation of the current research, which is discussed further in the limitations subsection.

The Correlation Between Stress and Anxiety

An aspect of both studies that is a source of uncertainty and may further explain why an effect was found in Study 2 but not Study 1 is the strong correlation (r = .86 in Study 1 and r = .87 in Study 2) between perceived stress and anxiety. This is noticeable when considering the wide confidence intervals and large standard errors for the regression paths between perceived stress and anxiety with belief in conspiracy compared to the control variables (see Table 8 and 14). Presumably, this is due to multicollinearity between stress and anxiety. While SEM is a practical approach to accounting for measurement unreliability, it can also aggravate multicollinearity issues (Dimitruk et al., 2007). Because of controlling measurement error, the SEM results in higher correlations between the predicting variables of perceived stress and anxiety (Grewal et al., 2004). The main issue with multicollinearity within an SEM is that it increases the variability of the sampling distribution of the estimated

effects and consequently reduces power (Scharf et al., 2021). Multicollinearity is particularly disruptive, as when aiming to provide causal inferences, the Type II error rate (risk of false negatives) increases. Thus, we plausibly could have failed to detect a significant effect in Study 1 due to issues related to multicollinearity reducing the power to detect an effect. Fortunately, the current research mitigated some of the issues related to multicollinearity. First, in simulations of the influence of multicollinearity of predictor variables in an SEM, Grewal et al. (2004) found that if reliability was high (i.e., alpha $> .85$), even fairly high multicollinearity can be tolerated. Further, large sample size (ratio of 6:1 of observation to estimated parameters) was another aspect that protected the parameter estimates, with Study 1 within the range for a large sample (5.4:1), and Study 2 well over Grewal et al.'s (2004) estimates of large sample size (11:1). However, a loss of power is still plausible due to the multicollinearity of perceived stress and anxiety, and the power to detect small effects may have been less than what we had planned for, and resulted in the inability to find a small effect in Study 1. The larger sample size in Study 2 may have overcome some of the issues related to multicollinearity and thus an effect was found.

Additional Findings

To a considerable extent, political orientation was related to belief in conspiracy theories. Participants who endorsed a right-wing political orientation were substantially more likely to endorse conspiracy theories and have lower stress and anxiety levels. This was found in both studies and could be due to a range of reasons.

Prior research has argued that the political right is associated with belief in conspiracy theories (Garrett & Bond, 2021; van der Linden et al., 2021; Winter et al., 2021), indicating support for the findings in both studies. One possible reason could be that right-wing politicians have been known to endorse conspiracy theories (Radnitz & Hsiao, 2020), which may lead to their supporters endorsing similar views. Second, lower stress and anxiety levels

may be due to the simple explanations that conspiracy theories provide. For example, believing that humans do not have a role in causing and preventing climate change or that COVID-19 is a hoax are convenient and much less emotionally provoking than the alternatives. In comparison, those with a left-wing orientation may feel an increased level of existential threat, for example, due to the reality of COVID-19, which may activate higher feelings of stress and anxiety. The tentative suggestion by Radnitz and Hsiao (2020) suggests that endorsing politicians who endorse conspiracy theories may be a means to reduce anxiety by restoring a sense of order during times of uncertainty. Therefore, the current research may provide initial support for the idea that conspiracy theories may reduce anxiety.

Interestingly, Peitz et al. (2021) recently found the complete opposite in a UK-based study, where left-wing oriented participants were more likely to endorse conspiracy theories. While it has been previously argued that belief in conspiracy theories is found at the extremes of the political spectrum (van Prooijen et al., 2015), this was also accounted for by Peitz et al. (2021) who found no evidence of a quadratic effect. One potential explanation is that prior research in the US has found that whoever is on the losing side of the political environment may be more susceptible to belief in conspiracy theories (Uscinski & Parent, 2014). However, equally plausibly, the content of the conspiracy theories we used in the survey could arguably be more conceptually aligned to endorsement from the political right (e.g., items about climate change and scientists). Currently, a right-wing government is in power in the UK, and a left-wing government is in power in the US and NZ. However, Australia is an exception, currently having a right-wing political party in power. The current research and previous literature highlight the complicated relationship between belief in conspiracy theories and political orientation between different countries.

Strengths of the Research

The current research contributes to the existing literature a more refined approach to determining the causal effect of perceived stress and anxiety on belief in conspiracy theories using two distinct samples.

