Experimental Manipulation of Uncanny Feeling does not Increase Adherence to Conspiracy Theories

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Abstract

Research over the past decade has shown that endorsement of conspiracy theories (CTs) are shaped by motivated cognition processes. Accordingly, CTs are theorized to stem from compensatory processes, as individuals attempt to cope with existential threats (i.e., uncertainty, loss of control). Based on the Meaning Maintenance Model, we investigated whether this compensatory effect could follow from epistemic threats in domains unrelated to CTs in the form of uncanniness. Feelings of uncanniness were experimentally manipulated through exposure to absurdist art and literature in a set of 5 studies, followed by a mini meta-analysis ($N_{total} = 1,041$). We conducted a final, pre-registered sixth study ($N = 266$) manipulating uncanniness through autobiographical recall. Results suggest that a compensatory effect occurs only among participants from a general population (i.e., non-students) and not among students. We discussed methodological limitations, conceptual limitations of the Meaning Maintenance Model, as well as boundary conditions under which conspiracy theories could have a compensatory function to deal with threats.

Keywords: conspiracy theories; meaning maintenance model; uncanny; threat; compensation; absurdist art

Introduction

Conspiracy theories (CTs) can be defined as *'proposed explanation of events that cites as a main causal factor a small group of persons (the conspirators) acting in secret for their own benefit, against the common good'* (Uscinski et al., 2016, p. 58). A recent survey showed that 52% of French people agreed with at least one Russian thesis on the origins of the war in Ukraine while 10% believe that the Ukrainian government is infiltrated by neo-Nazis (IFOP & Reboot, 2022). According to the same survey, 33% of French people also agreed with at least one fake news or CTs related to COVID-19 vaccines, and 19% with the claim that the vaccines are responsible for tens of thousands of deaths (IFOP & Reboot, 2022). The extent to which those beliefs are shared among the population is not limited to France. For example, in the United States, 25% of respondents said that it is definitely or probably true that powerful people intentionally planned the COVID-19 outbreak (Pew Research Center, 2020). In the United Kingdom, 35% of respondents said they do not think the official version on the origin of the serious terrorist attacks that have taken place in the country in recent years tell the whole truth (Policy Institute at King's College London, 2022).

Far from innocuous, belief in CTs can have serious negative societal consequences (Douglas et al., 2019). Indeed, endorsing medical CTs may lead individuals to engage in risky health behaviours, such as vaccine hesitancy and decreased compliance with social distancing rules during the COVID-19 outbreak (Bierwiaczonek et al., 2022; Marinthe et al., 2020; van Mulukom et al., 2022). Lamberty and Imhoff (2018) found that conspiracy mentality predicted a preference for so-called "alternative" medicine (over medically validated treatments). Endorsement of CTs also undermines acceptance of scientific knowledge (e.g., in the existence of climate change; Bertin et al., 2021; Lewandowsky et al., 2013) and is associated with endorsing or supporting political violence or radical actions (Vegetti & Littvay, 2022).

Therefore, understanding the psychological processes that underlie adherence to CTs remains a crucial task.

Conspiracy Theories as Compensatory Processes

Among the numerous determinants of adherence to CTs (e.g., individual differences in cognitive ability, personality; Goreis & Voracek, 2019; Stasielowicz, 2022), research over the past decade has shown that endorsement of CTs is also shaped by motivated cognition processes (Krekó, 2015; Kunda, 1990). Accordingly, endorsement of CTs have been conceptualised as an attempt to satisfy unmet psychological needs that are epistemic (i.e., feeling certainty and meaning regarding one's surroundings), existential (i.e., feeling in control and safe) and social (i.e., defend the image of one-self, feeling that one belongs to a group with a positive image) needs (Biddlestone et al., 2022; Douglas et al., 2017, 2019).

The role of epistemic motive in explaining adherence to CTs is supported by research showing that people adhere more to CTs under uncertainty (Biddlestone et al., 2022; van Prooijen & Jostmann, 2013) and when they are motivated to search for coherent patterns in the environment (Van Elk & Lodder, 2018; van Prooijen et al., 2018; Whitson & Galinsky, 2008). Similarly, the role of existential motives is supported by research showing that people are more likely to turn to CTs when they experience general or existential anxiety (Biddlestone et al., 2022; Liekefett et al., 2021; Scrima et al., 2022) or powerlessness (see van Mulukom et al., 2022). Finally, the role of social motives in explaining CTs was supported by studies that showed greater adherence to CTs among people who experience ostracism (Graeupner & Coman, 2017; Poon et al., 2020), collectivist values (Adam-Troian et al., 2021) defensive ingroup identity or collective narcissism (Bertin et al., 2022; Golec de Zavala et al., 2022), or who hold intergroup prejudice (Imhoff & Bruder, 2014; Nera et al., 2021).

This overall pattern of evidence suggests that individuals tend to turn to CTs in an attempt to regulate perceived threats to their psychological needs. In other words, adherence to

CTs can result from compensatory processes following threats to basic psychological needs (Douglas et al., 2017; Pellegrini et al., 2021; Stojanov et al., 2020).

Meaning Maintenance Model and Conspiracy Beliefs

Compensatory processes resulting from epistemic and existential threats were extensively addressed by the Meaning Maintenance Model (MMM; Heine et al., 2006). The MMM was proposed as an overarching framework for multiple theories pertaining to compensatory responses to so-called "meaning" threats broadly defined (e.g. threats to certainty, perceived control, order, structure, worldview coherence; Proulx & Inzlicht, 2012). According to this model, individuals understand their environment by structuring their experiences and knowledge in terms of expectations and anticipated causal relationships between stimuli (Proulx & Major, 2013). The MMM also assumes that when individuals' meaning frameworks are violated, they experience a negative arousal that generates a motivation to resolve the violation (Proulx et al., 2010). To do so, individuals can adjust their meaning frameworks so that the unexpected event becomes coherent with their beliefs (i.e. change their attitudes; Randles et al., 2015). So, for instance, a job applicant faced with a rejection after an interview they believed to have been successful may retrospectively change their attitudes and believe they had failed the interview in the first place.

