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Can Conspiracy Beliefs Be Beneficial? Longitudinal Linkages Between Conspiracy Beliefs, Anxiety, Uncertainty Aversion, and Existential Threat

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Abstract

Research suggests that conspiracy beliefs are adopted because they promise to reduce anxiety, uncertainty, and threat. However, little research has investigated whether conspiracy beliefs actually fulfill these promises. We conducted two longitudinal studies ($N_{Study\ 1}$ = 405, $N_{Study\ 2}$ = 1,012) to examine how conspiracy beliefs result from, and in turn influence, anxiety, uncertainty aversion, and existential threat. Random intercept cross-lagged panel analyses indicate that people who were, on average, more anxious, uncertainty averse, and existentially threatened held stronger conspiracy beliefs. Increases in conspiracy beliefs were either unrelated to changes in anxiety, uncertainty aversion, and existential threat (Study 2), or even predicted increases in these variables (Study 1). In both studies, increases in conspiracy beliefs predicted subsequent increases in conspiracy beliefs, suggesting a self-reinforcing circle. We conclude that conspiracy beliefs likely do not have beneficial consequences, but may even reinforce the negative experience of anxiety, uncertainty aversion, and existential threat.

Keywords

conspiracy beliefs, anxiety, uncertainty aversion, existential threat, random intercept cross-lagged panel model

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In an influential television address in March 2020, Angela Merkel, the German chancellor, described the coronavirus pandemic as the largest societal challenge since World War II (Merkel, 2020). Most people experienced drastic changes in their everyday lives, and voiced questions, such as "Where did the coronavirus come from?" "Is the vaccine dangerous?" and "Is the government really acting in our best interest?" Many people found the official answers to these kinds of questions unsatisfactory, and started to look for alternative explanations, for instance, in conspiracy theories (Nocun & Lamberty, 2020).

Conspiracy theories are attempts to explain significant social or political events (Douglas et al., 2019) that usually contradict common and official explanations (Nocun & Lamberty, 2020). They assume that events are the result of plots initiated by malevolent individuals or groups who act in secret (Bruder et al., 2013; Douglas et al., 2017; Imhoff & Bruder, 2014). In most cases, the conspirators are assumed to be powerful (although not necessarily; see Nera et al., 2021). Many different conspiracy theories developed during the coronavirus pandemic, such as that the virus was fabricated in a lab, or that it served to distract from the alleged dangers of the 5G mobile network (Nocun & Lamberty, 2020).

Research suggests that conspiracy beliefs are adopted in response to the experience of anxiety, uncertainty, and threat, most likely in an attempt to reduce these negative states (Douglas et al., 2017). Yet it has been suggested that conspiracy beliefs are "more appealing than satisfying" (Douglas et al., 2017, p. 538) and might not actually help deal with anxiety, uncertainty, and threat. Instead, conspiracy beliefs may represent a "self-defeating form of motivated social cognition" (Douglas et al., 2017, p. 541) and may ultimately reinforce the negative experiences that led to their adoption in the first place (Douglas et al., 2017, 2020). We aim to investigate this potential negative feedback loop in a longitudinal design. Longitudinal studies are especially suited for this purpose because they separate stable between-person differences from changes occurring *within* persons over time (Curran & Bauer, 2011). This allows to examine whether

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within-person changes in conspiracy beliefs relate to subsequent changes in anxiety, uncertainty aversion, and existential threat (and vice versa).

Although there are many other variables related to conspiracy beliefs (e.g., thinking styles, Pytlik et al., 2020; paranoia, Imhoff & Lamberty, 2018; narcissism, Cichocka et al., 2016; or ideology, Nera et al., 2021), the focus of this research is on variables related to uncertainty and fear. These were particularly relevant in the coronavirus pandemic: Almost everyone experienced substantial uncertainties (e.g., whether another lockdown would occur), existential threats (e.g., becoming infected, losing their job), and heightened levels of anxiety (Schwinger et al., 2020). Hence, within-person changes in these variables can be expected (whereas personality or ideology variables might be more stable over time). In sum, the pandemic provides a unique opportunity to study how uncertainty and fear-related variables relate to conspiracy beliefs over time: Can conspiracy beliefs be beneficial by reducing anxiety, uncertainty aversion, and existential threat, or do they, instead, reinforce these negative experiences?

Uncertainty Aversion, Anxiety, and Existential Threat Predict Conspiracy Beliefs

Previous research has demonstrated that conspiracy beliefs are associated with uncertainty aversion, anxiety, and existential threat. Whereas official accounts of important events, such as the coronavirus crisis, are often complex and ambiguous (e.g., there is still uncertainty surrounding the origin of the virus, Gordon et al., 2021), conspiracy beliefs offer seemingly simple and all-embracing answers to complex questions (Douglas et al., 2017; McHoskey, 1995; Nyhan & Reifler, 2010). Therefore, they appeal to people who are uncertainty averse by proposing a clear account of why events occurred. In addition, they allow to hold onto one's belief in the face of counterevidence: All disconfirming evidence can simply be construed as part of the conspiracy (Keeley, 1999). Research has found that the need for cognitive closure (i.e., the need to arrive at a certain view quickly and then maintain that view) fosters conspiracy beliefs in situations where clear explanations are lacking (Marchlewska et al., 2018), and that making uncertainty salient increases conspiracy beliefs (van Prooijen & Jostmann, 2013).

Conspiracy beliefs may also develop in response to the experience of anxiety. They are more likely to emerge in societal crises (van Prooijen & Douglas, 2017) and in anxiety-inducing situations: Participants who were waiting for an examination indicated heightened conspiracy beliefs (Grzesiak-Feldman, 2013) and participants who received an anxiety prime were more likely to suspect a conspiracy behind a fictional ambiguous scenario (Radnitz & Underwood, 2017). Finally, participants who experienced a lack of control, which likely induced anxiety, were more likely to perceive conspiracies behind unrelated stimuli (Whitson & Galinsky, 2008).

Conspiracy beliefs are also associated with the experience of existential threat, defined as the subjective experience of insecurity and danger (Douglas et al., 2017). For existentially threatened people, conspiracy beliefs appear attractive because they promise a certain amount of security: Conspiracy beliefs assume that the world is controlled by a small group of malevolent actors. They thereby imply that the world is, in fact, controllable, which may seem less threatening than an unpredictable world, where nobody is fully in control (Keeley, 1999; Sullivan et al., 2010). Conspiracy beliefs further provide clearly identifiable enemies, which can be managed and understood more easily than random, diffuse perils (Sullivan et al., 2010). Recent research found that greater threat perceptions in the context of the coronavirus pandemic predicted an increase in believing conspiracy claims a month later (Heiss et al., 2021). This suggests that existentially threatened individuals may turn to conspiracy beliefs in an attempt to establish a compensatory sense of security (Douglas et al., 2017).