The first contribution uses an Australasian sample, where conspiracy theory research is in its infancy compared to the US and Europe. While previous Australasian-based research by Williams et al. (2022) has focused on belief in conspiracy theories and perceived stress from a correlational viewpoint, the current research is the first to systematically consider the role of both stress and anxiety while controlling for plausible confounding variables. The effect found in Study 1 suggest that while bivariate correlations were used in most prior studies estimating this relationship, once controls are included in models, the size of the effect becomes smaller. The improvement allows for more robust causal inferences in determining the effect of stress and anxiety after accounting for other plausible explanations.

Second, the addition of a sizeable US-based representative sample allowed for comparisons across two different cultures. Study 2 provided a unique insight into the size of the effect of perceived stress on belief in conspiracy theories. It added confidence to the tentative inference of Swami et al. (2016), who suggested that stress appears to influence belief in conspiracy theories. The two current samples both highlighted that the effect of stress on belief in conspiracy theories is nevertheless consistently small within the current literature. Additionally, two samples identified the possible non-significant or negligible effect of anxiety on belief in conspiracy theories.

Finally, using a structural equation model that had the causal pathways predicted a priori was a unique aspect of the research considering perceived stress and anxiety. The benefit is the ability to account for measurement error within the model. Preliminary

statistical analyses have considered this within anxiety research; however, this is a novel contribution to the stress-based conspiracy theory literature.

Implications

These findings provide some tentative evidence for an effect of higher stress causing increased belief in conspiracy theories; however, this effect is small. Further, anxiety's effect on belief in conspiracy theories appears to be even smaller than that found in previous research. While such tentative evidence can be provided to support the idea that elevated stress may lead to increased belief in conspiracy theories (van Prooijen, 2019; van Prooijen & Douglas, 2017), the size of this effect only explains a small amount of variance.

More importantly, the relatively small effect raises questions regarding the Existential Threat Model, suggesting it may not be a reasonable explanation for interindividual differences in belief conspiracy theories. For example, with the effects of stress and (even more so) anxiety being relatively small, the model is unlikely to explain a substantial amount of variation between people in how much they believe in conspiracy theories. Elevated stress and anxiety are associated with existential threats during societal crises, yet the current effects and previous research provide limited support that feelings associated with existential threats lead to belief in conspiracy theories. Therefore, quite a significant aspect of the model, which predicts that existential threat may lead to increased belief in conspiracy theories, is limited in its empirical support. This is supported by research by Liekefett et al. (2021), who in an 18-month longitudinal study also failed to find an effect of increased existential threat predicting an increase in conspiracy beliefs.

Anxiety is often included in the definition of an existential threat, and for the current research to find no significant effect of anxiety on belief in conspiracy theories has further implications for the Existential Threat Model. First, it may imply that it appears to be stress

rather than anxiety that influences belief in conspiracy theories. Stress may be a better predictor within the current model, especially considering that stress is elevated during societal crises (Park, 2010). This identifies that an existential threat may be better defined as elevated levels of stress and stressful life events rather than measures of anxiety. Second, as previously mentioned, even with stress predicting belief in conspiracy theories more than anxiety, the size of the effects only explain a small amount of the differences in why individuals believe in conspiracy theories.

The practical implication of the current findings is that stress and anxiety interventions may not be effective in reducing belief in conspiracy theories. Swami et al. (2016) inferred that stress-reduction techniques may be an appropriate approach to indirectly reduce belief in conspiracy theories. Such a suggestion was reliant on future research that examined the association between stress and belief in conspiracy theories. A larger body of research has established that this relationship exists, but it is so small that such interventions would probably be futile in influencing and reducing belief in conspiracy theories.

Limitations

A limitation of the current research is whether belief in conspiracy theories cause stress and anxiety, with a small amount of research emerging that suggests the opposite to that hypothesised. Particularly, Liekefett et al. (2021) found in a two-month longitudinal study that increases in conspiracy belief predicted a subsequent increase in existential threat and anxiety. Similarly, Peitz et al. (2021) and Leibovitz et al. (2021) found that increased belief in conspiracy theories predicted an increase in anxiety levels. Therefore, it could be that it is not stress or anxiety that is causing belief in conspiracy theories; instead, the belief in conspiracy theories is the source of stress or anxiety. Belief in conspiracy theories increasing existential threat is posited by the Existential Threat Model of Conspiracy Theories. However, it has important implications as the causal inferences made in both

studies in the current research rely on the assumption that belief in conspiracy theories do not affect stress and anxiety. This said, ambiguity remains, with Liekefett et al. (2021) finding no effect of increased conspiracy beliefs predicting increased existential threat or anxiety in a more extensive longitudinal study over 18-months with a representative sample. Thus, the opposite possibility of belief in conspiracy theories affecting stress and anxiety levels may be a possibility, but the current empirical evidence is equivocal.

