



## Is Covid-19 a natural event? Covid-19 pandemic and conspiracy beliefs

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### ABSTRACT

In this paper, antecedents and consequences of conspiracy beliefs are investigated in the context of the COVID-19 pandemic in Italy. 618 individuals residing in different geographical area of Italy participated in the study. We found that perceived mortality rate of COVID-19 is positively associated with adherence to conspiracy beliefs and, in turn, with negative outcomes such as: (a) a reduced support for the measures taken to deal with the pandemic emergency, (b) a weaker feeling of guilt for the violation of anti-COVID-19 government rules, and (c) a stronger utilitarian stance which prioritizes economic over health-related outcomes of lockdown. Also, framing pandemic within the "natural order of things" – fundamental and implicit expectations concerning how life and the world should function – was expected to moderate the relationship between perceived mortality rate and conspiracy beliefs: we found this relationship to be weaker when people believe that pandemic falls into the "natural order of things".

### 1. Introduction

Throughout history, people have often faced events that were not only adverse, but which also challenged their perception of how the world functions. Terrorist attacks, wars, or economic crises are harmful events per se, but they might also embody a threat to shared worldview concerning how the world should function that can provide a sense of stability and predictability. The COVID-19 pandemic can be counted among such momentous events, challenging the perception of how the world functions, the norms that govern social life, and thus increasing uncertainty and unpredictability (van Prooijen & Douglas, 2017). As outlined by Landau et al. (2015), individuals are generally motivated to perceive themselves as able to have control over the surrounding reality. In circumstances where this ability is threatened and uncertainty and unpredictability increase, people may respond with compensatory strategies aimed at restoring an acceptable perception of control.

In the present work, we focus on a specific instance of such compensatory strategies: embracing a conspiratorial account of events. Belief in conspiracies can help to deal with feelings of fear, uncertainty and loss of control, by positing a conspiratorial intention behind upsetting events (van Prooijen & Jostmann, 2013). We advance that greater perception of risk connected to COVID-19 is linked with greater

endorsement of conspiracy beliefs and this, in turn, will be associated with reduced support to costly countermeasures against the pandemic – such as a lockdown. We also examine boundary conditions of this relationship. More specifically, we hypothesized that framing the pandemic within the "natural order of things" would reduce the urge of embracing conspiracy ideation.

### 2. Pandemic, conspiracy beliefs and their consequences

The COVID-19 pandemic represents one of the most impactful and tragic events that societies have had to face in their recent history. It has undermined the existing power structures, the practices, and the existence of people and groups. Events of social crises are inevitably accompanied by fear, uncertainty, and the feeling of being out of control. The aversive feelings that people experience may stimulate a motivation to make sense of the situation, increasing the likelihood of recurring to conspiratorial explanation (van Prooijen & Douglas, 2017). Among the several reasons that underlie endorsement of conspiracy beliefs, in the present work we focus on two intertwined motivations. The first is rooted in basic psychological needs such as understanding and controlling reality (Dweck, 2017). That is, conspiracy beliefs may help people to understand complex events, otherwise difficult to

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construe and accept, by placing the responsibility for their occurrence on a powerful and evil enemy group (Hofstadter, 1966). In doing so, conspiratorial explanations assume a clear-cut and rigid view of good and evil which provide an unambiguous account of the events also from the moral point of view, thus providing straightforward background for judgment and action (Leone et al., 2018). In other words, conspiracy beliefs can provide people with simplified answers on how a critical situation emerged. A consequence of this all-encompassing explanation is the satisfaction of epistemic needs as well as an enhancement of one's feelings of control and meaning (van Prooijen & Douglas, 2017).

Another reason to embrace conspiratorial mentality pertains the capacity of such beliefs to mitigate death related anxiety (Newheiser et al., 2011). As clearly outlined by Terror Management Theory, activation of death-related thoughts leads individuals to adopt strategies aimed at wipe away existential anxiety by a variety of means. For instance, individuals may embrace broad systems of meaning that will help them gaining symbolic immortality (Burke et al., 2010). Newheiser et al. (2011) found that conspiracy beliefs can provide individuals with a rather broad worldview which functions as meaning-provider and, ultimately, buffers them against death anxiety.

