Investigating the Link Between Sleep Quality and Belief in Conspiracy Theories

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Abstract

Two studies examined the link between sleep quality and conspiracy theory beliefs, as well as the underlying mechanisms. In Study 1 ($n = 540$), participants with poorer sleep quality over the past month reported higher conspiracy beliefs about the 2019 Notre Dame fire when exposed to Notre Dame fire conspiracy theories compared to non-conspiracy information. Study 2 ($n = 575$) investigated the underlying psychological mechanisms connecting poor sleep quality with increased conspiracy beliefs and whether insomnia shows a similar pattern. We found that poorer sleep quality and insomnia were positively correlated with conspiracy theory beliefs – conspiracy mentality and belief in specific conspiracy theories. A consistent indirect effect through depression was uncovered, although there were inconsistent indirect relationships between both sleep quality and insomnia with conspiracy beliefs for anger and paranoia. These findings suggest that improving sleep quality could reduce susceptibility to conspiracy theories, highlighting the need for sleep-focused interventions.

Keywords: Sleep Quality, Insomnia, Conspiracy Beliefs, Depression, Well-Being

Investigating the Link Between Poorer Sleep Quality and Belief in Conspiracy Theories

Poor sleep quality can leave us feeling irritable and impair our cognitive functioning. Research has even demonstrated that just one night of poor sleep negatively impacts our emotional and physical well-being (Lee, 2021). This decline in psychological function may also make c*onspiracy theories*—which attempt to explain the ultimate causes of political and social events through claims of secretive plots by two or more collaborating actors (Douglas et al., 2019; 2023)—more appealing. Conspiracy theories are consequential because they impact the smooth running of society ([anonymized for peer review]). To illustrate, they increase climate change scepticism (e.g., Biddlestone et al., 2022), increase distrust among citizens (e.g., Frenken and Imhoff, 2022), and even increase incidents of violent extremism (e.g., Schrader et al., 2024).

Given the negative consequences that conspiracy theories carry with them, a growing body of research has begun to delineate the focal predictors of conspiracy theories (Douglas et al., 2017). Recent findings have demonstrated that chief among these focal predictors are anxiety, anger, paranoia, and depression (see Douglas et al., 2019, for a review). Further, research has also highlighted that good sleep quality can serve as a psychological protective factor against feelings of anxiety, anger, paranoia, and depression (e.g., Scott et al., 2021). In other words, the poorer sleep quality one has, the more likely you are to report these feelings. Bridging these distinct research areas, we conducted two studies. Study 1 first explored whether poor-quality sleep would increase conspiracy beliefs following conspiracy exposure. In Study 2, we then examined whether poorer well-being (anxiety, anger, depression and paranoia) could explain the link between poorer sleep quality and increased conspiracy beliefs.

Poor Sleep Quality as a Precursor to Anxiety, Anger, Paranoia, and Depression (Well-Being)

Poor sleep quality refers to habitually having less than the recommended hours of sleep (seven to nine hours per night) for a healthy adult (Madrid-Valero et al., 2017; NHS, 2024). Poor sleep quality is not a clinical disorder, but it is pervasive, with 2022 polling data suggesting that 74% of people report a decline in sleep quality over the past 12 months (Nuffield Health, 2022). Insomnia, on the other hand, is a clinical disorder characterised by difficulty falling asleep, disturbed nights, and waking up early without being able to fall back asleep (Seow et al., 2018); people experience these symptoms at least three times a week over a minimum of three months (de Zambotti et al., 2018). Insomnia is also less prevalent, with 37% of the population experiencing acute symptoms and between 10% and 20% of the population experiencing chronic insomnia (Ferini-Strambi et al., 2021). Sleep quality and insomnia are theoretically distinct and are treated as such in the empirical literature. In our theorising, we explicitly acknowledge whether we are discussing poor sleep quality or insomnia.

A substantial body of research has demonstrated a robust positive relationship between poor sleep quality and anxiety—i.e., a future-orientated mood state based on preparing for negative outcomes (e.g., Alvaro et al., 2013; Cox and Olatunji, 2016; Craske et al., 2009; Teker and Luleci, 2018). Building on these findings, Pires et al. (2016) meta-analysed effect sizes from randomised control trials and demonstrated how prolonged sleep deprivation caused increased anxiety. In doing so, this finding demonstrated the causal connection between poor sleep quality and increased anxiety.

Extensive research findings also support a link between poor sleep quality and heightened anger—i.e., an emotional state that involves displeasure ranging from mild

irritation to intense rage (Spielberger et al., 1983). To illustrate, Audigier et al. (2023) used cross-sectional data to show the positive relationship between poor sleep quality and anger. Building on these preliminary findings, Audigier et al. (2023) also tested this relationship longitudinally and demonstrated how poor sleep quality at a given time point positively predicted anger a month later. Laboratory studies support this finding as well. For example, Hisler and Krizan (2017) sampled over 400 U.S. American participants and found that those who experienced sleep restrictions reported greater increases in anger from baseline levels compared to those without sleep restrictions.

Poor sleep quality has also been positively linked with paranoia—i.e., a fearful and hostile intention towards others based on false beliefs of other's intentions (Williams et al., 2022). Kahn-Greene et al. (2007) found that 56 hours of continuous wakefulness—i.e., not being allowed to sleep—resulted in heightened feelings of paranoia. In a large-scale study of 8,580 people, insomnia was associated with a two to threefold increase in paranoia (Freeman et al., 2010). In a more recent study, Kasanova et al. (2020) demonstrated that poor sleep quality predicted higher levels of paranoia the following morning, mediated by negative affect.

Finally, numerous studies have consistently shown a strong positive correlation between poor sleep quality and depression—i.e., a depressed mood and loss of pleasure or interest in activities for a sustained period (Hermens et al., 2004). A meta-analysis by Becker and colleagues (2016) significantly demonstrated that older people's lack of sleep quality significantly increased their levels of depression. Another meta-analysis demonstrated that people with insomnia at baseline had a two-fold increased risk of subsequently developing depression than those who did not report insomnia at baseline (Baglioni et al., 2011). These meta-analytic findings have been corroborated by cross-sectional findings demonstrating the

positive association between sleep quality and increased depression (Augner, 2011; Dinis and Bragança, 2018; Sarıarslan et al., 2015).