While we attempted to increase the credibility of causal inferences by controlling for plausible confounding variables, the use of a cross-sectional design means that inferences about causal effects come with substantial uncertainty attached. While both studies used causal arrows within the SEM to predict that higher perceived stress and anxiety will increase belief in conspiracy theories, major assumptions are made that stress and anxiety precede belief in conspiracy theories.

Another internal validity limitation of the study is the significant and strong correlation between perceived stress and anxiety, which has important implications for the estimated effects. As discussed in the previous section, this issue of multicollinearity was unlikely to influence the trustworthiness of the estimated effects; however, understanding which of the two variables has an effect is difficult to work out because of the strong correlation ($r > .85$). For example, if stress affects anxiety, which then affects belief in conspiracy theories, then controlling for anxiety would reduce the apparent effect on belief in conspiracy theories. Thus, controlling for anxiety would mean we unintentionally blocked the pathway by which stress could affect belief in conspiracy theories. The same limitation could apply to anxiety if anxiety affects perceived stress. The fact that there was minimal evidence for either perceived stress or anxiety affecting belief in conspiracy theories suggests this issue of multicollinearity has not had a major impact on the findings, but it is still a matter of concern.

A second limitation was the convenience sample used in Study 1, which was disrupted by an issue with TikTok and Prolific (see Charalambides, 2021), resulting in a sample biased towards younger women, thus limiting the external validity of the findings. Study 2 attempted to enhance the generalisability of the findings with a representative sample in the US which found comparable results to previous research. While sex and age were relatively similar to the US Census data, ambiguity remained in how Prolific created the five simplified ethnicity groups. Prolific does not clearly state how it created the ethnicity groups in the US, and the five simplified ethnicity groups it stratifies do not align with the current US Census data. Additionally, the sample was drawn from Prolific, where the average educational level is substantially higher compared to the US Census; however, education level was controlled for.

Third, the belief in conspiracy theories measure was developed for the current research and was not validated, although it yielded good reliability in both studies. The issue with measuring belief in conspiracy theories is that the content of conspiracies changes or becomes outdated. While the current study adapted the BCTI, a popular conspiracy theory measurement within psychology research, it was decided that the questions were not all of contemporary relevance. New items were drawn from prior research with prior reliability estimates in accounting for the validity issues.

Lastly, the statistical analyses have some limitations. Notably, Study 1 did not have enough participants to accurately run an ordinal-based estimator (DWLS) within lavaan without a warning message. However, the output was essentially the same even when using maximum likelihood estimation (see Appendix G). The second study overcame this limitation with a larger sample and no issues with the estimation method. Additionally, to limit the overall length of the survey, all control variables used one-item measures and were inputted as observed variables. In doing so, this has some implications on increasing the Type I error

rate (Westfall & Yarkoni, 2016). Using more complex multi-item measures would have allowed the control variables to be measured as latent variables and thus be more accurate in accounting for measurement error.

Future Research

Further work is needed to establish the causal effect of perceived stress and anxiety on belief in conspiracy theories. Future research should consider using different anxiety or stress measures to ensure multicollinearity is less of an issue. Distinguishing between stress and anxiety is essential to establish their role in affecting belief in conspiracy theories. While the current research used *feelings* of existential threat, directly measuring existential threat levels would be a helpful approach. However, to our knowledge, while Liekefett et al. (2021) created their own measure, validated measures do not currently exist. A validated measure of existential threat may be helpful in more accurately testing the Existential Threat Model of Conspiracy Theories.