An increased perception of COVID-19's lethality (i.e., perceived mortality rate) may represent a strong trigger of death related thoughts and make salient the fear of death. Individuals may thus experience a deep epistemic uncertainty. This will motivate the individual to recur to feasible and effective strategies to deal with these aversive mental states, trying to find explanations for what is happening. As discussed above, conspiracy mentality is a suitable mean to such end. This line of argument should translate empirically in an association between fears of death related with COVID-19 and endorsement of conspiracy beliefs.

Our interest for this association is because beneficial psychological effects of endorsing conspiracy mentality are steadily counterbalanced by negative outcomes both at the individual and social level. Beliefs in conspiracy theories can provoke a strong sense of distrust and suspicion toward institutions, leading people to a state of inaction and disengagement (Einstein & Glick, 2015). In the context of a pandemic, such inaction and distrust can dramatically contribute to spread of diseases and increase of mortality. For example, the diffusion among the African American population of a conspiracy theory on the origins of HIV resulted positively associated with the adoption of risky sexual behaviors and the refusal of medical treatments (Bogart et al., 2011). Also, Jolley and Douglas (2014) showed that participants exposed to anti-vaccines conspiracy theories were less likely to vaccinate their children.

In the context of the current pandemic emergency, endorsing conspiracy theories could imply insidious political and social consequences for people's health by discouraging people from following the indications proposed by this system. Infringing the rules imposed by a deceitful system could be seen as a virtuous action. Hence the guilt associated with acting in disregard of government-sanctioned safety measures may be weakened. This could be particularly relevant because guilt might play an adaptive function of preventing selfish behavior and in increasing the individual responsibility (Tangney, 1994). Finally, a further paradoxical consequence of conspiracy accounts of COVID-19 pandemic could be the predominance of a utilitarian attitude which translates in a strong negative emphasis on the economic consequences of the lockdown rather than on its health-related benefits.

### 3. Pandemic and “natural order of things”

The disruptive psychological consequences of the pandemic that motivate individuals toward a conspiracy mindset could be probably modulated by individuals' beliefs about the world and the pandemic itself. Under some conditions, it is legitimate to expect that, although the pandemic remains perceived as harmful and upsetting, individuals will not recur (or recur to a lowered extent) to conspiratorial explanations. This should be particularly the case for those who believe the pandemic falls into the “natural order of things”. From a psychological perspective,

the “natural order of things” could be conceived as a rather fundamental set of expectations concerning how life and the world should function. Whatever matches, or at least is compatible with, such expectations, although unpleasant or undesired, is deemed as legitimate. This is possible because, as well described by moral philosophers (Hume, 1978; Moore, 2014), individuals tend to superimpose “is” and “ought” or “facts” and “values”. In other words, a typical, although biased, moral reasoning about the facts of life could sound as follows: “if something happens, it must have been for good reasons”. Thus, whatever is consistent with one's expectations about what should happen “by nature”, is just, more acceptable and easier to understand. An example of a very common and widely shared expectation about the world is that it is fundamentally just (i.e., good individuals get good outcomes; Lerner, 1980). Even particularly negative outcomes, if framed in terms of just world, can be accepted more easily (Tomaka & Blascovich, 1994). It is important to note that such “natural order of things” does not necessarily correspond with things that occur in nature. For example, cubs are often killed by mothers or fathers for different reasons. This event, despite its naturalness, is perceived as upsetting and unjust by many individuals since it does not match widespread expectations such as “parents never harm children”.