Can Conspiracy Beliefs Be Beneficial?

Although conspiracy theories may promise to help deal with uncertainty and reduce anxiety and existential threat on the surface, research so far indicates that they may not actually provide these benefits (Douglas et al., 2017, 2020). The contents of conspiracy beliefs are inherently threatening: Conspiracy theories allege that people are at the mercy of malevolent forces (Bruder et al., 2013). Such a worldview may provide many triggers for worry and anxiety (Douglas et al., 2017; Peitz et al., 2021). For instance, people who believe that the government is secretly controlled by malevolent groups will likely fear the consequences of these groups' political influence, which should contribute to both anxiety and existential threat. In addition, it seems plausible that conspiracy beliefs further increase the aversion toward uncertainty: Conspiracy theories consist of a complex system of interdependent beliefs. To maintain belief in this system in the face of counterevidence, more and more people and institutions need to be drawn into the conspiracy theory (Keeley, 1999). This results in a highly fragile system in which even the smallest doubt about one of the theory's elements might bring down the whole system of beliefs. As a result, people might become more and more averse to uncertainty as they attempt to uphold the beliefs to which they have become attached.

This implies that conspiracy beliefs might be part of a negative feedback loop, similar to, for example, obsessive compulsory disorder (OCD).[1] In OCD, the experience of distressing thoughts, images, or impulses triggers obsessive compulsions in an attempt to reduce anxiety. Engaging in these compulsions, however, paradoxically increases preoccupation with the intrusion and serves to maintain a

vicious cycle of negative emotions (Calkins et al., 2013). Similarly, conspiracy beliefs may be adopted in an attempt to alleviate negative states, but may ultimately reinforce anxiety, perceived threat, and uncertainty.

Previous research provides initial evidence for this idea. Some studies found that exposure to convincing conspiracy theories increased people's levels of uncertainty and distrust, and suppressed their sense of autonomy and control (Einstein & Glick, 2015; Jolley & Douglas, 2014). Furthermore, COVID-19 conspiracy beliefs predicted greater compliance with governmental restrictions through increased anxiety (Peitz et al., 2021). In line with this, Leibovitz et al. (2021) found that greater COVID-19 conspiracy beliefs were associated with more anxiety a month later. However, these studies are limited for several reasons: First, they are mostly cross-sectional, and thus provide only information about between-person relations. The only longitudinal study (Leibovitz et al., 2021) used only two waves of data and did not separate between-person from within-person effects. Yet the processes of interest are specifically concerned with what happens at the within-person level, that is, whether the adoption of conspiracy beliefs reduces or increases distress *for the individual*. As relations observed at the between-person level do not necessarily imply a similar relation within persons, longitudinal research that separates these two levels of effects is required (Curran & Bauer, 2011). Furthermore, previous research has mostly relied on experimental designs that manipulate exposure to conspiracy theory materials in a laboratory setting. Thereby, they compared people who were exposed to conspiracy theory materials with people who were exposed to neutral materials. However, reading conspiracy materials does not mean that people believe this information. In addition, the consequences of conspiracy beliefs may not develop right after a one-time exposure in the lab, but rather over longer periods of time as people integrate these beliefs into their everyday lives. To overcome these limitations, longitudinal designs that separate between-person from within-person effects are needed.

The Present Research

This research aims to investigate how conspiracy beliefs result from, and in turn influence, anxiety, uncertainty aversion, and existential threat in a longitudinal setting. We use a random intercept cross-lagged panel model (RI-CLPM; Hamaker et al., 2015), which separates stable between-person differences from within-person changes in a naturalistic setting. This allows us to test directly whether changes in conspiracy beliefs are associated with subsequent changes in anxiety, uncertainty aversion, and existential threat (and vice versa) within the same person.

We expect that people who believe in conspiracies are, in general, more prone to uncertainty aversion, anxiety, and existential threat (between-person level). We further expect that people who experience increased uncertainty aversion, anxiety, and existential threat are more likely to subsequently report increased conspiracy beliefs (within-person level). We also propose that the adoption of conspiracy beliefs does not effectively reduce these negative states—instead, increased conspiracy beliefs should predict subsequent increases in uncertainty aversion, anxiety, and existential threat (within-person level).

We examine both short- (two weeks; Study 1) and long-term (four months; Study 2) associations across four waves of measurements. We capture different phases of the pandemic: Study 1 ranged from before the first lockdown in Germany (March 2020) until the end of April 2020 (first lockdown: March 22–May 11, 2020). Study 2 started at the end of the first lockdown (May 2020), continued during the time without lockdown (September 2020) and the second lockdown (January 2021; second lockdown: November 25, 2020–March 8, 2021), and ended at a time where many restrictions were relieved (May 2021). Our data therefore represent a unique opportunity to examine longitudinal linkages between conspiracy beliefs, anxiety, uncertainty aversion, and existential threat during the course of a major societal crisis.

Study 1

Method

Materials, data, analysis code, and codebooks can be found in Open Science Framework (OSF) at https://osf.io/dgzj6/?view_only=ee7d6a2755da475a83da8a95798a287e. No studies in this article were preregistered.

Participants and procedure. We recruited participants with a German nationality, using Prolific. A total of $N = 405$ participated in the first measurement wave (T1), of whom 188 identified as female, 215 as male, and two as diverse. The mean age was 30.24 years ($SD = 9.98$). The sample was highly educated: 231 participants had a university degree, 129 had completed the Abitur (high school diploma), and 45 had completed secondary school. Every second week, participants were invited to take part in the second ($n = 334$), third ($n = 300$), and fourth wave ($n = 231$).

To confirm that sample size was sufficient, we conducted a Monte Carlo power analysis with 1,000 replications to determine the power for $\alpha = .05$, with a sample size of $N = 405$ and missing data patterns corresponding to the dropout we observed for our most complex model (anxiety model). In such simulations, a large number of samples is drawn from a hypothesized population model and power is assessed by examining the percentages of replications for which the null hypothesis is rejected for non-zero parameters. We chose plausible population values for factor loadings (.70), residual variances of observed variables (.51), variances (1.00) and covariances (.40) of random intercepts (RIs), and covariances between residuals of within-person

components (.10; see OSF for details). Results indicated that power for a medium-sized lagged regression effect (.30) was sufficient (.81–.93). Furthermore, bias in parameter estimates (–.01–.03) and standard errors (–.04–.05) was small (according to Muthén & Muthén, 2002, bias should not exceed .10). This strengthens our confidence that the sample size is sufficient.