Future research should consider the relationship between belief in conspiracy theories and stress from a longitudinal perspective to determine a causal effect. While anxiety appears to be a non-significant predictor of belief in conspiracy theories, longitudinal research could infer whether stress may cause belief in conspiracy theories. Causal inference is far more plausible with a longitudinal design since it is possible to establish temporal precedence of the cause before the effect. Extensive longitudinal research by Liekefett et al. (2021) could be improved by incorporating more measurement points (i.e., measuring every month rather than once every four months) to better understand individual variability over time. Additionally, further longitudinal research should preregister the expected causal effects. Cross-lagged panel models require many decisions that should be articulated a-priori, so it is imperative that the reader is aware of the assumptions and statistical decisions made before data collection.

Additionally, the current research did not focus on an essential aspect of the Existential Threat Model of Conspiracy Theories; salient antagonistic outgroups. Future studies could measure or manipulate the salience of antagonistic outgroups and then estimate its interactions with stress and anxiety as predictors of belief in conspiracy theories. However, this may be associated with a range of ethical issues. For example, participants would need to be stressed for a substantial period to influence their beliefs about conspiracy theories. However, one approach could be through experimentally manipulating groups to be exposed to high-stress situations and only have one group experience a salient antagonistic outgroup. Thus, as in the study by Radntiz and Underwood (2017), a conspiracy vignette could be provided, which may allow consideration of whether the sense-making processes in the absence of a salient outgroup still lead to belief in conspiracy theories, or whether this is indeed a critical aspect of the model (van Prooijen, 2019). Lastly, political orientation appeared to be unexpectedly influential in predicting belief in conspiracy theories in both studies, and future research should consider multi-item measures of political orientation to measure and control for it accurately.

Conclusion

In conclusion, this study set out to better understand the causal effects of perceived stress and anxiety on belief in conspiracy theories in two preregistered studies, using cross-sectional designs while controlling for age, education, subjective social status and political orientation. Structural equation analyses revealed tentative evidence to support the hypothesis that perceived stress influences conspiracy theories in Study 2 but not Study 1, although no significant effect was found for anxiety in either study. The current research has highlighted that while stress may significantly predict belief in conspiracy theories, this effect is small. An implication of this is that the Existential Threat Model of Conspiracy Theories may not be useful in explaining why individuals believe in conspiracy theories at certain times. Because

stress only accounts for such a small amount of belief in conspiracy theories, a substantial amount remains unaccounted for. This research adds to the growing research that indicates perceived stress affects belief in conspiracy theories. Prior to this research, the influence of perceived stress on belief in conspiracy theories was reported from cross-sectional studies with limited attempts to control for plausible confounding variables. Thus, this research makes several methodological contributions to this area in detecting such a causal effect.

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Appendix A

Participant Information Sheet Study 1

Full survey and materials for Study 1 can be found on OSF:
https://osf.io/sfuz9/?view_only=495a049c99df46579ceb52a32d0771fe

Researcher introduction: My name is Nick Fox; I am completing the following research for the qualification of Master of Arts in Psychology at Massey University under the supervision of Dr Matt Williams.

Project description
This study is designed to investigate the perceptions about claims regarding current and historical events. The events included in the survey have had alternative versions where it is believed the official explanation has been incorrect. There will also be some questions about how you have been emotionally feeling in the last month. To be eligible, you need to be at least 18 years old and live in either Australia or New Zealand.

Project procedures
If you choose to participate, you will be asked to rate how much you believe a particular claim may be true or false. You will also be asked about rating your thoughts and feelings over the past month. There will also be some basic demographic questions about yourself. The survey will include 42 questions in total, estimated to take around 4-7 minutes. If you complete the survey, you will receive 0.88GBP, paid via Prolific. The survey is not anticipated to cause any risk or discomfort because of completing this survey.

Data management
You will not be required to provide your name in this survey. The data collected will only initially be available by the project team (Nick Fox and Dr Matt Williams). Once the data analysis has been completed, it will be made publicly available and stored indefinitely. The data will be shared on the Open Science Framework so that other researchers and members of the public can access this data. This does mean that additional studies may be completed that are not part of this study. We will ensure that any information that may indicate who you are (e.g., your Prolific ID) has been removed before the data is posted online. Suppose you wish to receive a summary of the findings. In that case, Prolific's messaging system will be used, so your email address will not be stored.

Participant rights
You are under no obligation to accept my invitation to take part in this research. If you decide to participate, you have the right to decline to answer any question or to stop answering questions at any time.

Project contacts
If you have any questions about this research, please contact me using the Prolific messaging system or you are welcome to contact me at nick.fox.2@uni.massey.ac.nz or Matt Williams m.n.williams@massey.ac.nz.
This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Professor Craig Johnson, Director (Research Ethics), by email at humanethics@massey.ac.nz.