Critically, in all these relationships so far discussed, poor sleep quality is linked to these well-being outcomes (anger, anxiety, paranoia, and depression) because quality sleep plays a prominent role in restoring people's cognitive and affective functioning (Finan et al., 2017; Klumpp et al., 2017). When this function is undermined—via poor sleep quality— people are more susceptible to problems that occur when this function is impaired (McDermott and Ebmeier, 2009). Further, this relationship is likely more complicated because we must leave open the possibility that these relationships are bi-directional. To illustrate, Ballesio et al. (2022) demonstrated that poor sleep quality can be a starting point that triggers increased anxiety. Anxiety, in turn, sparks a negative feedback loop, which increases episodes of paranoia, which in turn negatively impacts sleep quality (Ballesio et al., 2022). Nonetheless, Scott et al. (2021) provided robust meta-analytic evidence of randomised control trials highlighting the causal link between poor sleep quality and anger and depression. Perhaps indicating that although some of the relationships are bi-directional, the trigger (or starting point) could be poor sleep quality.

Poor Sleep Quality as A Precursor to Well-Being and Conspiracy Theory Beliefs

The link between poorer sleep quality and declining well-being is particularly relevant in the context of conspiracy theory beliefs. Specifically, there is strong evidence that anxiety, anger, paranoia, and depression play a prominent role in the formation of conspiracy beliefs (i.e., Douglas et al., 2019). Within this framework, either explicitly or implicitly, they serve as key precursors to conspiracy beliefs (Douglas et al., 2017). There is compelling empirical evidence to support this line of reasoning, which we will now review.

First, anxiety is positively associated with conspiracy beliefs (Krüppel et al., 2023; Hettich et al., 2022), with Bowes et al., (2023) providing meta-analytic evidence of this finding ($r = 0.19$). It is worth noting that this meta-analytic approach (which is also evidence for each of the subsequent proposed mediators) provides a way to quantify the relationship that is more precise and powerful estimate than any individual study contributing to the analysis (Cohn & Becker, 2003). Building on these meta-analytic findings, experimental research has demonstrated that inducing high anxiety significantly increases people's beliefs in conspiracy theories (Spasovski et al., 2021; see also Radnitz and Underwood, 2017). Further, anger is also positively associated with conspiracy beliefs (Bowes et al., 2021; Szymaniak, Harmon-Jones et al., 2023; Szymaniak, Zajenkowski et al., 2023; see Bowes et al., 2023, $r = 0.17$ for meta-analytic findings). Probing deeper into this relationship, Harmon-Jones and Szymaniak (2023) found that perceiving conspirators as having "evil intentions" explained the relationship between anger and belief in conspiracy theories in their data. In other words, a key ingredient to why people believe in conspiracy theories appears to be the anger elicited against those who are the culprits of the conspiracy.

Finally, paranoia has also been positively associated with conspiracy beliefs (Grzesiak-Feldman and Ejsmont, 2008; see Bowes et al., 2023, $r = 0.34$ for meta-analytic findings). Some have argued that conspiracy beliefs and paranoia are so closely related that they are measuring the same construct, and thus, one should expect to see a positive overlap. However, Imhoff and Lamberty (2018) provided compelling evidence that they are, in fact, distinct via their discrepant predictive validity. Conspiracy beliefs attribute blame to the powerful, whereas paranoia attributes blame indiscriminately. Finally, recent work has demonstrated the positive relationship between depression and conspiracy beliefs (De Coninck et al., 2021; Fountoulakis et al., 2021; Green et al., 2022; Bowes et al., 2023, $r = 0.16$ for meta-analytic findings). Belief in conspiracy theories is appealing to people with

symptoms of depression because they provide a unique means to deal with threatening situations by explaining said threat through a conspiracy (Green et al., 2022). Taken together, this accumulation of evidence demonstrates the close connection between these measures of well-being (anxiety, anger, paranoia, and depression) and increased conspiracy beliefs.

It is important to clarify that while evidence supports well-being (anxiety, anger, paranoia, and depression) preceding conspiracy mentality, this does not imply that sleep quality predicts well-being (and not vice versa). However, there are theoretical and empirical reasons to believe it does. Theoretically, the connection between sleep quality and poor well-being is attributed to suppressed cognitive and affective functioning that poor sleep quality brings (Finan et al., 2017). This being the case, it seems logical that a further downstream consequence of suppressed cognitive and affective acuity is increased belief in conspiracy theories—something which the empirical evidence strongly suggests individuals are more prone to when said faculties are marred (Bowes et al., 2023; see also Furnham and Grover, 2022). Thus, we suggest that sleep quality, an underexplored aspect of well-being, may explain the connection between poor well-being and conspiracy mentality.

However, Poon and colleagues (2013) put forward and tested an alternative model in which conspiracy mentality is indirectly related to psychological well-being via insomnia. In line with Poon and colleagues, we agree with the two main rationales behind their model. First, research on conspiracy theories has hitherto not probed deep enough into the well-being dimension of these beliefs. Second, a profitable way to start probing deeper is to look more closely into the psychological mechanisms driving the connection between well-being and conspiracy beliefs. However, where it is theoretically plausible to differ is in the connection between sleep quality and conspiracy mentality. As outlined above, it is theoretically plausible to predict that poor sleep quality also leads to conspiracy mentality, via deteriorated

wellbeing. Indeed, thinking about the relationship in the manner we propose could also further our understanding of conspiracy theories. Specifically, much attention has been paid to how conspiracy theories are spread through the combination of having an ingroup or partisan bias and the public nature of social media platforms (Cinelli et al., 2022; Douglas and Sutton, 2023). Here, we are theorising about how conspiracy theories might also spread through the more private sphere when people's sleep impacts their well-being.