Measures. If not indicated otherwise, all items were answered on a 7-point scale ranging from 1 (*do not agree at all*) to 7 (*agree completely*; see Supplemental Online Materials [SOM] for full scales). We report additional measures from the survey in the SOM. Instead of Cronbach's alpha, we report the less restrictive coefficient omega (Dunn et al., 2014). The use of Cronbach's alpha as a measure for internal consistency has been criticized because it relies on assumptions that are rarely met in psychological research (i.e., that the true score variance is constant across all items; Dunn et al., 2014). When these conditions are met, omega performs at least as well as alpha—when they are violated, omega outperforms alpha (Dunn et al., 2014; Flora, 2020; McNeish, 2018).

Conspiracy beliefs. We used the Conspiracy Mentality Questionnaire (CMQ; Bruder et al., 2013). It consists of five items that measure an individual's general tendency to believe that important societal phenomena are the result of conspiracies, such as "I think that many very important things happen in the world, which the public is never informed about" (ω = .89–.90). An advantage of this scale is that it does not refer to the content of specific conspiracy theories, which may vary across different temporal or cultural contexts. Furthermore, items that describe specific conspiracy theories are often highly transparent: People can immediately recognize them as conspiracy theories and might be motivated to answer in a socially desirable manner. In an attempt to reduce this problem, the CMQ uses items that are more abstract, and that capture a general propensity to attribute societal outcomes to conspiracies. Bruder et al. (2013) provide evidence for the scale's convergent, discriminant, and predictive validity: It correlates positively with related measures, such as paranoid ideation, paranormal beliefs, and schizotypal personality, and negatively with measures of sociopolitical control and agreeableness. It predicts endorsement of a variety of specific conspiracy theories over and above other individual difference measures (Bruder et al., 2013).

Anxiety. We used the German version of the Generalized Anxiety Disorder Scale (Spitzer et al., 2006). The scale measures the degree to which participants had been bothered by a variety of symptoms in the past two weeks, such as "Feeling nervous, anxious or on edge," or "Not being able to stop or control worrying," on a scale ranging from 0 (*not at all*) to 7 (*nearly every day*; ω = .92–.94). Higher scores on the scale are related to stronger functional impairment in multiple domains and more disability days and health care use (Spitzer et al., 2006).

Uncertainty aversion. We used three items from the Uncertainty Response Scale that capture our notion of uncertainty aversion most directly, namely, responding to uncertainty with hesitancy and negative emotional experiences (Greco & Roger, 2001). A sample item is "I get worried when a situation is uncertain" (ω = .84–.86).[2]

Existential threat. To our knowledge, there is no agreed upon measure for existential threat. For this reason, we developed three items that capture our notion of existential threat, namely, the subjective experience of insecurity and danger to one's own person (Douglas et al., 2017; Hirschberger et al., 2016), for example, "I often feel in danger" (ω = .92–.94).

Analytic strategy

Random intercept cross-lagged panel model. As we are interested in reciprocal relations of our variables over time, the cross-lagged panel model (CLPM) would be the traditional model of choice. However, the CLPM does not differentiate stable between-person differences from fluctuating within-person changes (Hamaker et al., 2015). As a result, the estimated parameters are confounded by the relationship that exists at the between-person level. For variables that are to some extent trait-like, the RI-CLPM model is more appropriate (Hamaker et al., 2015). The RI-CLPM decomposes the observed variance into a stable, between-person component ("trait-like") and a time-variant within-person component ("state-like"; see Figure 1). For each variable, an RI is included that captures a person's time-invariant deviation from the grand means, and thus represents stable, trait-like variance. Correlations between RIs inform about relations on the between-person level: A positive correlation between the RIs of, for instance, anxiety and conspiracy beliefs would indicate that a person who, on average, reports higher anxiety also, on average, reports higher conspiracy beliefs.

The autoregressive and cross-lagged parameters pertain to the within-person level. The autoregressive parameters indicate how within-person deviations from expected scores (based on the grand means and RIs) at one time are related to further deviations at a later time. A positive autoregressive parameter for anxiety would indicate that a person who experiences higher anxiety than usual will likely experience a further increase in anxiety at the next time point. The cross-lagged parameters indicate whether different-from-usual scores on one variable will likely be followed by different-from-usual scores on the other variable (Hamaker, Kruiper and Grasman, 2015). A positive cross-lagged parameter from anxiety to conspiracy beliefs would indicate that a person who reports higher anxiety than usual at one time will likely report higher conspiracy beliefs than usual at the next time point.

Covariation of variables of interest. Anxiety, uncertainty aversion, and existential threat are related, although conceptually