Appendix B

Survey Debrief Study 1

Thank you for participating as a research participant in the present study.

Please remember that the anxiety and stress items included in this survey are not diagnostic tools suitable for assessing individuals; instead, they are used for research purposes and making generalisations about groups of people.

If you are struggling with stress or anxiety, these are some useful resources relating to mental health in **New Zealand** or **Australia.**

If you have any questions regarding this study, please feel free to ask the researcher through the Prolific messaging system or contact me at nick.fox.2@uni.massey.ac.nz or Matt Williams m.n.williams@massey.ac.nz.

Appendix C

Low Risk Ethics Notification

Application Title: Belief in conspiracy theories and its relationship with perceived stress and anxiety.

Project Summary: This research considers whether people are more likely to endorse conspiracy theories when they have higher perceived stress and anxiety levels. A large sample of 450 New Zealand and Australian participants aged 18 and over will be recruited via the Prolific crowdsourcing platform. Participants will complete a survey that assesses their belief in specific conspiracy theories and asks about their perceived stress and anxiety levels. The survey will be based on the Qualtrics survey platform and will have 42 questions in total and will take approximately 8 minutes. Participants will be paid 1GBP (~NZD1.97) as financial payment in return for their time completing the survey. Fifteen specific conspiracy theories were drawn from the literature relevant to the intended sample to measure belief in conspiracy theories. The 7-item General Anxiety Disorder (GAD-7) will measure anxiety within the last two weeks. For stress, the 10-item Perceived Stress Scale (PSS) will be used. Single item questions are included to measure age, social status, education and political orientation.

The current research has been based on previous research, which found a small but significant correlation between perceived stress and conspiracy belief in a US-based sample (Swami et al., 2016). The conspiracy theory literature also suggests that anxiety may play an influential role in conspiracy belief. However, in the same study by Swami et al., it was found that once the effects of stress were controlled for, anxiety was a non-significant predictor of conspiracy belief. Therefore, the research aims to extend these findings but with a different and more robust research approach. Overall, the study investigates conspiracy theories from a perspective outside the US and UK to give a unique insight into the possible predictors of belief in conspiracy theories. The findings may provide further insight into potential interventions that may indirectly reduce a person’s belief in conspiracy theories.

Describe the peer review process that has been used to discuss and analyse the ethical issues present in this project.

This project and its ethical issues were discussed between Nick (researcher) and Matt Williams (supervisor, member of MUHEC Northern). During discussions in supervision, we considered whether this project was low risk or required a full application. Dr Stephen Hill was consulted in the peer review process, who also agreed this study is suitable as a low risk study and provided small suggestions regarding our considerations about question 4b.

The question requiring most consideration was 4b – "Use of a questionnaire or interview, whether or not it is anonymous, which might reasonably be expected to cause discomfort, embarrassment or psychological or spiritual harm to the participants." Our planned survey does include questions relating to psychological distress (e.g., anxiety, stress). However, there is no reason to expect that answering these questions will *cause* discomfort or other types of harm to participants, especially considering that participants' engagement with these items will be limited to ticking particular response options in short widely-used scales rather than writing personal narratives or sharing identifiable information.

In addressing this issue – Dr Stephen Hill suggested including a reminder in the debrief section of the survey for the participants. This reminder will contain information that the anxiety and stress items are not diagnostic tools suitable for assessing individuals; instead, they are used for research purposes and making generalisations about groups of people.

Another question that required consideration was 4.c – "Processes that are potentially disadvantageous to a person or group, such as the collection of information which may expose a person/group to discrimination." It is crucial to ensure that the current study does not indirectly harm those who believe in conspiracy theories by further stigmatising them or marginalising those who question mainstream narratives. In addressing this risk, the study focuses on possible predictors which may lead to conspiracy belief rather than negative characteristics of those who believe in conspiracy theories. In addition, we will avoid reinforcing the misconception that conspiracy beliefs can be dismissed as irrational even before understanding the evidence related to those claims will be avoided.

List the ethical issues considered and explain how each has been addressed

Respect for persons

- The study will maintain respect for those who endorse conspiracy theories. The wording of information within the survey will ensure it contains no demeaning descriptions or comments.

Anonymity

- Participants will not be asked for their names.
- Only Matt Williams and I will view the raw data with possible identifying information.