Present Research

Building on these recent findings, the present research makes three contributions. First, we seek to replicate previous findings by Poon et al. (2023), demonstrating the negative relationship between sleep quality and conspiracy beliefs (Studies 1 and 2). Second, we extend previous findings by exploring the negative conditional effect sleep quality has on the relationship between conspiracy exposure and increased conspiracy beliefs (Study 1). We predict that if poorer sleep is a risk factor for conspiracy theory endorsement, conspiratorial information will be more appealing than non-conspiratorial information for those with poorer quality sleep. Third, we propose and test a model to isolate the unique indirect effect a range of well-being measures (anxiety, anger, paranoia, and depression) has on the positive relationship between poorer sleep quality and conspiracy beliefs (Study 2). In doing so, for the first time, we dig deeper into the relationship between sleep quality and conspiracy beliefs by isolating the most consequential indirect effects. We also included a measure of insomnia in Study 2, a chronic sleep condition, to examine whether a similar pattern emerged with purely poorer quality sleep. Pre-registration documents, data, and materials can be accessed via https://osf.io/hzevx/?view_only=8f51fd66b3b2408a8bf8cb72c5b25282.

Study 1

Previous research has shown that exposure to conspiracy theories can directly increase conspiracy beliefs (e.g., van Prooijen et al., 2020). Extending this work, in Study 1, we aimed to examine whether poor-quality sleep is a risk factor that increases susceptibility to conspiracy beliefs following exposure to conspiracy theories. We predicted (link: https://aspredicted.org/3XR_RL7) that exposure to Notre Dame conspiracy theories (*vs* non-conspiratorial information) would increase Notre Dame conspiracy beliefs (H1) and that poor-quality sleep would strengthen this relationship (H2).

Method

Ethics

This study was approved by the [anonymized for peer review] Ethics Committee. All participants provided informed consent to participate in this research.

Participants and Design

Five hundred and seventy-eight participants were recruited from Prolific (*M*age = 42.33, *SD* = 13.60, 283 females, 286 males, 6 'other' (with 1 who disclosed being trans, 1 non-binary, and 1 gender non-confirming), and 3 who would prefer not to say). Participants who failed a pre-registered manipulation check to confirm the type of article that they had read were removed from the analyses (*n* = 38), leaving 540 (*M*age = 42.27, *SD* = 13.62, 262 females, 269 males, six 'other' (as above) and 3 who would prefer not to say). We powered our analyses for moderation. Specifically, we used the linear multiple regression option to specify three predictors and their product terms for a total of six predictors, where G*Power recommended approximately 550 participants to find a small effect (.02) at 80% power. We recruited 578, expecting a 5% dropout rate.

An experimental design was employed. Participants were exposed to conspiracy theories ($n = 268$) or a control condition ($n = 272$). Conspiracy beliefs were the outcome variable, and (poor) sleep quality was the moderator.

Materials and Procedure[1]

Participants first provided informed consent before completing the Sleep Quality Scale (SQS, Yin et al., 2006), which comprises 28 questions. Participants responded to each question thinking about their sleep over the last month (e.g., "*I have difficulty falling asleep*", $\alpha =. 92$) on a four-point scale (1 = rarely, 2 = sometimes, 3 = often, 4 = almost always).

Next, participants were randomly assigned by Qualtrics to our experimental conditions. Using a conspiracy theory manipulation developed by van Prooijen et al. (2020), all participants were asked to read an article about the Notre Dame Cathedral fire in Paris on 15th April 2019, which we assumed would be less known by our UK participants. Participants in the *conspiracy* condition then read a narrative that the fire was deliberate and that this was being kept from the public. Participants in the *control* condition instead read that the fire was a tragic accident and that all relevant information had been shared with the public. As used by van Prooijen et al. (2020), participants were then asked, "*Does the writer believe that the Notre Dame fire was an accident?*" as a manipulation check. The response options were *yes*, *no*, and *don't know*. Those who indicated the incorrect answer were removed; as the pattern of results did not change when those who indicated 'don't know' were removed, we retained those participants.

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[1] We also included a measure of resilience, which was part of a larger project examining whether resilience could act as a safeguarding factor. This variable is not reported in the current manuscript.

Next, participants completed a measure of Notre Dame fire conspiracy beliefs (van Prooijen et al. 2020), with three items (e.g., "*Do you believe that Notre Dame was set on fire deliberately by a powerful group?*", α =. 93*)* on a 5-point scale (1 = Not at all, 5 = Very much so).

Participants in the conspiracy condition were then asked to read the control article and provided with additional factual information about the fire (https://www.friendsofnotredamedeparis.org/notre-dame-cathedral/fire). They had to confirm that they had this information carefully before continuing. Finally, all participants answered basic demographic questions before being fully debriefed, thanked, and paid for the time.

Results[2]

Exposure to Notre Dame Fire Conspiracy Beliefs (H1)

Using an Independent Samples t-test, we first examined the hypothesis that exposure to conspiracy theories (*vs* non-conspiratorial information) would increase conspiracy beliefs (H1). As expected, and supporting H1, exposure to conspiracy theories ($M = 2.58$, $SD = 1.13$, $n = 268$) increased belief in Notre Dame fire conspiracy theories compared to the control condition ($M = 1.46$, $SD = 0.66$, $n = 272$), $t(538) = -14.03$, $p <. 001$, $d = 1.39$, 95% CI [-1.27682 - -0.96316]). This is consistent with previous research that found exposure to Notre Dame fire conspiracy theories increases belief (van Prooijen et al., 2020).

Exposure to Notre Dame Fire Conspiracy Beliefs and Poor Sleep Quality (H2)

A moderation analysis was then run with PROCESS Model 1 using 5,000 bootstrapped samples (Hayes, 2015) to examine whether poor sleep quality strengthened the

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[2] Of interest, there was a positive correlation between poor sleep quality and Notre Dame fire conspiracy beliefs across experimental conditions, $r(578) = 0.19$, $p <.001$.

impact of conspiracy exposure (*vs* non-conspiratorial information) on Notre Dame fire

conspiracy beliefs (H2). Each level of the moderator was generated by the pick-a-point

method (Hayes, 2013), comprising low (standardized variable: -1SD), moderate (standardized

variable: 0) and high (standardized variable: +1SD).