Although this is a classical prediction directly derived from an integrative take including cognitive dissonance theory (Harmon-Jones & Harmon-Jones, 2007), the MMM offers less intuitive mechanisms that may be of interest to study CTs. In fact, the theory states that another way to resolve a meaning violation is to focus on alternative, accessible but unrelated (or remotely related) meaning frameworks that make sense out of the world (Heine et al., 2006), through a process called compensatory abstraction (Proulx & Inzlicht, 2012). This process can be defined as distal attempts to restore a sense of control and predictability in a domain not directly related to the one that was threatened (Proulx & Heine, 2010; Proulx & Inzlicht, 2012).

Following our previous example, a rejected applicant could be more likely to adhere to CTs about immigrants or Jewish bankers to make sense of their failure. Hence, compensatory abstraction could be one of the cognitive processes underlying the robust, positive link between, personal, economic failure and beliefs in CTs (Adam-Troian et al., 2022: Wagner-Egger et al., 2022).

Several authors have repeatedly highlighted the theoretical usefulness using the MMM to understand how certain types of threats may motivate endorsement of CTs (see Golec de Zavala, 2021; Proulx & Inzlicht, 2012; van Prooijen, 2020). Yet, to the best of our knowledge, no empirical tests of MMM threat manipulations on endorsement of CTs have been conducted so far. In a MMM perspective, we propose that CTs could be considered as accessible beliefs that serve an existential and epistemic function when people's meaning framework is disrupted. Meaning threat could trigger compensatory processes which would lead to endorsing CTs when they are available beliefs, because they would represent a powerful, encompassing alternative meaning framework. This is likely to be the case as CTs typically offer meaningful narratives to understand complex situations, seemingly coherent relationships between persons or events based on perception of patterns and agency (van Prooijen, 2020; van Prooijen & van Vugt, 2018). In other words, CTs '*provide unifying, even if false, frameworks to interpret events that are otherwise difficult to connect and explain*' (Zavala, 2021, p. 285). Importantly, according to the process of compensatory abstraction, endorsing CTs could be triggered by threats which do not necessarily relate to the content of CTs (or only remotely, Proulx & Inzlicht, 2012; Golec de Zavala, 2021). To mobilise a methodological framework comparable to those used in the studies about compensatory abstraction, that is consistent with the MMM, and to consider meaning violations that are reasonably unrelated to CBs, we therefore propose to focus on a kind of meaning violation that is not personally threatening (Proulx & Major, 2013): feelings of uncanniness (Proulx et al., 2010).

Uncanny Feeling as an Epistemic Threat

Based on Freud's seminal discussions (1919/1990), uncanniness was defined by Proulx et al. (2010) as a particular "feeling aroused by unfamiliar experiences in *familiar* situations" (p. 818), or by perceiving incongruities that are unexpected in a familiar setting. In a structured and meaningful situation, the perception of incongruent stimuli generates a violation of individual expectations. Proulx et al. (2010) proposed (and experimentally corroborated) that exposure to absurdist art and literature - where unexpected elements are inserted into a familiar or meaningful structure - is an effective way to induce uncanny feeling and leads to 'compensation' effects. As feelings of uncanniness threaten individual meaning frameworks about basic expectancies and not personal or social aspects (Proulx & Major, 2013), it can be conceptualised as a particular form of epistemic threat.

Note that epistemic threats - as considered in the CTs literature - include, among other, epistemic uncertainty (Biddlestone et al., 2022), that Proulx and colleagues closely linked with uncanny feeling (Proulx et al., 2010) and absurdity (Proulx & Major, 2013) without necessarily specifying the nature of the relation between the two concepts. Following the few studies on CTs that experimentally manipulated epistemic uncertainty and were included in a recent meta-analysis (Biddlestone et al., 2022), epistemic uncertainty and uncanny feeling can be considered as separate constructs. For example, in one study (van Prooijen & Jostmann, 2013) uncertainty was induced by asking participants to describe their emotional and physical state when they are 'uncertain', without offering a more precise definition of this feeling. In two other studies (Marchlewska et al., 2018, Study 2; Nyhan et al., 2016), uncertainty was manipulated by the amount of information provided to describe the occurrence of an event susceptible to conspiracy explanation. Finally, in a meta-analysis (Biddlestone et al., 2022), the evidence for an effect of epistemic uncertainty on CTs was mixed (i.e., significant among non-student samples and not among student samples).

Only Proulx et al. (2010)'s work seems to have investigated the effect of feeling uncanniness in the context of compensatory processes. The results of a first study indicated that participants exposed to absurdist art compensated for the meaning threat by more affirming aspects of their cultural ingroup than participants in the control condition. The results of a second study indicated that participant exposed absurdist humour compensated for the meaning threat punishing more a lawbreaker than participants in the control condition. Finally, in a third study, participants exposed to an absurdist painting or invited to think about their own mortality presented a higher need for personal structure – suggesting an increase in need for meaning – than participants in the control condition.

The Present Research

In this study, we propose that MMM is of theoretical interest to better understand how endorsement of CTs may stem from compensatory processes following exposure to a threat. More specifically, compensatory abstraction could be a likely candidate to explain why individuals threatened in their personal or social lives (failure, interpersonal rejection) are more prone to adhere to medical or political CTs which – at face value – do not meaningfully relate to these threats. In addition, the MMM conceptualised feelings of uncanniness as an original threat (Proulx et al., 2010) that we propose to test as a particular kind of epistemic threat and distinct from epistemic uncertainty (as considered in Biddlestone et al., 2022). Insofar, as evidence for an effect of epistemic uncertainty on endorsement of CTs is still mixed (see Biddlestone et al., 2022), it seems important to test whether other types of related but distinct threats (i.e., uncanny feeling) can have an effect on endorsement of CBs. Feelings of uncanniness should therefore increase adherence to CTs if these are indeed-accessible beliefs that serve an epistemic function following expectancy violations. We conducted a series of 6 studies to test this hypothesis.