- The participants will know that the researcher will upload a de-identified copy of the data to an online repository. Any data stored will be cleared of any identifying information (such as Prolific ID, IP address).
- The research data will be handled with privacy, with file sharing and backup copies being made on secure software.

Informed consent

- Informed consent will be established before completing the survey. Participants will be provided with a description and purpose of the study. They will also understand how long it is expected to take and information regarding their compensation.
- It will be made clear that participation in this study is voluntary and participants can decline to respond to any question.

Disadvantages to a person or group

- Strict anonymity of data will be maintained since it could harm participants' reputations or social standing if it became known they endorse certain conspiracy beliefs.
- As the study considers socio-economic status and education with their belief in conspiracy theories, this area will be treated carefully to avoid stigmatising these groups.

Justice

- All participants will be financially compensated in return for the small quantity of time spent completing the survey. The financial payment ensures a fair distribution of burden and reward, but is not large enough to comprise an inducement.

With whom did you peer review your research?

Dr Matt Williams (Supervisor)

Peer Reviewed by: Dr Stephen Hill (School of Psychology)

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

Date: 14 June 2021

Dear Nick Fox

Re: Ethics Notification - **4000024597** - **Belief in conspiracy theories and its relationship with perceived stress and anxiety.**

Thank you for your notification which you have assessed as Low Risk.

Your project has been recorded in our system which is reported in the Annual Report of the Massey University Human Ethics Committee.

The low risk notification for this project is valid for a maximum of three years.

If situations subsequently occur which cause you to reconsider your ethical analysis, please contact a Research Ethics Administrator.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:
"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Professor Craig Johnson, Director - Ethics, telephone 06 3569099 ext 85271, email humanethics@massey.ac.nz."

Please note, if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to complete the application form again, answering "yes" to the publication question to provide more information for one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely

Professor Craig Johnson
Chair, Human Ethics Chairs' Committee and Director (Research Ethics)

Research Ethics Office, Research and Enterprise
Massey University, Private Bag 11 222, Palmerston North, 4442, New Zealand **T** 06 350 5573; 06 350 5575 **F** 06 355 7973
E humanethics@massey.ac.nz **W** http://humanethics.massey.ac.nz

Appendix D

Participant Information Sheet Study 2

Full survey and materials for Study 2 can be found on OSF:
https://osf.io/sfuz9/?view_only=495a049c99df46579ceb52a32d0771fe

Researcher introduction: My name is Nick Fox; I am completing the following research for the qualification of Master of Arts in Psychology at Massey University under the supervision of Dr Matt Williams.

Project description
This study is designed to investigate the perceptions about claims regarding current and historical events. The events included in the survey have had alternative versions where it is believed the official explanation has been incorrect. There will also be some questions about how you have been emotionally feeling in the last month. To be eligible, you need to be at least 18 years old and currently reside in the United States of America.

Project procedures
If you choose to participate, you will be asked to rate how much you believe a particular claim may be true or false. You will also be asked about rating your thoughts and feelings over the past month. There will also be some basic demographic questions about yourself. The survey will include 42 questions in total, estimated to take around 4-6 minutes. If you complete the survey, you will receive GBP0.75, paid via Prolific. The survey is not anticipated to cause any risk or discomfort because of completing this survey.

Data management
You will not be required to provide your name in this survey. The data collected will only initially be available by the project team (Nick Fox and Dr Matt Williams). Once the data analysis has been completed, it will be made publicly available and stored indefinitely. The data will be shared on the Open Science Framework so that other researchers and members of the public can access this data. This does mean that additional studies may be completed that are not part of this study. We will ensure that any information that may indicate who you are (e.g., your Prolific ID) has been removed before the data is posted online. Suppose you wish to receive a summary of the findings. In that case, Prolific's messaging system will be used, so your email address will not be stored.

Participant rights
You are under no obligation to accept my invitation to take part in this research. If you decide to participate, you have the right to decline to answer any question or to stop answering questions at any time.

Project contacts
If you have any questions about this research, please contact me using the Prolific messaging system or you are welcome to contact me at nick.fox.2@uni.massey.ac.nz or Matt Williams m.n.williams@massey.ac.nz.
This project has been evaluated by peer review and judged to be low risk. Consequently it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Professor Craig Johnson, Director (Research Ethics), email humanethics@massey.ac.nz.