Supporting our novel H2, poorer sleep quality was shown to be a significant

moderator (b = .40, SE = .16, p = .011, 95% CI [0.0929 – 0.7158], F (1,536) = 6.5027, p =

.011, M = 2.28, SD = 0.50). A simple slope test revealed that at all levels of poor-quality

sleep, the effect of conspiracy exposure on Notre Dame conspiracy beliefs was significant in

a positive direction (see Figure 1) – however, as sleep quality became poorer, the magnitude

of the moderation strengthened (low: b = .88, p < .001, 95% CI [0.6649 – 1.1007], moderate:

b = 1.08, p < .001, 95% CI [0.9296 – 1.2382], high: b = 1.29, p < .001, 95% CI [1.0655 –
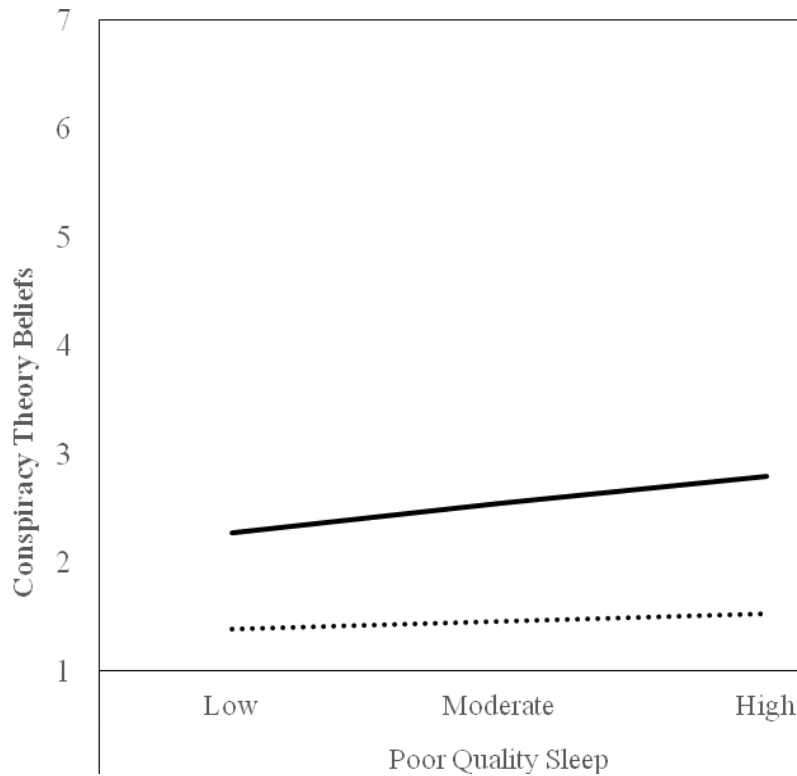
1.5044]).

Figure 1. Simple slope moderator effects of conspiracy exposure (*vs* control) on conspiracy theory beliefs between poorer sleep quality (low, moderate, high) in Study 1 ($n = 540$).

Discussion

This data provides evidence that poorer sleep quality can increase the appeal of conspiracy beliefs. Specifically, exposure to conspiracy theories (*vs* non-conspiratorial content) leads to higher conspiracy beliefs, and poorer sleep quality amplifies this effect. Poor sleep quality could be a risk factor for increased susceptibility to conspiracy theories after exposure. However, little is known about the reasons behind this effect. In Study 2, we aimed to address this and explore the underlying factors that might explain the link between poorer sleep quality and conspiracy beliefs.

Study 2

In Study 2, we aimed to replicate and extend the findings of Study 1. Firstly, we sought to replicate the link between sleep quality and conspiracy beliefs, using a general measure of conspiracy theorising and belief in a range of specific conspiracy theories (e.g., climate change, JFK assassinations, 9/11 terrorist attack). Such measures enhance methodological rigour by testing whether the relationships in our model replicate across both forms of conspiracy beliefs. In doing so, we examine whether the content of conspiracy theories matters or if the negative downstream consequences of poor sleep indiscriminately fuel belief in any conspiracy.

Secondly, we aimed to identify the indirect effects that could explain the expected positive relationship between sleep quality and both conspiracy mentality and specific conspiracy beliefs by focusing on well-being (i.e., anger, anxiety, depression and paranoia). Building on robust findings documented through meta-analysis, a clear connection exists between well-being (i.e., anxiety, anger, paranoia, and depression) and conspiracy beliefs (Bowes et al., 2023). Poor sleep quality is also strongly linked to well-being (Audigier et al., 2023; Williams et al., 2022). Integrating these findings into a unified model provides a critical opportunity to pinpoint the unique impact of sleep quality on different facets of well-being and, in turn, on conspiracy beliefs. This approach offers valuable theoretical insights by identifying which aspect of well-being most influences conspiracy beliefs, paving the way for targeted interventions to disrupt the negative effects of poor sleep on these beliefs.

Furthermore, building on the poor sleep quality used in Study 1, in Study 2, we also employed the more chronic and debilitating measure of sleep quality of insomnia to examine whether the same pattern emerged. Consistent with our preregistration (link: https://aspredicted.org/BZ3_B19), we predicted that poor sleep quality and insomnia would positively predict conspiracy beliefs in both the form of conspiracy mentality and specific

conspiracy beliefs (H3). Further, we predicted there would be significant indirect effects of all the parallel mediators of well-being (i.e., anger, anxiety, depression and paranoia, H4).

Method

Ethics

As in Study 1, this study was approved by the [anonymized for peer review] Ethics Committee. All participants provided informed consent to participate in this research.

Participants and Design

We initially recruited 578 participants through Prolific to complete an online survey; however, 3 participants failed to complete all measures, so they were removed from the analysis. The full sample used in all analyses was $N = 575$ ($M_{age} = 43.19$, $SD = 13.91$; 286 female, 286 male, three 'other' (1 indicated non-binary, 1 fluid, and 1 does not have a gender). All participants were based in the UK. On average, participants reported it took 33.14 minutes ($SD = 33.89$) to fall to sleep in the past month, where they slept for 6.94 hours ($SD = 1.18$). Power analysis revealed this meant we had 80% power (alpha = 5%) to detect $r = 0.11$ (two-tailed test), given that Study 1 analysis revealed the relationship between sleep quality and conspiracy beliefs was $r = 0.19$, we concluded that our analysis was sufficiently powered.