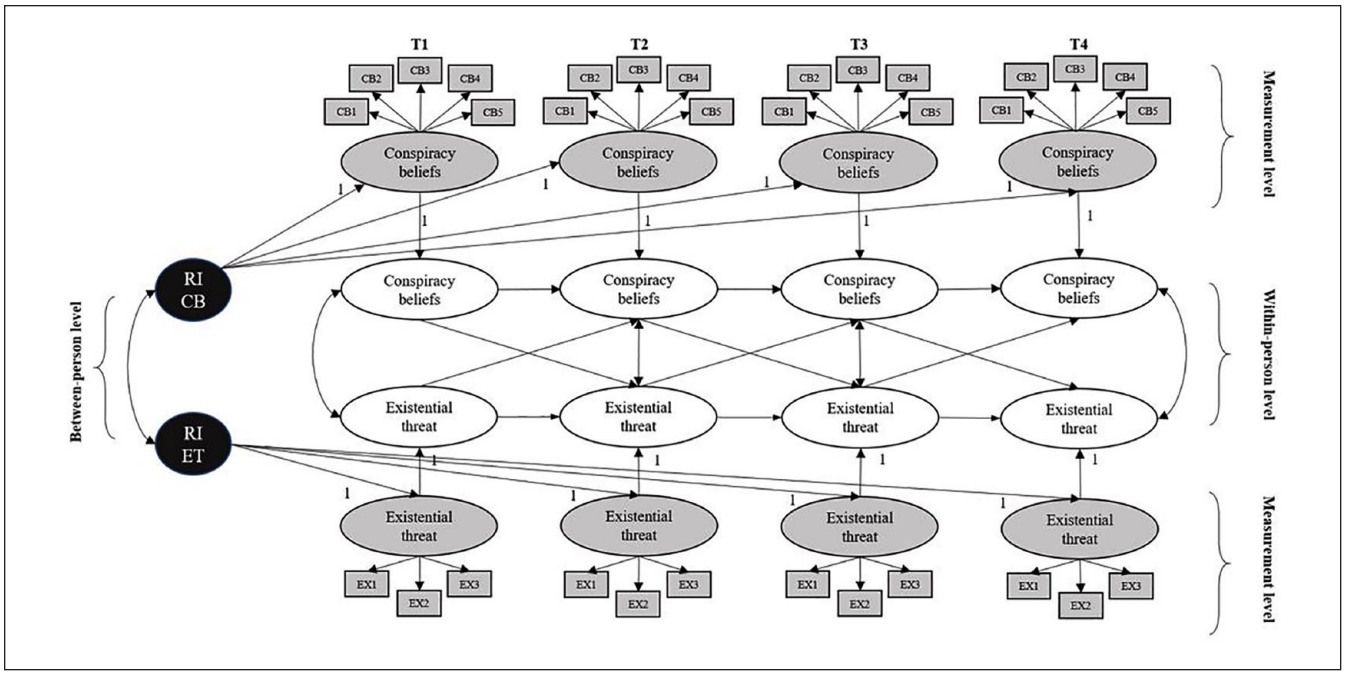

Figure 1. Exemplary random intercept cross-lagged panel model.
Note. RI CB = random intercept conspiracy beliefs; RI ET = random intercept existential threat.

distinct variables. Anxiety focuses on the frequency of various symptoms over the past two weeks (i.e., nervousness, worrying, restlessness, and irritability). It is more state-like and agnostic toward what caused the anxiety. Uncertainty aversion focuses on negative experiences due to uncertainty, and existential threat captures a general sense of feeling insecure and in danger. However, they have a certain amount of overlap, which could be described as a vulnerability for negative emotional experiences. Therefore, it is important to decide whether their relations to conspiracy beliefs should be analyzed simultaneously or in separate models. We argue that removing the variance that anxiety, uncertainty aversion, and existential threat have in common (by considering them in one model) produces variables that are difficult to interpret. For instance, what do individual differences in uncertainty aversion mean after partializing out shared variance with anxiety and existential threat (which may arise due to a general emotional vulnerability)? To keep our results easy to interpret, we decided to examine the relations of anxiety, uncertainty aversion, and existential threat to conspiracy beliefs in separate models. However, we report results for a full model that includes all variables simultaneously in the SOM (see SOM Tables S5, S6, S11, and S12).[3]

Results and Discussion

Preliminary analyses. We conducted all analyses using R 4.0.3 (R Core Team, 2020) in RStudio 1.3.1090 (RStudio Team, 2020). Our main analysis was conducted with lavaan (Rosseel, 2012). We included all participants in the analysis, using full information maximum likelihood estimation, which has been found to outperform casewise and listwise deletion, and produces unbiased estimates even when missing of data is not completely at random (Enders & Bandalos, 2001). We tested whether dropout was systematic (for details, see SOM). Older adults were less likely to drop out. Otherwise, the variables of interest were unrelated to dropout.

We tested longitudinal measurement invariance in a model that included all variables (Little et al., 2007). To begin with, we tested a factor model with configural invariance (i.e., factor loadings were estimated freely over time). We allowed item-specific residual covariances. The model fit was acceptable: $\chi^2(2256) = 3293.28$, $p < .001$, root mean square error of approximation (RMSEA) = .05, comparative fit index (CFI) = .93, Tucker–Lewis index (TLI) = .92, standardized root mean square residual (SRMR) = .06. Next, we constrained factor loadings to be equal over time and compared this model with the previous one with a chi-square difference test. This yielded a difference of $\Delta\chi^2(41) = 38.91$, $p = .608$, and we concluded that this model did not fit significantly worse. Hence, we assumed weak invariance, which is sufficient to test relations between variables over time (van den Schoot et al., 2012).

Table 1 provides all descriptive statistics. Table 2 presents correlations between measures during T1 (see SOM Tables S1–S4 for correlations during all waves). All correlations were significant, except for the association between uncertainty aversion and conspiracy beliefs at T4.

Table 1. Descriptive Statistics for All Measurements, Study 1.

	T1 *M* (*SD*)	T2 *M* (*SD*)	T3 *M* (*SD*)	T4 *M* (*SD*)
Conspiracy beliefs	3.69 (1.28)	3.56 (1.31)	3.37 (1.37)	3.27 (1.33)
Anxiety	3.39 (1.47)	3.61 (1.44)	3.38 (1.49)	3.36 (1.43)
Uncertainty aversion	4.37 (1.26)	4.37 (1.32)	4.25 (1.38)	4.29 (1.44)
Existential threat	2.57 (1.37)	2.67 (1.44)	2.61 (1.46)	2.52 (1.42)

Table 2. Concurrent Correlations for Measures During T1, Study 1.

	1	2	3	4
1. Conspiracy beliefs	1			
2. Anxiety	.26**	1		
3. Uncertainty aversion	.15*	.57**	1	
4. Existential threat	.34**	.60**	.44**	1

*$p < .05$. **$p < .001$.

To examine the proportion of between- and within-person variance in our variables, we calculated the intraclass correlation coefficients (ICCs; see SOM). All variables had ICCs between .70 and .80, indicating that substantial within-person changes (20%–30%) occurred.

Conspiracy beliefs and anxiety. First, we tested a latent RI-CLPM, assessing the linkages between conspiracy beliefs and anxiety. This model fit the data well: $\chi^2(1027) = 1454.74$, $p < .001$, RMSEA = .03, CFI = .97, TLI = .96, SRMR = .05. There was a significant autoregressive effect for conspiracy beliefs, indicating that increases in conspiracy beliefs predicted even further increases in conspiracy beliefs at the next measurement wave ($B = .69$, $SE = .12$, $p < .001$, 95% confidence interval [CI] = [.45, .93]). In addition, we observed a significant cross-lagged effect from conspiracy beliefs to anxiety: Increases in conspiracy beliefs predicted subsequent increases in anxiety ($B = .37$, $SE = .14$, $p = .012$, 95% CI = [.08, .65]). Increases in anxiety did not predict increases in conspiracy beliefs ($B = .05$, $SE = .05$, $p = .297$, 95% CI = [–.05, –.15]). The RIs of conspiracy beliefs and anxiety were significantly correlated ($r = .29$, $SE = .07$, $p < .001$, 95% CI = [.15, .43]), indicating that people who were, on average, more anxious, also reported greater conspiracy beliefs.