Appendix E

Debrief Study 2

Thank you for participating as a research participant in the present study.

Please remember that the anxiety and stress items included in this survey are not diagnostic tools suitable for assessing individuals; instead, they are used for research purposes and making generalisations about groups of people.

If you are struggling with stress or anxiety, here are some useful resources relating to mental health from the CDC and NAMI.

If you have any questions regarding this study, please feel free to ask the researcher through the Prolific messaging system or contact me at nick.fox.2@uni.massey.ac.nz or Matt Williams m.n.williams@massey.ac.nz.

Appendix F

Variation to Ethics Notification for Study 2

Email submission:

I am contacting regarding a previously submitted low-risk ethics notification: 4000024597. This email is intended to record a variation to this notification.

Specifically, we have collected data as described in the original notification, and now we plan to expand the original study by also collecting a representative sample (N = 1050) from the United States of America through the same recruitment platform (Prolific).

The survey itself will remain nearly identical to what was in the original submission. Small changes in the wording of the survey have been made to make it relevant to the USA rather than New Zealand/Australia.

The only notable difference is that the payment per participant will be GBP0.75 (~NZD1.45) instead of GBP0.88 (~NZD1.71). This is because, in the first sample of participants, the median time was 5 minutes to finish (which was quicker than the expected completion time we initially used to determine the payment amount). We have then decided to use GBP0.75 as Prolific suggests paying this amount for a survey with a median completion time of 6 minutes.

Lastly, the debrief section has been updated to include USA specific mental health-related links.

Our answers to all risk-screening questions remain the same, and the collection of this additional sample therefore does not affect the low-risk status of the study.

Response:

Thank you for your email. The amendment as outlined below has been noted in our records and approved. Thank you for the level of detail provided.

Appendix G

Supplementary SEM Analysis using Maximum Likelihood for Study 1

The following is a supplementary analysis using maximum likelihood (ML) estimation. The extra analysis was to display that the fit indices and regression paths remained similar to that of the ordinal estimator (DWLS; diagonally weighted least squares), which had the following warning message in RStudio:

"Warning message: lavaan WARNING: number of observations (502) too small to compute Gamma."

The standardised regression paths (with DWLS vs ML) can be seen in Table G1. The estimated direct effects for perceived stress and anxiety remained small and insignificant, and the standardised regression paths for the control variables remained identical to those estimated using DWLS.

Table G1

Regression Paths with DWLS versus ML Estimation Method

	DWLS Estimation			ML Estimation		
Measure	β	*p*	95% CI	β	*p*	95% CI
Perceived Stress	.07	.295	[-.06, .20]	.09	.432	[-.14, .32]
Anxiety	.12	.063	[-.01, .24]	.08	.485	[-.14, .30]
Subjective Social Status	-.01	.789	[-.07, .05]	-.01	.812	[-.11, .08]
Age	-.05	.186	[-.12, .02]	-.03	.581	[-.13, .07]
Education Level	-.15	.000	[-.21, -.08]	-.15	.002	[-.25, -.05]
Political Orientation	.28	.000	[.24, .33]	.27	.000	[.19, .36]

Note. β = standardised regression path; 95% confidence intervals for standardised regression paths.