A correlational design was employed. Participants completed the Sleep Quality Scale (Yi et al., 2006) and the Insomnia Severity Index (Bastien et al., 2001). Participants then completed measures of anxiety (Harmon-Jones et al., 2016), anger (Harmon-Jones et al., 2016), depression (Kroenke et al., 2001), and paranoia (Green et al., 2008). Finally, participants completed a measure of conspiracy mentality (Imhoff et al., 2011) and specific conspiracy beliefs (Douglas and Sutton, 2011).

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Materials and Procedure[3]

Participants first provided informed consent before beginning the questionnaire. First, like in Study 1, participants completed the 28-item Sleep Quality Scale ($\omega = .95$, Yi et al., 2006) alongside the Insomnia Severity Index (Bastien et al., 2001), comprising seven items (e.g., "*How satisfied/dissatisfied are you with your current sleeping pattern*" ($\omega = .88$), on a 5-point scale (0 = very satisfied, 4 = very dissatisfied). A higher score for both measures represents poorer quality sleep. Both measures were counterbalanced.

Participants then completed our proposed mediator variables, which were counterbalanced. First, participants completed the eight-item Discrete Emotions Questionnaire (Harmon-Jones et al., 2016). Four items measured state anger (*anger, mad, rage, pissed off,* $\omega = .94$) and four items measured state anxiety (*dread, anxiety, worry, nervous,* $\omega = .93$) (1 = *not at all*, 7 = *an extreme amount*) for how they felt at that moment in time, on a 7-point scale (1 = *not at all* to 7 = *an extreme amount*).

Depression was measured using the nine-item Patient Health Questionnaire (Kroenke et al., 2001) whereby participants were asked to respond to each item thinking about the last two weeks (e.g., "*little interest or pleasure in doing things",* $\omega = .90$) on a 4-point scale (0 = not at all, 3 = nearly every day).

Paranoia was then measured by participants completing the 16-item Paranoid Thoughts Scale (Green et al., 2008), whereby participants were asked to respond to each item and think about the last month (e.g., "*People wanted me to feel threatened, so they stared at me*", $\omega = .96$) on a 5-point scale (1 = do not agree to 5 = totally agree).

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[3] As in Study 1, we also included a measure of resilience, which was part of a larger project examining whether resilience could act as a safeguarding factor.

Finally, two conspiracy belief measures were completed, which were counterbalanced. The first was the Conspiracy Mentality Questionnaire (Bruder et al., 2013), which is comprised of five items (e.g., *"I think that events which superficially seem to lack a connection are often the result of secret activities"*, ω = .89), on a 0 = certainly not to 100% certain scale. The second was a belief in specific conspiracy theories scale (adapted from Douglas & Sutton, 2011), with eight items (e.g., "*Scientists are creating panic about climate change because it is in their interests to do so.*", ω = .86) on a 7-point scale (1 = strongly disagree, 7 strongly agree). Participants then provided basic demographic details before being fully debriefed, thanked and paid for their time.

Analysis Strategy

We estimated a path model to see how well our proposed model explained the data. In our proposed model, both sleep quality and insomnia predict conspiracy mentality and belief in specific conspiracy theories (*path c'*) via the parallel mediators of anger, anxiety, depression, and paranoia. Thus, these mediators are predicted by sleep quality and insomnia (*path a*), and conspiracy mentality and belief in specific conspiracies are predicted by the mediators (*path b*).

To examine the fit of our model, first, we examined the size and significance of the path coefficients and the indirect effects. Second, we examined whether the relative magnitude of the indirect effects significantly differed from one another. Third, we examined the amount of variance explained in all the endogenous variables in the model (R^2). Finally, we examined whether a theoretically plausible alternative models explained the data better. To aid this evaluation, we compared the number of significant indirect effects, and the variance explained by the alternative model (R^2).

Table 1

Zero-Order Correlations and Descriptives for Study 2 Variables ($n = 575$).

	M	*SD*	1.	2.	3.	4.	5.	6.	7.	8.
1. Sleep Quality	2.24	0.50	-	0.78*	0.36*	0.52*	0.39*	0.71*	0.21*	0.17*
2. Insomnia	1.30	0.80		-	0.38*	0.53*	0.41*	0.70*	0.17*	0.17*
3. Anger	1.48	0.96			-	0.63*	0.49*	0.49*	0.18*	0.27*
4. Anxiety	2.19	1.37				-	0.49*	0.70*	0.19*	0.23*
5. Paranoia	1.36	0.56					-	0.56*	0.21*	0.29*
6. Depression	1.74	0.64						-	0.26*	0.27*
7. Conspiracy Mentality	4.63	2.50							-	0.65*
8. Specific Conspiracy Beliefs	2.18	1.12								-

Notes. * $p < .01$.

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<center>**Results**</center>

Table 1 shows the correlations across all variables. As predicted and supporting H3, poorer sleep quality and insomnia positively correlate with conspiracy mentality and specific conspiracy beliefs. Additionally, sleep quality and insomnia are positively correlated with all mediators (anger, anxiety, paranoia, and depression), which, in turn, positively correlate with both forms of conspiracy beliefs.

Building on these preliminary findings, *Figure 2* presents the path model used to test the indirect effects as part of H4. As predicted by our parallel mediation model, sleep quality positively predicted anxiety, anger, paranoia, and depression (see *Figure 2* for standardised path coefficients, *paths a*). Similarly, insomnia also positively predicted these mediators (*paths a*). Although correlated (see Table 1), in this model, neither sleep quality nor insomnia significantly predicted conspiracy mentality or specific conspiracy beliefs (*paths c'*).[4]

However, consistent with H4, depression positively predicted both conspiracy mentality and specific conspiracy beliefs (see Figure 2, *paths b*). Also, anger and paranoia positively predicted specific conspiracy beliefs (see Figure 2, *paths b*). Contrary to our predictions, anxiety did not predict either conspiracy mentality or specific conspiracy beliefs.

Notably, the indirect effects of depression between both sleep quality and insomnia with conspiracy mentality and specific conspiracy beliefs were significant (see Table 2). The indirect effect of paranoia between insomnia and sleep quality and specific conspiracy beliefs was significant. Additionally, the indirect effect of anger between sleep quality and insomnia with specific conspiracy beliefs was significant. No other indirect effects were significant.[5]

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[4] Omitting the mediators from the model and sleep quality significantly predicted conspiracy mentality ($\beta = 0.19$, $p = .002$) but not real-world conspiracy beliefs ($\beta = 0.07$, $p = .23$). Insomnia did not significantly predict conspiracy mentality ($\beta = 0.01$, $p = .79$) nor real-world conspiracy beliefs ($\beta = 0.10$, $p = .12$).
[5] To rule out the influence of any single real-world conspiracy belief, we reestimated the model by disaggregating the real-world conspiracy beliefs scale, treating each belief as a separate dependent measure.