Overview

To test if endorsement of CTs can be triggered by an uncanny feeling, we conducted six experimental studies using subtle priming methods. The hypothesis we wished to test was straightforward. If induction of an uncanny feeling creates a meaning threat, and if CTs serve as a coping mechanism to restore meaning following such a threat, then exposure to uncanny stimuli should increase individuals' adherence to CBs. Thus, we predicted that adherence to CTs would be higher in an uncanny condition compared to a control condition. If successful, this test would provide further empirical corroboration of the value of the MMM and feelings of uncanniness in understanding adherence to CTs. This article reports a series of 6 studies that are direct or conceptual replications of each other, focused on the main effect of uncanny feeling manipulation on adherence to CBs. To provide a concise presentation of this work, we first presented our five initial studies, followed by a mini meta-analysis (Goh et al., 2016). In a second time, we presented a pre-registered sixth and final study, carried out to ultimately replicate the previous results by overcoming some of the limitations common to the previous five studies.

All studies were conducted in accordance with the Helsinki Declaration (WMO, 1964) and its later amendments, the ethical principles of the French Code of Ethics for Psychologists (CNCDP, 2021), and the 2016 APA Ethical Principles of Psychologists and Code of Conduct (APA, 2017). All statistical analyses were made using JAMOVI and significance threshold α was set at .05. Datasets and the materials used for all studies can be found on the following OSF repository: https://osf.io/r5d7g/?view_only=fdaf8498a28d4af3bcf6bca57a724a72.

Studies 1- 5

General method

In each study, participants were attributed to an uncanny vs. control condition. Uncanny feeling was manipulated through two different methods across studies. The five studies were based on paper-and-pencil (Studies 1 & 5) and online (Studies 2, 3 & 4) questionnaires. Mixing these two study formats should provide more internal and external validity to our results. Methodological details and sample characteristics for each study are summarised in Table 1. Based on methodological and theoretical considerations, we computed *a priori* power with G*Power (Faul et al., 2009). We estimated the expected effect size as follows. First, uncanny feeling manipulation in the Proulx et al.'s (2010) study was associated with differences on personal need of structures that was $\eta^2 = .15$ (or Cohen's $d = 0.84$). Because the online questionnaire methodology generates much more noise than in the carefully controlled laboratory conditions of the original experiment, we expected the effect size to be lower than this one, around $\eta^2 = .10$, which corresponds to a moderate effect (Cohen's $d = 0.66$) according to Cohen (1988). Given this effect size, with parameters set for two-tailed independent samples *t*-tests, a power of .95 and $\alpha = .05$, minimum required sample size was 61 per condition ($N = 122$) for each study. Only participants with missing data were removed from the sample.

Detailed method for the five studies

Study 1

This study was conducted with a paper-and-pencil questionnaire, introduced as a study about '*art, reasoning, and political opinions*''. Uncanny feeling was induced with the same manipulation as in Proulx et al.'s (2010) Study 1, based on two texts. In the control condition, participants had to read a meaningful text, a version of Aesop's parable '*The Tortoise and the Hare*', which ended with a conclusion following the moral premises of the story. In the uncanny

feeling condition, participants had to read an absurd parable, an abridged version of Kafka's '*An Imperial Message*', ending with an absurd conclusion that does not follow the premises of the story (see Proulx et al., 2010, Study 1, for a detailed presentation about the content of these two parables). In Proulx et al.'s 2010 Study 1, the manipulation led the participants in the experimental condition to evaluating aspects of their cultural ingroup as being more important to their identity than participants in the control condition, suggesting that the manipulation was effective to induce uncanny feeling and then compensatory abstraction by affirming another available meaningful framework. In our study, participants were asked to carefully read the text and they were told that they would have to later answer questions about it. Participants were randomly assigned to the conditions by the software.

Next, participants were asked to fill in a French version of the Positive and Negative Affect Scale (PANAS; Watson et al., 1988; see Caci & Baylé, 2007, for the French validation) and a distractor task. These two tasks were mainly used as a delaying period between the uncanny feeling manipulation and the measure of CTs' endorsement. In accordance with the general process model of threat and defense (Jonas et al., 2014; Pyszczynski et al., 1999; Wichman et al., 2008), a delay period between after exposure to threat is required to catalyse compensation effects on beliefs (for more details, see Greenberg et al., 1994). The experimental condition highlights a discrepancy between individual expectations about the conclusion of parable and the effectively presented conclusion. This meaning violation should lead to an uncanny feeling that could be dealt with in different ways. The delay period was demonstrated to be necessary to lead participants to indirectly resolve the discrepancy with distal defenses that are compensatory reactions on domains unrelated to the threatened domain (e.g., Jonas et al., 2014; Pyszczynski et al., 1999). The PANAS consists of a series of 20 emotional states that participants have to assess on a 5-point Likert scale (from 1 '*I do not feel that way at all*' to 5 '*I extremely feel that way*'). The two conditions should not differ in terms of emotional valence,

so that subsequent uncanny feeling effect could not be attributed to a difference in arousal of negative feelings. The distractor task was presented as a reasoning test. Participants had to classify a series of 20 items according to their relevance in the context of a camping trip. Proposing the PANAS followed by such a distractor task during the delay period is commonly used in previous threat-induced experiments (e.g., Proulx et al., 2010; Webber et al., 2018).

Adherence to CTs was measured by using the Generic Conspiracist Beliefs Scale (GCBS; Brotherton et al., 2013; Lantian et al., 2016 for the French version) which consists in a series of 15 statements about various conspiracies that participants have to rate on a 5-point Likert scale (from 1 '*Definitely not true*' to 5 '*Definitely true*'). The GCBS was used because it is generic enough to tap into global '*conspiracist ideation*' (Drinkwater et al., 2020) and allow us to study general processes without content specific effects. Participants were next presented with a measure of the familiarity level of the presented text and a manipulation check. The level of familiarity was rated on a 9-point Likert scale ('*this text looks familiar to you*', from 1 '*Not at all*' to 9 '*Totally*'). For the manipulation check, participants had to fill four items assessing perceived uncanniness of the text ('*this text looks strange/worrying/absurd to you*'; '*the meaning of this text seems clear to you*' [inverted item], from 1 '*Not at all*' to 9 '*Totally*') with 9-point Likert scales. In order for the material to be judged suitable for experimental purposes, we did not expect differences in familiarity between the two texts, but a substantial difference in perceived uncanniness should be found so that the absurd text would be judged as more uncanny than the representational one. Finally, participants had to fill demographics (age and gender) before being debriefed.