Conspiracy beliefs and uncertainty aversion. We tested a latent RI-CLPM, assessing the linkages between conspiracy beliefs and uncertainty aversion. This model fit the data well: $\chi^2(423) = 695$, $p < .001$, RMSEA = .04, CFI = .97, TLI = .96, SRMR = .06. Again, there was a significant autoregressive effect for conspiracy beliefs ($B = .53$, $SE = .15$, $p = .001$, 95% CI = [.23, .83]). In addition, we observed a significant cross-lagged effect from conspiracy beliefs to uncertainty aversion: Increases in conspiracy beliefs predicted subsequent increases in uncertainty aversion ($B = .30$, $SE = .14$, $p = .027$, 95% CI = [.03, .56]). Increases in uncertainty aversion did not predict increases in conspiracy beliefs ($B = .02$, $SE = .09$, $p = .854$, 95% CI = [–.17, .20]). The RIs of conspiracy beliefs and uncertainty aversion were significantly correlated ($r = .18$, $SE = .06$, $p = .003$, 95% CI = [.06, .30]), indicating that people who were, on average, more uncertainty averse, also reported greater conspiracy beliefs.

Conspiracy beliefs and existential threat. We tested a latent RI-CLPM, assessing the linkages between conspiracy beliefs and existential threat. This model fit the data well: $\chi^2(423) = 658.43$, $p < .001$, RMSEA = .04, CFI = .97, TLI = .97, SRMR = .06. Again, there was a significant autoregressive effect for conspiracy beliefs ($B = .77$, $SE = .10$, $p < .001$, 95% CI = [.56, .97]). In addition, we observed a significant cross-lagged effect from conspiracy beliefs to existential threat: Increases in conspiracy beliefs predicted subsequent increases in existential threat ($B = .24$, $SE = .11$, $p = .026$, 95% CI = [.03, .45]). Increases in existential threat did not predict increases in conspiracy beliefs ($B = –.04$, $SE = .05$, $p = .457$, 95% CI = [–.14, .06]). The RIs of conspiracy beliefs and existential threat were significantly correlated ($r = .42$, $SE = .06$, $p < .001$, 95% CI = [.30, .54]), indicating that people who were, on average, more existentially threatened also reported greater conspiracy beliefs.

Discussion. The goal of this study was to examine how conspiracy beliefs result from, and in turn influence, uncertainty aversion, anxiety, and existential threat. Consistent with previous research, people who, overall, experienced more anxiety, uncertainty aversion, and/or existential threat were also more likely to report higher conspiracy beliefs (between-person level). Also consistent with expectations, increases in conspiracy beliefs predicted subsequent increases in anxiety, uncertainty aversion, and existential threat on the within-person level. This indicates that conspiracy beliefs actually do make people feel worse by intensifying the experience of anxiety, uncertainty, and threat. This may be because conspiracy beliefs promote a threatening worldview filled with suspicion and mistrust.

Contrary to expectations, we did not observe the same effect vice versa: Increases in anxiety, uncertainty aversion,

Table 3. Descriptive Statistics for All Measurements, Study 2.

	T1 *M* (*SD*)	T2 *M* (*SD*)	T3 *M* (*SD*)	T4 *M* (*SD*)
Anxiety	3.15 (1.43)	2.96 (1.46)	2.89 (1.47)	2.93 (1.48)
Conspiracy beliefs	4.22 (1.55)	4.01 (1.57)	3.89 (1.61)	3.70 (1.63)
Uncertainty avoidance	4.19 (1.44)	4.11 (1.47)	4.10 (1.46)	4.09 (1.53)
Existential threat	2.82 (1.54)	2.87 (1.60)	2.84 (1.52)	2.86 (1.61)
Coronavirus conspiracy beliefs	—	2.45 (1.82)	2.36 (1.81)	2.45 (1.88)

and/or existential threat did not predict increases in conspiracy beliefs. Conspiracy beliefs are only one of many ways in which people may respond to increased anxiety, uncertainty aversion, and existential threat. Perhaps, especially in the context of the pandemic, other strategies seemed more promising in the attempt to reduce uncertainty and fear-related states, such as strictly adhering to coronavirus guidelines and protecting oneself and others from the risk of infection.

Increases in conspiracy beliefs predicted even further increases in conspiracy beliefs two weeks later. This is in line with research indicating that belief in one conspiracy theory reinforces other conspiratorial ideas (Goertzel, 1994; Swami et al., 2010; Wood et al., 2012) and points to a self-reinforcing spiral of conspiracy beliefs.

We address several limitations in Study 2. First, we used short-term time intervals (i.e., two weeks), yet it is possible that effects may be different over longer periods of time. Second, we include coronavirus conspiracy beliefs (starting from T2 in Study 2). It may be that specific conspiracy beliefs have different consequences than general conspiracy beliefs (Imhoff & Lamberty, 2020).

Study 2

Method

Participants and procedure. We instructed a survey company to collect a sample that would be representative for the German adult population regarding age, gender, level of education, and region of residence. The first measurement wave was in May 2020 (at the end of the first coronavirus lockdown in Germany). A total of $N = 1{,}012$ participated in the first measurement (T1), of whom 520 identified as female, 491 as male, and one as diverse. The mean age was 44.72 years ($SD = 16.85$). Participants were invited to take part in three additional measurements in September 2020, n(T2) = 698; January 2021, n(T3) = 518; and May 2021, n(T4) = 437.

Measures. For general conspiracy beliefs (ω = .98–.90), anxiety (ω = .93–.94), uncertainty aversion (ω = .84–.86), and existential threat (ω = .92–.94), we used the same measures as in Study 1.

Coronavirus conspiracy beliefs. We included five items that measured belief in specific conspiracy theories or misinformation regarding the coronavirus (starting from T2). These captured content that was particularly relevant at the time of our study (Nocun & Lamberty, 2020). Items were as follows: (a) I believe that the coronavirus crisis was fabricated by powerful actors with malicious intentions; (b) I believe the coronavirus crisis exists, so that other political scandals can be covered up; (c) I believe that Bill Gates was involved in putting the coronavirus in the world; (d) I believe that there are secret organizations that put the coronavirus in the world intentionally; and (e) I believe that the coronavirus does not exist.

We tested the factorial structure of these items. A model with all items loading on one factor did not fit the data well: $\chi^2(80) = 466.36$, $p < .001$, RMSEA = .11, CFI = .94, TLI = .93, SRMR = .09. We excluded two items that had weak factor loadings (Bill Gates involved in coronavirus and coronavirus does not exist). These items had the lowest agreement overall, so their weak loadings might be due to floor effects. Excluding those items resulted in an acceptable model fit: $\chi^2(19) = 45.86$, $p = 001$, RMSEA = .06, CFI = .99, TLI = .99, SRMR = .03 (ω = .93–.95).