Finally, the magnitude of the indirect effects did not significantly differ across depression,

anger, and paranoia ($\beta \leq .04$, *ps* $\geq .141$).

Results revealed that there were significant indirect effects across all eight specific real-world conspiracy beliefs, see Supplementary Materials for full model results.

Figure 2

Parallel Mediation Model Between Sleep Quality and Insomnia and Conspiracy Beliefs (Conspiracy Mentality and Specific Conspiracy Beliefs)

Through Anxiety, Anger, Paranoia and Depression in Study 2 (*n* = 575).

Note. Thicker arrows indicate significant (standardised) path coefficients.

Table 2.

Indirect Effects Between Sleep Quality and Insomnia and Conspiracy Beliefs (Conspiracy Mentality and Specific Conspiracy Beliefs) Through

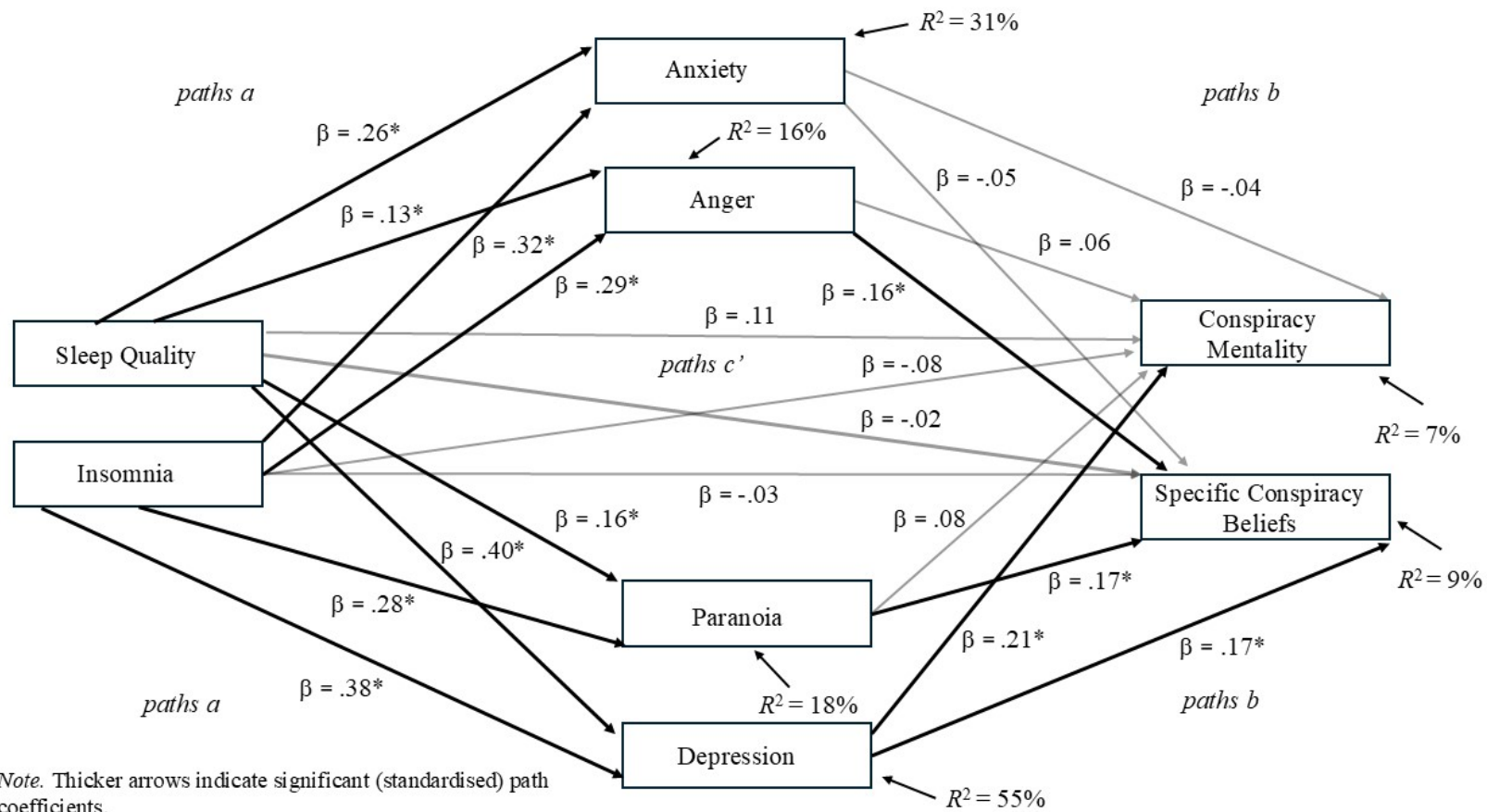Anxiety, Anger, Paranoia and Depression in Study 2 ($n = 575$).

		Indirect Effects			**Indirect Effects**		
Predictor		*Outcome*: Conspiracy Mentality			*Outcome:* Specific Conspiracy Beliefs		
Sleep Quality		β	95% CI LL	95% CI UL	β	95% CI LL	95% CI UL
	Anger	0.03	-0.02	0.10	0.02	<-0.01	0.09
	Anxiety	-0.01	-0.19	0.07	-0.01	-0.09	0.02
	Paranoia	0.01	-0.02	0.14	**0.02**	**0.01**	**0.11**
	Depression	**0.08**	**0.16**	**0.67**	**0.06**	**0.04**	**0.26**
		Indirect Effects			**Indirect Effects**		
Predictor		*Outcome:* Conspiracy Mentality			*Outcome*: Specific Conspiracy Beliefs		
Insomnia		β	95% CI LL	CI UL	β	95% CI LL	CI UL
	Anger	0.01	-0.02	0.13	**0.05**	**0.02**	**0.11**
	Anxiety	-0.01	-0.14	0.05	-0.01	-0.06	0.01