The questionnaire was proposed to undergraduate students during courses. The sample consisted of 134 undergraduate students.

Studies 2 to 5

Studies 2, 3, and 4 were online questionnaires (with Limesurvey for Studies 2 and 4, with Qualtrics for Study 3) while Study 5 was operationalized with a paper-and-pencil questionnaire during undergraduate courses. Studies 2 to 5 were introduced as a study about '*art, reasoning, and political opinions*' and used the same uncanny feeling manipulation as Proulx et al.'s (2010) Study 3, based on paintings. In this latter, uncanny feeling was manipulated through exposure to four different types of art but we only retained two groups for designing our protocol: absurd art (uncanny feeling condition) vs. representational art (control condition). Therefore, in the present studies, in the control condition participants were presented the John Constable's representational piece '*Landscape with a Double Rainbow*' whereas, in the uncanny feeling condition, they were presented the absurdist Rene Magritte's '*The Son of Man*' (see Proulx et al., 2010, Study 3, for a detailed presentation about the content of these two painting). In Proulx et al. 's 2010 Study 3, the presentation of the absurd art led to an increase in participants' Need For Structure, compared to the representation art, suggesting an elevating need for meaning and a successful induction of uncanny feeling. In the present studies, participants were asked to take a close look at the picture because – they were told – they would have to later assess its meaning.

The following procedure was similar to that of Study 1. Participants were presented with the same delay period including the PANAS and the distractor task. Once again, they were asked to fill the GCBS. Familiarity level of the painting was measured with one item ('*this painting looks familiar to you*'). For the manipulation check, participants had to fill four items assessing perceived uncanniness of the painting ('*this painting looks strange/worrying/absurd to you*'; '*the meaning of this painting seems clear to you*' [inverted item] with 9-point Likert scales, except for Study 4. In Study 4, only three of these items were presented ('*this painting looks strange/worrying/absurd to you*'), due to a computer glitch. Familiarity level and uncanny

feeling were operationalized with 9-point Likert scales in Studies 3, 5, and 6, while they were operationalized with a continuous slider ranging from 0% to 100% in Study 4. In order for the material to be judged suitable for experimental purposes, we did not expect differences in familiarity between the two paintings, but a substantial difference in perceived uncanniness should be found so that the absurd painting would be judged as more uncanny than the representational one. Finally, participants had to fill demographics (age and gender) before being debriefed.

We recruited participants from a general population on social networks in Studies 2 ($N = 237$) and 3 ($N = 269$). We recruited undergraduate students with an online survey in Study 4 ($N = 274$) and with a paper-and-pencil questionnaire during course in Study 5 ($N = 127$).

Table 1.

Methodology and sample characteristics across for Study 1 to 5.

Study	Type	Prime	Population	N_{total}	$N_{control}$	N_{threat}	%Male	M_{Age}
1	paper	text	undergraduate students	134	69	65	15%	18.87 (1.37)
2	online	painting	general	237	109	128	13%	32.01 (11.90)
3	online	painting	general	269	146	123	17%	36.92 (14.64)
4	online	painting	undergraduate students	274	136	138	16%	20.54 (4.35)
5	paper	painting	undergraduate students	127	66	61	20%	21.54 (2.86)

Note. Numbers between parentheses represent *SDs*.

Results

Confirmatory analyses

Independent samples *t*-tests were conducted to check potential differences on familiarity and perceived uncanniness (see respectively Table S4 & Table S5 in the '*Supplementary analyses*' file on OSF) according to paintings and texts presented in Studies 1 to 5. In Studies 2 to 5, the painting was systematically perceived by participants as more familiar in the experimental than in the control condition (all $ps < .01$). In Study 1, the text was perceived by participants as more familiar in the control condition than in the experimental condition ($p < .001$). In Studies 1 to 5, perceived uncanniness measure showed an acceptable internal consistency, except for Study 5 where it appeared to be questionable ($\alpha_{study\ 1} = .84$, $\alpha_{study\ 2} = .68$, $\alpha_{study\ 3} = .69$, $\alpha_{study\ 4} = .63$, $\alpha_{study\ 5} = .58$). As expected, the text in Study 1 and the painting in Studies 2 to 5 were systematically perceived by the participants as more uncanny in the experimental condition than in the control condition (all $ps < .01$). These results suggest that uncanny feeling manipulations based on text and painting were efficient.

Potential differences on positive and negative affect between the control condition and experimental condition were checked with independent samples *t*-tests for all studies. In all studies, PANAS showed good internal consistency for both positive ($\alpha_{study\ 1} = .87$, $\alpha_{study\ 2} = .89$, $\alpha_{study\ 3} = .87$, $\alpha_{study\ 4} = .87$, $\alpha_{study\ 5} = .85$) and negatives affect ($\alpha_{study\ 1} = .80$, $\alpha_{study\ 2} = .88$, $\alpha_{study\ 3} = .88$, $\alpha_{study\ 4} = .85$, $\alpha_{study\ 5} = .84$). No differences in positive affect between the two conditions were found (all $ps > .09$). A higher level of negative affect was found in the control condition, compared to the experimental condition in Studies 3 and 5 ($ps < .05$), despite no differences were found in the other studies (all $ps > .10$). Detailed results are presented in Table S6 and Table S7 in the '*Supplementary analyses*' file on OSF.