Results and Discussion

Preliminary analyses. Again, we included all participants in the analysis, using full information maximum likelihood estimation (Enders & Bandalos, 2001). Older adults and those with greater uncertainty aversion were less likely to drop out (see SOM). Thus, dropout did not occur systematically for almost all variables of interest, while the association with uncertainty aversion should be considered a potential limitation. Again, we tested measurement invariance following the same procedure as in Study 1. The chi-square test was significant: $\Delta\chi^2(42) = 71.36$, $p = .003$. Given that the chi-square difference test is known to be overly sensitive in large samples, we followed recommendations by Chen (2007). He recommends that a change of ≥–.010 in CFI, supplemented by a change of ≥.015 in RMSEA or a change of ≥.030 in SRMR, would indicate noninvariance. Adding the constraints in the factor loadings yielded ΔCFI = –.001, ΔRMSEA = .000, and ΔSRMR = .003. Thus, weak measurement invariance can be assumed.

Table 3 presents an overview of the means and standard deviations of all variables across the four measurements. Table 4 presents correlations between measures during T2

Table 4. Concurrent Correlations for Measures During T2, Study 2.

	1	2	3	4	5
1. Conspiracy beliefs	1				
2. Anxiety	.19**	1			
3. Uncertainty aversion	.10*	.54**	1		
4. Existential threat	.24**	.64**	.49**	1	
5. Coronavirus conspiracy beliefs	.64**	.16**	.02	.19**	1

*$p < .05$. **$p < .001$.

(see SOM Tables S7–S10 for correlations during all waves; we use T2 to present correlations with the coronavirus conspiracy beliefs). Again, we calculated the ICC. All ICCs were between .63 and .75, indicating that substantial within-person changes occurred (see SOM).

Conspiracy beliefs and anxiety. The RI-CLPM for conspiracy beliefs and anxiety fit the data well: $\chi^2(1027) = 1852.79$, $p < .001$, RMSEA = .03, CFI = .97, TLI = .97, SRMR = .05. We observed significant autoregressive parameters for both conspiracy beliefs ($B = .18$, $SE = .08$, $p = .031$, 95% CI = [.02, .33]) and anxiety ($B = .25$, $SE = .07$, $p < .001$, 95% CI = [.11, .40]). Neither did increases in conspiracy beliefs predict increases in anxiety ($B = –.09$, $SE = .08$, $p = .267$, 95% CI = [–.26, .07]), nor did increases in anxiety predict increases in conspiracy beliefs ($B = .02$, $SE = .04$, $p = .655$, 95% CI = [–.07, .11]). On the between-person level, the RIs for conspiracy beliefs and anxiety were significantly correlated ($r = .26$, $SE = .04$, $p < .001$, 95% CI = [.18, .34]).

Conspiracy beliefs and uncertainty aversion. The RI-CLPM for conspiracy beliefs and uncertainty aversion fit the data well: $\chi^2(423) = 821.49$, $p < .001$, RMSEA = .03, CFI = .98, TLI = .97, SRMR = .05. We observed significant autoregressive parameters for conspiracy beliefs ($B = .18$, $SE = .08$, $p = .020$, 95% CI = [.03, .34]). Increases in conspiracy beliefs did not predict increases in uncertainty aversion ($B = .02$, $SE = .08$, $p = .771$, 95% CI = [–.13, .17]). However, we observed a significant cross-lagged relation from uncertainty aversion to conspiracy beliefs: Increases in uncertainty aversion predicted increases in conspiracy beliefs at the next measurement ($B = .11$, $SE = .05$, $p = .023$, 95% CI = [.02, .21]). On the between-person level, the RIs for conspiracy beliefs and uncertainty aversion were significantly correlated ($r = .11$, $SE = .04$, $p = .008$, 95% CI = [.03, .19]).

Conspiracy beliefs and existential threat. The RI-CLPM for conspiracy beliefs and existential threat fit the data well: $\chi^2(423) = 938.06$, $p < .001$, RMSEA = .04, CFI = .97, TLI = .97, SRMR = .06. We again observed significant autoregressive parameters for both conspiracy beliefs ($B = .20$, $SE = .08$, $p = .013$, 95% CI = [.04, .35]) and existential threat ($B = .19$, $SE = .06$, $p = .002$, 95% CI = [.07, .31]. Beyond that, no significant within-person associations emerged: Increases in conspiracy beliefs did not predict increases in existential threat ($B = –.03$, $SE = .08$, $p = .712$, 95% CI = [–.19, .13]), and neither did increases in existential threat predict increases in conspiracy beliefs ($B = –.01$, $SE = .04$, $p = .811$, 95% CI = [–.08, .06]). On the between-person level, the RIs for conspiracy beliefs and existential threat were significantly correlated ($r = .36$, $SE = .04$, $p < .001$, 95% CI = [.28, .43]).

Coronavirus conspiracy beliefs

Coronavirus conspiracy beliefs and anxiety. The RI-CLPM for coronavirus conspiracy beliefs and anxiety fit the data well: $\chi^2(381) = 716.88$, $p < .001$, RMSEA = .04, CFI = .98, TLI = .98, SRMR = .04. We observed significant autoregressive parameters for anxiety ($B = .35$, $SE = .11$, $p = .001$, 95% CI = [.14, .51]). Beyond that, no significant within-person associations emerged: Increases in coronavirus conspiracy beliefs did not predict increases in anxiety ($B = –.03$, $SE = .09$, $p = .768$, 95% CI = [–.21, .15]), and increases in anxiety did not predict increases in coronavirus conspiracy beliefs ($B = .04$, $SE = .11$, $p = .726$, 95% CI = [–.18, .26]). On the between-person level, the RIs for coronavirus conspiracy beliefs and anxiety were significantly correlated ($r = .19$, $SE = .06$, $p = .001$, 95% CI = [.08, .30]).

Coronavirus conspiracy beliefs and uncertainty aversion. The RI-CLPM for coronavirus conspiracy beliefs and uncertainty aversion fit the data well: $\chi^2(115) = 151.39$, $p = .013$, RMSEA = .02, CFI = 1.00, TLI = 1.00, SRMR = .03. No significant within-person associations emerged: Increases in coronavirus conspiracy beliefs did not predict increases in uncertainty aversion ($B = .01$, $SE = .11$, $p = .930$, 95% CI = [–.20, .21]), and increases in uncertainty aversion did not predict increases in coronavirus conspiracy beliefs ($B = .18$, $SE = .18$, $p = .304$, 95% CI = [–.17, .54]). On the between-person level, the RIs for coronavirus conspiracy beliefs and uncertainty aversion were not significantly correlated ($r = .03$, $SE = .05$, $p = .589$, 95% CI = [–.07, .13]).