Paranoia	0.02	-0.01	0.15	**0.04**	**0.02**	**0.11**
Depression	**0.08**	**0.09**	**0.39**	**0.06**	**0.02**	**0.15**

Alternative Model

To gain further confidence in our proposed model, we tested an alternative model proposed by Poon and colleagues (2023). Therefore, treating conspiracy mentality and specific conspiracy beliefs as exogenous and sleep quality and insomnia as endogenous, mediated via the same well-being mediators (i.e., anger, anxiety, depression, and insomnia). In this model, the indirect effects of depression from both conspiracy mentality and specific conspiracy beliefs to sleep quality and insomnia were significant (see Supplementary Materials for full model results). However, we were unable to replicate the significant indirect effects for anger and anxiety. Further, this model explained less variance across anger ($\Delta R^2 = 8\%$), anxiety ($\Delta R^2 = 29\%$), depression ($\Delta R^2 = 47\%$), and paranoia ($\Delta R^2 = 9\%$). Taken together, we concluded that sleep quality and insomnia are better conceptualised as exogeneous and conspiracy mentality and specific conspiracy beliefs as endogenous – more consistent with our proposed model.

Discussion

We replicated Study 1, demonstrating the links between poor sleep and conspiracy beliefs. Extending this work, we found these connections also applied to insomnia, conspiracy mentality, and specific conspiracy beliefs and uncovered the mechanisms behind them. Depression had a consistent indirect effect between sleep quality, insomnia, and both forms of conspiracy beliefs (conspiracy mentality and specific conspiracy beliefs). The roles of anger and paranoia were less consistent. Paranoia had an indirect effect between both sleep quality and insomnia and specific conspiracy beliefs. Anger had an indirect effect between insomnia and specific conspiracy beliefs. Therefore, Study 2 highlights the crucial role of depression in linking sleep quality to conspiracy beliefs. In the General Discussion, we unpack these findings and their consequences in more detail.

However, it is important to underscore that these significant indirect effects were observed while the direct relationships between both forms of sleep quality (i.e., sleep quality and insomnia) and both forms of conspiracy beliefs (i.e., conspiracy mentality and specific conspiracy beliefs) in the mediation model were not significant. Although we did uncover significant correlations (see Table 1). Consistent with recent theorising (see Hayes, 2009; Memon et al., 2020), the absence of direct effects does not undermine the presence of significant indirect effects. This is because the indirect effect can be significantly different from zero without one of its constituent paths being significantly different from zero (Hayes, 2017; see also MacKinnon et al., 2002). Thus, quantifying the magnitude of indirect effects helps advance theory by providing greater detail on intervening variables (i.e., depression) and a more precise understanding of the connection between variables (i.e., between sleep quality and conspiracy beliefs).

General Discussion

Across two studies, we found that poorer sleep quality was linked to an increased belief in conspiracy theories. In Study 1, participants with poorer sleep quality were more likely to endorse conspiracy theories about the Notre Dame fire after exposure to conspiratorial information than non-conspiratorial content. In Study 2, we investigated the underlying mechanisms connecting poor sleep quality and conspiracy beliefs and extended our analysis to include the chronic condition insomnia. Our findings revealed that poor sleep quality and insomnia were positively correlated with a tendency to engage in conspiracy thinking and believe in specific conspiracy theories. Notably, an indirect effect was consistently found between sleep quality/insomnia and conspiracy beliefs via depression. In contrast, the indirect effects of anger and paranoia were inconsistent. Specifically, paranoia had an indirect effect between sleep quality and insomnia on specific conspiracy beliefs.

Whereas anger had an indirect effect between insomnia and specific conspiracy beliefs. Critically, these findings suggest that remedying poor sleep quality—whether acute or chronic—is a route to reducing susceptibility to conspiracy beliefs. Put another way, good sleep quality appears to be a protective factor that insulates people against conspiracy beliefs.

Our work advances previous research in several key ways. First, we demonstrate the negative conditional effect sleep quality has on exposure to conspiracy beliefs. Our findings demonstrate that poor sleep quality can exacerbate the increased endorsement of conspiracy beliefs—following exposure to conspiracy theories (Study 1; van Prooijen et al., 2013). This finding highlights the insulating power sleep quality has on the spread of conspiracy theories and underscores the protective factor sleep quality can have against conspiratorial *content*. Second, replicating previous findings (i.e., Poon et al., 2023), we provide further correlational evidence of the link between poorer sleep quality and conspiracy beliefs (Study 2). Extending previous findings, we demonstrate that this association occurs not only for conspiracy mentality but extends to specific conspiracy beliefs. Such a finding demonstrates the insidious role of poor sleep quality as it could raise people's conspiratorial mentality and make people more susceptible to specific conspiracy beliefs. We know that belief in specific conspiracy theories makes people less amenable to other good health-related behaviours, such as vaccine uptake ([anonymized for peer review]). Therefore, our work questions the impact of poor sleep quality on other important and consequential health-related behaviours.

It stands to reason that encouraging better sleep quality can reduce the appeal of conspiracy information that has secondary health benefits beyond improved sleep. This could involve addressing psychological factors that contribute to poor sleep quality (such as anxiety) or aspects of sleep itself (such as routine). Future research could examine this intriguing possibility.

Going beyond previous analysis (i.e., Poon et al., 2023), we wished to dig deeper into the underlying mechanism that links sleep quality (sleep quality and insomnia) with conspiracy beliefs (i.e., conspiracy mentality and specific conspiracy beliefs). Our findings point to the key role that depression plays in explaining the link between poor sleep quality and increased conspiracy beliefs. Thus, it appears that being able to explain threats through conspiracy theories seems particularly appealing to individuals experiencing higher levels of depression (Green et al., 2022). Indeed, increased endorsement of conspiracy beliefs might be an externalising coping mechanism. People experiencing higher levels of depression look to cope by projecting malevolent and evil intentions (i.e., conspiracy theories) onto the actions of others. In fact, for people experiencing depression, living in a world engulfed with conspiracies might make more sense to the extent that reality might then appear a better fit with their cognitive and emotional state (Stalder & Anderson, 2014).