Differences in GCBS scores between the control condition and the experimental condition were tested with independent samples *t*-tests in each study. The GCBS showed a good

internal consistency in all studies ($\alpha_{study\ 1}$ = .86, $\alpha_{study\ 2}$ = .86, $\alpha_{study\ 3}$ = .92, $\alpha_{study\ 4}$ = .87, $\alpha_{study\ 5}$ = .87). Results are presented in Table 2 and Figure 1. No difference in GCBS score was found in studies 3, 4, and 5 (all ps > .10) and these results stayed unchanged when familiarity level and negative affect were statistically controlled for. Contrary to our expectations, in Study 1, GCBS score was significantly lower in the experimental condition (M = 2.87, SD = 0.65) than in the control condition (M = 3.13, SD = 0.62), $t(132)$ = 2.38, p = .019, d = -0.41. However, this difference became non-significant when familiarity level and negative affect were statistically controlled for, p >. 10. In Study 2, as expected, GCBS score was significantly higher in the experimental condition (M = 3.52, SD = 0.67) than in the control condition (M = 3.25, SD = 0.66), $t(235)$ = -3.15, p = .002, d = 0.41. This difference remained unchanged when familiarity level and negative affect were statistically controlled for. Details of analyses including familiarity level and negative affect as covariates are presented in Table S8 in the '*Supplementary analyses*' file on OSF. Finally, in each study, no significant correlation between uncanny feeling and GCBS scores was found, except a negative correlation in Study 1 (r = -.19, p = .029). However, when controlling for familiarity level, no significant partial correlation was significant (all ps > 10; see Table S9 in the '*Supplementary analyses*' file on OSF for detailed results).

Table 2.

Effect size and mean differences on GCBS score between the experimental and the control conditions in Study 1 to 5.

Study	$M_{control}$	M_{threat}	t	df	d
1	3.13 (0.62)	2.87 (0.65)	-2.38*	132	-0.41
2	3.25 (0.66)	3.52 (0.67)	3.15**	235	0.41
3	2.87 (0.81)	2.88 (0.92)	0.05	267	0.01
4	3.01 (0.64)	2.95 (0.81)	-0.75	272	-0.09
5	2.85 (0.65)	2.96 (0.69)	0.88	125	0.16

Note. Numbers between parentheses represent *SDs*.

* $p < .05$, ** $p < .01$.

To mini meta-analyse our results (Goh et al., 2016) we aggregated the databases from the five studies. It yielded a $N = 1,041$ sample (*M*age = 27.29, $SD = 12.16$, 16% male). A mixed model was then computed with study label as random factor, uncanny condition as fixed factor and GCBS score as the dependent variable, according to the following equation: *GCBS ~ 1 + (1 | Study label) + Uncanny condition*. The model (AIC = 2343.02, r^2conditional = .07) does not support the effect of uncanny induction upon adherence to CBs, $F(1, 1035.44) = 0.32$, $p = .57$. The effect size was not significantly different from a null effect, with $b = .03$, 95% CI [−.06, .12], and r^2 marginal < .01 or $d = 0.04$ (see Figure 1). This result remained unchanged when the mini meta-analysis took into account familiarity level, negative affect, priming method (painting, text), and survey form (paper-and-pencil vs. online). Details of this latter analysis are presented in the '*Supplementary analyses*' file on OSF.
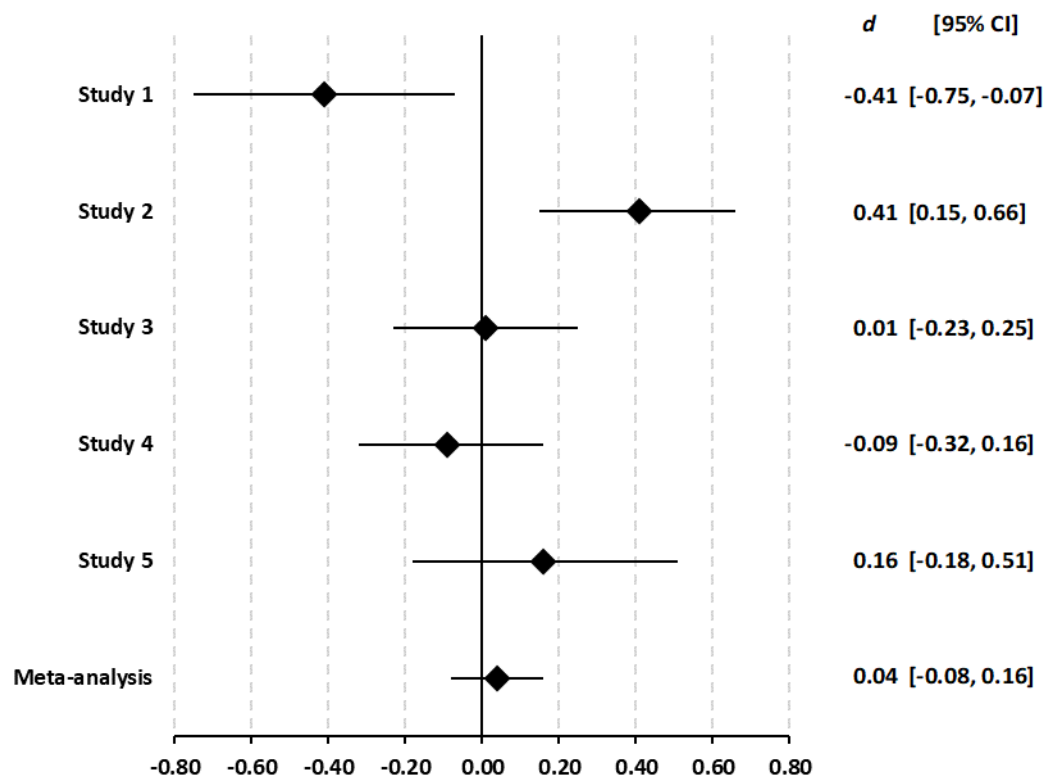
Figure 1. Forest plot of effect size for mean differences on GCBS scores between experimental and control conditions for Studies 1 to 5. Note: Error bars represent 95% CI.