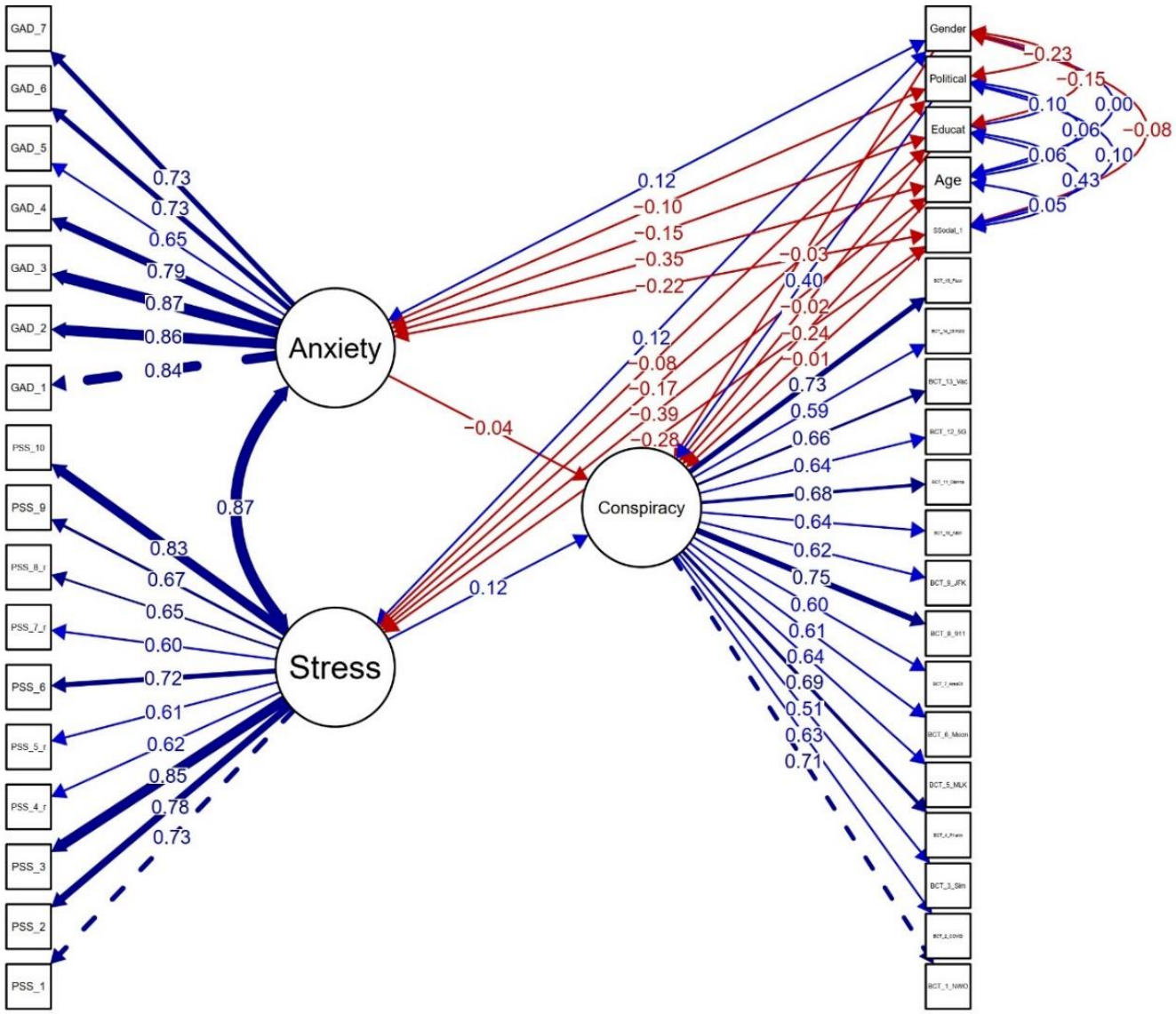
In terms of fit statistics, when using DWLS, three out of the four preregistered fit statistics suggested adequate fit (robust CFI, SRMR and robust RMSEA), whereas for ML, only the one of the four fit statistics suggested adequate fit (SRMR). Therefore, the ML estimation method does imply additional ambiguity (compared to DWLS) surrounding the direct effects found in the model.

Appendix H

Supplementary Analyses for Gender in Study 2

An additional non-preregistered exploratory analysis was conducted to determine whether gender was a plausible confounding variable. In the structural equation model (see Figure H1), the standardised effect of gender on belief in conspiracy theories after controlling for perceived stress, anxiety, age, education, political orientation, and subjective social status was negative but not statistically significant (β = -.03, 95% CI [-.12, .02], p = .139). The direct effects of perceived stress and anxiety on belief in conspiracy theories remained similar to the original analysis. Therefore, gender was not deemed a plausible confounding variable.

Figure H1


GAD_7
GAD_6
GAD_5
GAD_4
GAD_3
GAD_2
GAD_1
PSS_10
PSS_9
PSS_8_r
PSS_7_r
PSS_6
PSS_5_r
PSS_4_r
PSS_3
PSS_2
PSS_1
Anxiety
Stress
Conspiracy
0.87
−0.04
0.12
Gender
Political
Educat
Age
SSocial_1
BCT_13_Vac
BCT_12_5G
BCT_9_JFK
BCT_8_911
BCT_6_Moon
BCT_5_MLK
BCT_3_Sin
BCT_1_NWO
−0.23
−0.15
0.10
0.00
0.06
−0.08
0.06
0.10
0.43
0.05