Further, we observed inconsistent indirect effects for paranoia and anger. For the former, both poor sleep quality and insomnia were linked to specific conspiracy beliefs via paranoia. For the latter, only insomnia was linked to specific conspiracy beliefs via anger. Such findings demonstrate that the relationship between sleep quality and conspiracy beliefs is rather more nuanced. Our findings support Sutton and colleagues' (2024) theoretical position, demonstrating the non-equivalence of conspiracy mentality and specific conspiracy beliefs. If they were equivalent, in our model (Study 2), we would expect that our mediating mechanisms operate similarly for both conspiracy mentality and specific conspiracy beliefs. Our data suggests that poor sleep quality may heighten feelings of paranoia and anger about specific, powerful targets. Specific conspiracy beliefs may gain traction through paranoia and anger because their specificity allows these emotions to be more precisely directed. Contrary to our expectations, anxiety did not influence either conspiracy mentality or specific conspiracy beliefs. This is particularly surprising as previous findings have demonstrated the

positive association between anxiety and conspiracy beliefs (Bowes et al., 2023; Liekefett et al., 2023). Research suggests that anxiety often co-occurs with other conditions, such as depression (e.g., Nyer et al., 2013). It is, therefore, possible that you need to control for these other measures of well-being to estimate the true association between anxiety and conspiracy beliefs.

We also extend the theoretical framework proposed by Poon and colleagues (2023). In their model, they suggest that conspiracy mentality might disrupt sleep, which in turn negatively impacts well-being. Our alternative model demonstrated how poor sleep quality can impact well-being, subsequently influencing conspiracy beliefs. Our Study 2 findings provided correlational evidence supporting this model. Our data also showed stronger support for this model than the alternative model proposed by Poon and colleagues (2023). These findings suggest that interventions targeting sleep quality could enhance well-being while also delivering the valuable downstream benefit of reducing conspiracy beliefs. As both models shed more light on the hitherto underexplored connection between well-being and conspiracy beliefs, they both might be converging onto the same theoretical model. Specifically, we propose the concept of a *"sleep cycle of conspiracy beliefs"*. In this model, poor sleep degrades well-being, increasing conspiracy beliefs. This, in turn, further disrupts sleep quality, impacting well-being. Thus, poor sleep quality might be the starting point or trigger of a negative sleep quality conspiracy beliefs cycle. Although we cannot establish this cycle with our cross-sectional data, it offers a novel, testable set of hypotheses that are more amenable to longitudinal and experimental designs. These findings also have intervention implications: if the *"sleep cycle of conspiracy beliefs"* is accurate, targeting either sleep or conspiracy beliefs could yield benefits for both the primary target and the other indirectly. However, the most efficacious intervention would be identifying the starting point of the sleep cycle on conspiracy beliefs.

Limitations and Future Directions

There are some limitations to the research that we would like to acknowledge. First, we used self-report measures of sleep quality and insomnia in both studies. While self-reporting remains the most consistent way to measure sleep quality (Cudney et al., 2022) and sets the groundwork for investigating sleep quality and conspiracy beliefs, an objective marker could offer additional insights. For example, a future study could investigate whether one night of poor sleep versus normal sleep in an experimental design affects well-being, subsequently increasing conspiracy theory beliefs.

Second, the correlational design of Study 2 limits our ability to make causal claims, a limitation further compounded by the fact that Study 1 only manipulates conspiracy theories, rather than sleep. However, we have laid the groundwork by further demonstrating that sleep quality operates as a protective factor against increased conspiracy beliefs. Future research could build on our findings and investigate the *"sleep cycle of conspiracy beliefs"* using longitudinal designs. Longitudinal designs will aid in making causal claims by estimating cross-lagged effects (i.e., testing how sleep quality at an earlier time-point predicts both well-being (i.e., the mediators) and conspiracy beliefs at subsequent time-point(s)). This would mean a minimum of three time points would be needed to identify the model and incorporate mediators and outcomes into it. Further still, it would be beneficial to estimate longitudinal models that differentiate between-person and within-person effects (i.e., RI-CLPM; Hamaker et al., 2015). In doing so, we can address how an individual's fluctuations in sleep quality predict an individual's well-being and conspiracy beliefs.

We also operationalised well-being through four variables linked to severe clinical conditions. These represent extreme cases of impaired well-being. However, it is possible that sleep quality influences conspiracy beliefs through more benign forms of well-being, such as

self-esteem, positive affect, and self-efficacy. These subtler aspects of well-being may make the connection between sleep quality and conspiracy beliefs more pronounced than currently outlined, especially since they are likely more prevalent in the general population.

Finally, there is another untapped theoretical reason why it is plausible for sleep quality to predict conspiracy beliefs that could be further explored. A core facet of poor sleep quality is that it, by definition, provides people with unwanted time that needs to be used up (Shin et al., 2017). In this unwanted idle time, research suggests that people are more likely to ruminate (Holdaway et al., 2018). Evidence has also linked increased rumination to conspiracy beliefs (Liekefett et al., 2024). Further, ruminating is positively correlated with catastrophising life's problems, which can make people more susceptible to conspiracy beliefs (Green and Douglas, 2018). In other words, poor sleep quality might provide a fertile group for conspiracy beliefs because they provide individuals with idle time. Indeed, we know that people can be reticent to share conspiracy theories because it can be stigmatising when they do so (Lantian et al., 2018). The solitary nature of poor sleep quality might be an ideal environment where conspiracy beliefs can take seeds and flourish. Such a novel proposal could be examined in future research.

Conclusion

In conclusion, our research emphasises the significant influence of sleep quality on conspiracy beliefs. Both experimental and correlational evidence show that poor sleep quality—whether acute or due to chronic conditions like insomnia—is linked to a higher likelihood of endorsing conspiracy theories. Depression consistently mediates this relationship, while anger and paranoia are specifically associated with specific conspiracy beliefs. These findings highlight sleep as a modifiable factor in combating conspiracy thinking. Improving sleep quality could enhance overall well-being and reduce susceptibility

to conspiracy beliefs, potentially lessening their impact on individuals and society. Future research should further investigate the *"sleep cycle of conspiracy beliefs"* to better understand the long-term relationship between sleep, well-being, and conspiratorial thinking.

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