Exploratory analyses

In the recent meta-analysis from Biddlestone et al. (2022), epistemic uncertainty was found to be significantly associated with endorsing more CTs among non-student samples and not among student samples. Given that epistemic uncertainty can be conceptualised as an epistemic threat close to (though distinct from) uncanny feeling and thus sharing some common points, we proposed as a post-hoc and exploratory analysis to test the interaction between the uncanny condition (experimental vs. control condition) and the population (undergraduate students vs. general population) with another mini meta-analysis on the five studies. A mixed model was computed with studies label as random factors, meaning condition and population

(undergraduate students vs. general population) as fixed effect[1], GCBS score as the dependent variable, familiarity and negative affect as covariates, according to the following equation: *GCBS ~ 1 + (1 | Study label) + Uncanny condition + Population + Uncanny condition*Population*. The model (AIC = 2340.75, r^2conditional = .09) does not revealed a main effect of uncanny induction nor the main effect of population upon adherence to CTs beliefs, respectively $F(1, 1034.45) = 0.40$, $p = .53$, $F(1, 3.05) = 0.79$, $p = .44$. However, the Uncanny condition*Population interaction was significant, $F(1, 1034.45) = 5.11$, $p = .024$. Among the general population, simple effects analyses revealed a significantly higher GCBS scores in the experimental condition (estimated marginal $M = 3.20$, $SE = 0.16$) than in the control condition among the general population sample with a small effect size (estimated marginal $M = 3.07$, $SE = 0.16$), $t(1034.64) = 2.01$, $p = .044$, $d = 0.13$. Among undergraduate students, no difference in GCBS scores was found in the experimental condition (estimated marginal $M = 2.93$, $SE = 0.13$) compared to the control condition (estimated marginal $M = 3.00$, $SE = 0.13$), $t(1034.06) = -1.17$, $p = .24$, $d = -0.07$. This result remained unchanged when the mini meta-analysis took into account familiarity level, negative affect, priming method (painting, text), and survey form (paper-and-pencil vs. online). Details of this latter analysis are presented in the '*Supplementary analyses*' file on OSF.

Discussion

Confirmatory analyses do not support the existence of an effect of uncanny feeling on adherence to CBs. Exploratory analyses suggest that the predicted effect of uncanny feeling on adherence to CTs may only occur in a non-student sample, as observed with epistemic uncertainty in the recent meta-analysis of Biddlestone et al. (2022). The authors proposed to explain this sampling effect by the possibility that students have access to more resources to

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[1] Population was entered as a fixed factor (and not as a random factor) in the mixed model in order to allow for the testing of the Condition*Population interaction.

tolerate or counteract epistemic uncertainty, and thus a lower need to compensate with endorsing CBs. Although interesting, the conditional effect we observed remains exploratory (it was considered after the collection of data of Studies 1 to 5 and Study 6), and of small size. It is therefore necessary to consider it with caution. The following study (Study 6) was designed to test once the hypothesised effect of uncanny feeling on adherence to CTs by overcoming several methodological limitations common to the five previous studies. Indeed, the attention and seriousness with which the participants carried out the study was not checked and potential outliers were not looked for and excluded. In addition, endorsement of CTs was measured with a single scale common to all studies. Moreover, although manipulation checks suggested that uncanny feeling inductions were effective, they only relied on two different manipulations. Note that this study was conducted before the exploratory analysis on the interaction between condition and population was carried out, and was not specifically designed to investigate this result further.

Study 6

To ensure that the absence of the hypothesised effect of uncanny feeling on adherence to CTs was not related to common methodological limitations of the five studies, a final and pre-registered study was conducted. It aimed to check whether the previous results can be replicated with some different measures of adherence to CBs, since the GCBS was the only measure in the five previous studies. In addition, we proposed to test another experimental manipulation of uncanny feeling, based on an autobiographical recall task. Finally, we also proposed to exclude outliers on several criteria that were not considered in the previous studies.

Materials and procedure

This study was pre-registered on *AsPredicted*, (the pre-registration form is available on the OSF repository). Note that we have deviated from the pre-registration on several minor points that are detailed and justified, as recommended by Claesen et al. (2021), in a dedicated

file '*Deviations from pre-registration*' available in the OSF repository. The study was conducted with an online questionnaire introduced as a study about '*reasoning and personal and political opinions*', with Limesurvey (*https://www.limesurvey.org/fr/*). Uncanny feeling was operationalized as a between-subject variable, with four conditions. Among the three experimental conditions, two have been taken from the previous studies and are the absurd art painting (Rene Magritte's '*The Son of Man*') and the absurd parable (abridged version of Kafka's '*An Imperial Message*'). In contrast to previous studies, to limit the possibility that the participants were looking at the absurd painting or reading the absurd text too briefly, the page presenting the stimulus was not able to be changed until 20 seconds for the painting and 60 seconds for the text. The third and original experimental condition was an autobiographical recall task we designed for the study's purposes. As an introduction to the task, it was explained to participants that we can sometimes experience strange and disturbing moments for no apparent reason, where we suddenly feel a sense of absurdity and strangeness. Participants were next asked to remember the last similar situation they experienced, and then to describe in detail the place they were in, the people present, the actions that took place and their emotional and physiological feelings. To limit the possibility that participants do not perform the autobiographical recall task correctly, the text had to contain at least 500 characters (about 100 words) to be validated and go to the next page of the questionnaire. In the control condition, participants were simply presented with a message asking them to click on the '*next*' button. Participants were randomly assigned to one of the four conditions by the software.