Coronavirus conspiracy beliefs and existential threat. The RI-CLPM for coronavirus conspiracy beliefs and existential threat fit the data well: $\chi^2(115) = 200.23$, $p < .001$, RMSEA = .03, CFI = .99, TLI = .99, SRMR = .04. No significant within-person associations emerged: Increases

in coronavirus conspiracy beliefs did not predict increases in existential threat ($B = .07$, $SE = .10$, $p = .466$, 95% CI = [–.12, .27]), and increases in existential threat did not predict increases in coronavirus conspiracy beliefs ($B = –.01$, $SE = .11$, $p = .921$, 95% CI = [–.23, .21]). On the between-person level, the RIs for coronavirus conspiracy beliefs and existential threat were significantly correlated ($r = .25$, $SE = .05$, $p < .001$, 95% CI = [.16, .34]).

Discussion. The goal of Study 2 was to replicate findings from Study 1, with greater temporal distances in a sample representative for the German adult population and to include specific coronavirus conspiracy beliefs. Again, we found consistent between-person associations: People who, on average, experienced more anxiety, uncertainty aversion, and existential threat tended to report higher general conspiracy beliefs. At the within-person level, we observed that an increase in uncertainty aversion predicted an increase in general conspiracy beliefs, but not vice versa. This suggests that people turn to conspiracy beliefs when they experience greater uncertainty aversion than usual, perhaps in an attempt to avert this negative state. Beyond that, no within-person associations with general conspiracy beliefs emerged.

Relations with coronavirus conspiracy beliefs pertained mostly to the between-person level: People who, on average, experienced more anxiety and existential threat were more likely to believe in a variety of unfounded beliefs about the coronavirus. We found no within-person associations for coronavirus conspiracy beliefs and anxiety, uncertainty aversion, and existential threat. Overall, Study 2 supports the claim that conspiracy beliefs likely do not reduce uncertainty, and reduce anxiety and existential threat. Yet we did not replicate the finding that conspiracy beliefs increase anxiety, uncertainty aversion, and existential threat.

General Discussion

This research aimed to examine whether conspiracy beliefs can provide personal benefits by reducing uncertainty aversion, anxiety, and existential threat, or whether conspiracy beliefs instead reinforce these negative experiences. Two longitudinal studies with different time intervals (two weeks and four months, respectively) demonstrate that conspiracy beliefs likely do not reduce the negative experience of anxiety, uncertainty aversion, and existential threat, but may sometimes even reinforce them. We extend previous research by separating stable between-person effects from within-person changes in these variables for the first time.

Within-Person Changes Over Time

Are conspiracy beliefs beneficial or harmful for the individual? In both studies, within-person increases in conspiracy beliefs did not predict reduced anxiety, uncertainty aversion, and existential threat. Increases in conspiracy beliefs were either unrelated to changes in these variables (Study 2) or even predicted increases in uncertainty aversion, anxiety, and existential threat (Study 1). This indicates that conspiracy beliefs are likely not beneficial in this regard. However, we cannot answer conclusively whether conspiracy beliefs, instead, reinforce the negative experience of anxiety, uncertainty, and threat: We observed these harmful effects only in Study 1. It may be that the time intervals in Study 2 were too long to observe these effects. It has been argued that the optimal time intervals to observe longitudinal relations are relatively short, especially for within-person effects (Dormann & Griffin, 2015), and that effect sizes typically decrease as time intervals get larger (Atkinson et al., 2000; Cohen, 1993; Dormann & Griffin, 2015; Hulin et al., 1990). This may explain why we observed only few within-person associations in Study 2.

We did not find within-person consequences of coronavirus-related conspiracy beliefs in Study 2. This may be due not only to long time intervals, but also to opposing effects that cancel each other out: Most coronavirus conspiracy beliefs contain some element that downplays the dangers of the virus, which might relieve distress. Yet, most of them also describe threatening scenarios of malevolent, secret forces, which should increase distress.

We revealed an additional way in which conspiracy beliefs may be harmful for the individual: Both studies found that increases in conspiracy beliefs predicted even further increases in conspiracy beliefs at the next measurement wave. This effect emerged for both short- and long-term distances, and indicates that conspiracy beliefs are part of a self-reinforcing cycle that results in more and more extreme attitudes (Goertzel, 1994; Swami et al., 2010; Wood et al., 2012).

Do anxiety, uncertainty aversion, and existential threat predict conspiracy beliefs? We observed only few within-person associations going from anxiety, uncertainty aversion, and existential threat to conspiracy beliefs. Increases in these variables were unrelated to increases in conspiracy beliefs in Study 1 and only increases in uncertainty aversion were associated with subsequent increases in conspiracy beliefs in Study 2. The absence of these within-person associations does not rule out that within-person effects were present in earlier life stages: The within-person effects we observed pertain only to processes that occurred during our study. All processes that happened earlier in the participants' lives would be captured by the between-person variance. Future research should examine these relations over different time intervals and during different developmental phases.

Bearing in mind that this effect occurred only in Study 2, the cross-lagged effect from uncertainty aversion to conspiracy beliefs might tentatively point to a downward spiral that unfolds over time: People might turn to conspiracy beliefs in an attempt to alleviate the negative experience of uncertainty but do not succeed in this attempt. Instead, they may even

experience short-term increases in uncertainty aversion, anxiety, and existential threat.

Stable Between-Person Differences

On the between-person level, both studies revealed that people who were, on average (i.e., across all measurements), more anxious, more averse to uncertainty, and/or more existentially threatened than other people were also more likely to hold conspiracy beliefs. These findings are in line with previous work, indicating that conspiracy beliefs are related to anxiety, uncertainty aversion, and existential threat (Douglas et al., 2017; Grzesiak-Feldman, 2013; Swami et al., 2016).

Coronavirus conspiracy beliefs were correlated with anxiety and existential threat on the between-person level. People who were, on average, more anxious and existentially threatened also agreed more to a range of unfounded beliefs about the coronavirus. No correlations with uncertainty aversion emerged. It may be that uncertainty averse people found other explanations for the coronavirus crisis that better matched their desire for certainty.

Strengths, Limitations, and Future Research

We observed the negative impact of conspiracy beliefs on uncertainty aversion, anxiety, and existential threat only in Study 1. This may be due to different time intervals. In general, it is not uncommon that researchers who study the same phenomenon with different time intervals come across different estimates of lagged effects (Kuiper & Ryan, 2018). The selection of appropriate time intervals is of crucial importance in longitudinal research, yet the actual time interval required for an effect to unfold is rarely known to researchers (Bollen, 1989). Instead, "decisions about when to measure and how frequently to measure critical variables are left to intuition, chance, convenience, or tradition" (Mitchell & James, 2001, p. 533). Choosing anything other than the actual time interval can lead to important biases in estimation. For instance, Bollen (1989) points out that in cases where one variable influences another, and measurement intervals are longer than the actual time intervals, this relation may sometimes be approximated by a reciprocal causal relation, although the one-way nature of the effect would become visible in shorter time lags. Furthermore, Cole and Maxwell (2009) argue that choosing the wrong interval may result in gross underestimations of relations over time.