Next, participants were presented with the same delay period including the PANAS ($\alpha_{\text{positive affect}}$ = .89; $\alpha_{\text{negative affect}}$ = .91) and the distractor task, as in previous studies. An attention check item was inserted in the middle of the PANAS and was presented as follows: '*Attention question: please answer '3''*. No manipulation check was included in this study, as manipulations based on the texts and paintings were found to be efficient in the previous studies,

and to ensure a short completion time. For each participant, adherence to CTs was measured with three scales. In addition to the French version of the GCBS (see Studies 1 to 5), the study included the French version of the Conspiracy Mentality Questionnaire (CMQ) from Bruder et al. (2013, for the French version, see Lantian et al., 2016) and the French version of the single-item conspiracy beliefs scale from Lantian et al. (2016). The CMQ consists of a series of 5 statements about various conspiracies that participants have to rate on a 11-point Likert scale (from 0% '*Certainly not*' to 100% '*Certainly yes*'). The 5 items were averaged to compute a mean score. The single-item conspiracy beliefs scale was rated on a 9-point Likert scale (from 1 '*Completely false*' to 9 '*Completely true*'). The presentation order for the three scales was randomised. The GCBS and the CMQ showed a high internal consistency ($\alpha_{GCBS} = .95$; $\alpha_{CMQ} = .90$).

Sample and data screening

The minimum required sample size was estimated following the same procedure and the same parameters as in Studies 1 to 5, except that independent samples *t*-tests were planned as one-tailed. Thus, the minimum required sample size after exclusions was 51 per condition ($N = 204$). In order to anticipate the exclusion of participants, our targeted sample size was rounded up to 250 participants. A total of 284 participants provided a complete response to the questionnaire. They were recruited from a company panel and compensated for their participation. Following pre-registered exclusion criteria, 18 participants were excluded from the database. More precisely, were excluded participants who failed the attention check item (*n* = 4; Aust et al., 2013), who answered '*a lot*' to the question '*Have you been disturbed or distracted by your environment during the study*' (*n* = 2) and who not follow the instructions for the biographical recall task (i.e., participants who have written a recall obviously unrelated with feeling of uncanny, meaningless; this criterion was independently evaluated by two authors and disagreements were resolved after consultation between the two authors; *n* = 12).

Finally, 266 participants were retained for the analyses ($N_{control}$ = 71, $N_{painting}$ = 74, N_{text} = 70, $N_{autobiographical\ recall}$ = 51; 53% male; M_{age} = 43.15, $S.D._{age}$ =13.55).

Results

Potential differences on positive and negative affect between the control and each of the three experimental conditions were checked with independent samples t-tests. No differences in positive affect were found (all ps > .10). A higher level in negative affect was found in the control condition, compared to the painting condition, $t(143)$ = -2.48, p = .014, d = -0.41. Detailed results are presented in Table S10 in the '*Supplementary analyses*' file on OSF.

For each of the three dependent variables (i.e., GCBS score, CMQ score, single-item scale score), we carried out a one-way ANOVA on the 4 conditions (uncanny feeling manipulation: absurd art painting vs. absurd text vs. autobiographical recall vs. control condition). We expected a significant effect between the uncanny feeling conditions overall and the control condition for each of the dependent variables. Moreover, we expected significant differences on dependent variables between the control condition and each of the uncanny feeling conditions (i.e., absurd art painting, absurd text, autobiographical recall task): CTs adherence should be lower in the control condition than in the three uncanny feeling conditions. For each dependent variable, three planned pairwise comparisons, one-tailed, would be used to test this hypothesis.

For each of the three dependent variables, no overall model effect from the one-way ANOVAs was found; for the GCBS score: $F(3, 262)$ = 0.14, p > .10, η^2 < .01; for the CMQ score: $F(3, 262)$ = 0.20, p > .10, η^2 < .01; for the single-item scale score: $F(3, 262)$ = 0.29, p > .10, η^2 < .01. These results were unchanged when negative affect was statistically controlled for, all ps > .10. Contrast analyses revealed no significant differences for each dependent variables between the control condition vs. the three experimental condition combined; for the GCBS score: t = 0.47, p > .10; for the CMQ score: t = 0.10, p > .10; for the single-item scale

score: $t = -0.66$, $p > .10$. These results were unchanged when negative affect was statistically controlled for, all ps $> .10$. Results for planned pairwise comparisons for each dependent variable between the control condition and each of the uncanny feeling conditions are presented in Table 3. No significant differences were found, all ps $> .10$. These results were unchanged when negative affect was statistically controlled for, all ps $> .10$ (note that to account for negative affect, we carried out ANCOVAs with the uncanny feeling condition as independent variable and negative affect as covariate, that only allows for two-tailed and not one-tailed tests; detailed results are presented in Table S11 in the '*Supplementary analyses*' file on OSF).

Discussion

Again, based on the results observed in this study, we cannot conclude to an effect of uncanny feeling on adherence to CBs. This finding does not appear to be related to methodological limitations in the nature of the experimental manipulation of uncanny feeling, in the measure of adherence to generic CBs, nor to the nature of the sample. Although this study did not allow us to test again the interaction between the uncanny feeling and the population type (revealed by the exploratory analyses in Studies 1 to 5), due to a small number of undergraduate students in this sample ($N = 11$), if uncanny feeling would increase CTs only among a non-student population, it could have been detected.

Table 3.

Effect size and mean differences between the control and each of the three experimental conditions, for each of the three measures of adherence to conspiracy beliefs measures for Study 6.

DV	Experimental condition	$M_{control}$	M_{threat}	t	df	d
GCBS	Painting	2.68 (0.99)	2.65 (0.89)	-0.18	143	-0.03
	Text		2.58 (1.03)	-0.57	139	-0.10
	Autobiographical recall		2.62 (0.87)	-0.36	120	-0.07
CMQ	Painting	5.90 (2.40)	5.87 (2.17)	-0.07	143	-0.01
	Text		5.71 (2.50)	-0.47	139	-0.08
	Autobiographical recall		6.02 (2.03)	0.30	120	0.06
SIS	Painting	4.90 (2.28)	5.00 (2.31)	0.26	143	0.04
	Text		5.06 (2.55)	0.38	139	0.06
	Autobiographical recall		5.29 (2.18)	0.95	120	0.18

Note. Numbers between parentheses represent *SDs*. DV = dependent variable; GCBS = Generic Conspiracy Beliefs Scale; CMQ = Conspiracy Mentality Questionnaire; SIS = Single-item scale. All ps > .10.

General Discussion

The aim of this series of studies was to investigate whether a particular epistemic threat, the uncanny feeling, could increase endorsement of CTs through a compensatory abstraction process. We proposed that CTs could serve as a coping mechanism to restore a meaning framework following an epistemic threat, even when the threatened domain is not related to

that of CBs. In this way, adherence to CTs was supposed to represent an outcome to the activation of sense-making processes. The six studies included different populations, induction methods and measures of CTs. Yet, they did not provide robust evidence for the effect of an uncanny feeling on CTs endorsement, despite being sufficiently powered. No difference in adherence to CTs according to manipulation of uncanny feeling was observed in the mini meta-analysis conducted on the results of Studies 1 to 5, nor in Study 6. However, these results may contribute to the identification of boundary conditions under which CTs could have a compensatory function allowing individuals to deal with psychological threat, which we propose to discuss in conjunction with the methodological limitations of our studies.

Manipulation checks, carried out for painting and text suggested that both uncanny feeling manipulations were efficient, consistent with Proulx et al. (2010). However, we did not use a manipulation check for the autobiographical recall task (Study 6). Consequently, its ineffectiveness to induce the expected uncanny feeling cannot be ruled out. In addition, it is possible that the experimental context and design, in particular the distractor task, were not efficient in catalysing compensatory abstraction effects. Indeed, threat-induced effects on beliefs occur strongly after some delay (Jonas et al., 2014) and when participants are leading to suppress threat related cognitions (Greenberg et al., 1994). Although a similar task was efficiently used in Proulx et al. (2010), we cannot rule out this possible limitation, especially because we did not control for attention focused and time spent by participants on the distractor task.

Another important methodological limitation common to all six studies is the generic nature of the measures of CTs (i.e., the GCBS in studies 1 to 6, the CMQ and the single-item scale in Study 6). Indeed, generic CTs are conceptualised as a trait variable or rather stable inter-individual differences, with a low context-sensitivity (for the GCBS see Brotheron et al., 2013; for the CMQ see Bruder et al., 2013, for the single-item scale see Lantian et al., 2016),

while specific CTs (related to specific domains, events or social groups) are more context sensitive and malleable (Imhoff et al., 2022). Although adherence to generic CTs predict adherence to specific CBs, these two levels of measures are empirically and conceptually different (Frenken & Imhoff, 2021; Imhoff et al., 2022). Thus, although our experimental manipulations of uncanny feeling did not affect adherence to generic CBs, they could affect adherence to specific CBs. In this way, some studies show that experimental manipulations of threats to psychological needs such as economic inequality (Salvador Casara et al., 2022) and particularly lack of control (for a meta-analysis see Stojanov & Halberstadt, 2020; but see also the meta-analysis from Biddlestone et al., 2022), are more likely to affect adherence to specific than generic CBs, although CTs are not insensitive to any form of experimental manipulation more generally (e.g., Mao et al., 2020, Study 2; Marchlewska et al., 2022, Study 3; Swami et al., 2014, Studies 2 & 3). A possible effect of uncanny feeling manipulation upon specific CTs could be examined in further studies.

Exploratory results from Studies 1 to 5, carried out with a mini-meta-analysis interestingly suggest that uncanny feeling may only lead non-student participants to compensate for the epistemic threat with endorsement of CBs. However, the effect of uncanny induction on endorsement of CTs was not detected in Study 6 (including mainly non-students). This may suggest that this study was underpowered to detect this effect, or it may invite more caution about its existence. In their meta-analysis, Biddlestone et al. (2022) observed a similar result with epistemic uncertainty, and suggested that this can be explained by the potentially greater resources (e.g., frequent intellectual discussions) that students have to tolerate or counteract epistemic uncertainty. These epistemic resources can rely, for example, on a more predominant analytical thinking among students, this inter-individual variable being robustly associated with less endorsement of CTs (see Biddlestone et al., 2022; see also Gjoneska, 2021). As another example, students' epistemic resources can also rely on greater literacy (Wild et al., 2022), that

can be associated with lesser endorsement of CTs (e.g., Craft et al., 2017; Landrum & Olshansky, 2019; Pisl et al., 2021). As the difference observed between students and non-students in the present studies rely on exploratory analyses and a weak effect size, it could be first replicated on several kinds of epistemic threats. Then psychological variables that could explain differences between students and non-students should be investigated.

Among other factors that could contribute to identifying boundary conditions for threat compensation on CTs endorsement, the study of Kofta et al. (2020) reports interesting results. The authors refer to another assumption of the MMM according to which all kinds of threat to meaning have the potential to induce the same motivation for compensation by turning to other meaningful frameworks. Their results did not support this assumption since political lack of control and not political uncertainty predicted more adherence to Jewish CTs. According to the authors, if both threats deprive people of meaning structure, uncontrollability differs from uncertainty in which it particularly motivates people to place blame of their misfortune on an antagonistic outgroup. In the same way, van Prooijen (2020) suggested that the saliency of an antagonistic outgroup during the meaning-making processes, following a meaning threat, could be a critical ingredient to lead people to perceive agency, and finally embrace specific CTs about this group.

Conclusion

In a set of six studies, we did not find robust evidence for an effect of uncanny feeling on endorsement of CBs, as a threat-compensatory process in an unrelated domain. However, it should be noted that these results do not call into question the role of embracing CTs as an attempt to restore threatened epistemic needs, more broadly. Adding to one of the only other studies that proposed conceptual links between MMM and CTs but did not corroborate them (Kofta et al., 2020), these results do not support the relevance of the MMM to better understand the compensatory function of CBs. Interestingly, our meta-analytical exploratory results,

suggested that the hypothesised compensatory process only occurs among individuals with low epistemic resources. In addition to individual differences, the recent literature indicates that compensatory function of CTs may depend on their level of specificity, the nature of exposed threat, the domain to which CTs and threat relate, and the proximity between the two. In order to better identify these boundary conditions, it seems important to work on proposing a more detailed typology of the different types of threats by identifying their common points and delimiting their differences.

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