Thus, an important goal for future research consists in identifying the "optimal" time lag for observing potential effects of conspiracy beliefs, that is, the time lag that yields a maximum effect of conspiracy beliefs on anxiety, uncertainty aversion, and/or existential threat (Dormann & Griffin, 2015). Dormann and Griffin (2015) propose an algebraic procedure to do so for traditional CLPMs. This involves collecting data with a time lag that is presumably smaller than the optimal time lag, calculating the optimal time lag (based on effect sizes of stability and cross-lagged parameters), and repeating data collection. Yet, so far, this procedure has not been extended to designs that focus on within-person effects. Dormann and Griffin (2015) suspect, however, that such an extension will reveal very short optimal time lags for most persons and call for more "shortitudinal" studies.

There are alternative explanations for why results were inconsistent across studies, for instance, differences in sample composition. Douglas et al. (2017) argue that conspiracy beliefs may be beneficial for some people and detrimental for others. In particular, they argue that conspiracy beliefs may provide benefits for people who are disadvantaged and alienated from society, whereas people who are not disadvantaged may find them distressing. This coincides with our pattern of results: We observed the harmful consequences of conspiracy beliefs only in Study 1, which consisted of highly educated participants. Future research should investigate potential moderators of the consequences of conspiracy beliefs, such as social status or level of education.

Furthermore, future research should investigate whether conspiracy beliefs provide personal benefits in areas that were not the focus of this study. For example, conspiracy beliefs might boost self-esteem by promoting a sense of uniqueness (Imhoff & Lamberty, 2017). Conspiracy beliefs might also provide a community of fellow conspiracy believers and a subsequent positive social identity (Douglas et al., 2017). Yet conspiracy beliefs can also be stigmatizing: Others might avoid or exclude former friends who openly advocate conspiracy beliefs (Lantian et al., 2018). Future research should investigate these potentially opposing personal consequences of conspiracy beliefs.

Another limitation of our research is that results may be biased due to unmeasured confounding variables. This prevents us from drawing causal conclusions about the observed processes (Bollen, 1989). For instance, there might be omitted variables that are common causes of conspiracy beliefs, anxiety, uncertainty aversion, and existential threat. This might bias the regression parameters we observed. For example, if conspiracy beliefs were, in fact, not causally related to anxiety, but both were caused by an omitted third variable, a spurious relation between conspiracy beliefs and anxiety might arise (Bollen, 1989). A potential common cause might be, for example, right-wing media consumption.[4] It is plausible that watching more right-wing television resulted in both increased anxiety (because concerns about economic crises were raised) and conspiracy beliefs (because convincing conspiracy claims were made). Yet it would still be plausible that conspiracy beliefs additionally reinforce anxiety, uncertainty aversion, and existential threat because they promote a threatening worldview filled with suspicion and mistrust. Future research that aims to establish causality should consider these potential common causes (Bollen, 1989).

Recently, the RI-CLPM has been criticized because it does not capture the potential effects of causes that explain differences between persons over time and focuses only on fluctuations around individual person means (Lüdtke & Robitzsch, 2021). Yet we argue that, for our purposes, this focus on within-person dynamics is appropriate: If conspiracy beliefs had harmful consequences for the individual, then they should produce higher anxiety as compared with that person's usual (average) levels of anxiety, regardless of whether that person is more or less anxious than others. Nevertheless, future research could profit from considering different aspects of change from competing methodological approaches. For example, the traditional CLPM might provide insights on potential causes that make one person different from another over time (Lüdtke & Robitzsch, 2021). Furthermore, the latent curve model with structured residuals examines both interindividual differences in change over time on the between-person level, and intraindividual change on the within-person level (Curran & Hancock, 2021). Systematically comparing these different models of change could further our understanding of the processes at hand.

In addition, future research should apply continuous-time models that treat time as a continuous variable that may take an infinite number of values (Voelkle et al., 2018). These models assume that the processes of interest influence each other at every moment in time, not only at the times of measurement (Kuiper & Ryan, 2018). By using differential calculus, it becomes possible to compute the effects of interest as a function of any arbitrary time interval. Future research should systematically compare results obtained from discrete time models (such as the RI-CLPM) with continuous-time approaches (Voelkle et al., 2018).

The pandemic represents an advantage for our research. During normal circumstances, peoples' conspiracy beliefs are likely relatively stable (Bruder et al., 2013), making it more difficult to observe within-person changes. During the pandemic, however, many new conspiracy theories emerged, thus providing suitable circumstances to study the within-person associations of changes in such beliefs. In addition, the fact that we did not find evidence for any beneficial effects of conspiracy beliefs, despite differences in sample composition, time intervals, and phases of the pandemic, adds to the robustness of this finding.

Conclusion

Previous research concluded that conspiracy beliefs are attractive for people who are anxious, uncertainty averse, and existentially threatened. However, no prior research examined whether conspiracy beliefs actually help deal with uncertainty and reduce anxiety and perceived threat. We conducted two studies to explore the longitudinal relationships between conspiracy beliefs, uncertainty aversion, anxiety, and existential threat. Findings suggest that conspiracy beliefs are likely not beneficial for the individual, at least with regard to the variables we studied: Within-person increases in conspiracy beliefs were either unrelated to within-person changes in uncertainty aversion, anxiety, and existential threat (Study 2; four-month intervals) or even predicted subsequent increases in uncertainty aversion, anxiety, and existential threat (Study 1; two-week intervals). Our results further suggest that increases in conspiracy beliefs predict even further increases in conspiracy beliefs at the next measurement (both studies). This demonstrates that conspiracy beliefs are part of a self-reinforcing circle. These findings did not extend to coronavirus conspiracy beliefs: The specific content of conspiracy beliefs seems to be crucial for their consequences. Future longitudinal research on the potential harmful effects of conspiracy beliefs for their adherents is required.

Data Availability Statement

The data that support the findings of this study are openly available in Open Science Framework (OSF).

Declaration of Conflicting Interests

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Supplemental Material

Supplemental material is available online with this article.

Notes

1. We thank an anonymous reviewer for this example.
2. We report additional evidence for convergent and discriminant validity of our measures for uncertainty aversion and existential threat in the SOM.
3. Results from Study 1 vary slightly in this model—however, the overall conclusions remain similar.
4. We thank an anonymous reviewer of a previous version of this article for this example.

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