In sum, if the pandemic is not inconsistent with the personal set of expectations about how the world functions (i.e., beliefs on the natural order of things), it might be perceived as just and less threatening for sense of meaning and control, regardless how tragical are its outcomes. This, in turn, would reduce the need to appeal to compensatory strategies such as conspiracy thinking, to regain understanding, reassurance and a sense of control over the events. Whereas the “natural order of things” is framed as a general scheme of the world functioning, conspiracy theories provide individuals with plausible explanations about specific events. People are therefore likely to implicitly assess in the first instance whether a sudden high-impact event falls within their view of how the world works. If such an event (as the Covid-19 pandemic) falls within one's world functioning scheme, it will likely be perceived as less upsetting, thereby reducing the need to find alternative explanations for its occurrence. From the opposite, if such an event is unjustifiable, an alternative explanation will be sought and potentially found in a conspiracy theory.

## 4. Overview and hypotheses

To recap, we derived from the arguments exposed above that the pandemic may undermine psychological basic needs of control and understanding and trigger death anxiety. These psychological issues can be partially restored by appeal to conspiratorial explanations. Therefore, we hypothesize that the perceived mortality rate of COVID-19, conceived as an indicator of how threatening the pandemic is experienced, could be positively associated with adherence to conspiracy beliefs. Beliefs in conspiracy should in turn be associated with a variety of negative consequences. More specifically, conspiracy beliefs should mediate the association between perceived mortality rate and a lower willingness to support the measures taken to deal with the pandemic emergency, a weaker feeling of guilt related to the violation of anti-COVID-19 government rules, a stronger utilitarian stance which prioritizes economic over health-related outcomes of lockdown.

In addition, we expect that the association between perceived mortality rate and conspiracy thinking will be less intense for those who believe that pandemic falls into “natural order of things”.

## 5. Method

### 5.1. Participants and procedure

Data were collected during the first week of Italy's lockdown via Prolific Academic. Participants received a monetary compensation for completing a short questionnaire and thus being enrolled in the present

cross-sectional study. Sample size was established by means of two distinct power analyses – one related to the interaction hypothesis and the other to the mediation hypotheses. The power analysis for interaction yielded a required sample size of 526 ( $f^2 = 0.015$ ,  $1-\beta = 0.80$ ,  $\alpha = 0.05$ ). This sample size was corroborated by the power analysis for mediation effect that indicated a power of 0.86 for 526 participants. Power analysis for mediation was performed setting low expected correlations (between 0.10 and 0.20) among involved variables and following the indications of Schoemann et al. (2017).

The sample consisted of 618 Italians (287 females,  $Mage = 27.84$ ,  $SDage = 8.60$ ), all resident in Italy and coming from different geographical area of the country (North = 47.9%, Center = 25.7%. South = 17.6%, Islands = 8.7%). Regarding the educational level, 4.4% had a lower secondary school diploma, 51.3% a high school diploma, 39.2% a degree, 5.2% had a higher-level qualification. Employment was distributed as follow: 50.2% were non-student adults, varying in occupation and employment status (18.9% employed, 10.9% self-employed, 15.9% unemployed or homemaker, 4.5% other occupations), while the remaining 49.8% declared to be students.

**6. Measures**

**6.1. Criteria**

**6.1.1. Economic utilitarian attitude (UA)**

Participants were presented with a brief introduction stating the forecast of economic loss between 3 and 8 percentage points of the country's GDP. Afterwards, they were invited to express their agreement, on a 7-point Likert scale (1 = Completely disagree; 7 = Completely agree), with three items: "It is necessary to intervene with restrictive measures that protect everyone's health, even if it will have serious repercussions on the economy of our country"; "It is necessary to keep our country's economy afloat, even at the cost of sacrificing human lives"; "It is necessary to let the coronavirus run its course, so as to naturally immunize the population (herd immunity)". The scores of the first item were reversed and then averaged with those of the other two.

**6.1.2. Lockdown support (LS)**

It was examined by means of four items (e.g., "To what extent are you in favor or against the restrictive measures adopted by the Italian Government to deal with the coronavirus emergency?"). The items were rated on a 7-point Likert scale ranging from 1 (Completely against) to 7 (Completely in favor) and averaged.

**6.1.3. Guilt feeling (GF)**

Participants answered four items (e.g., "If I would transgress the restrictive measures adopted by the Italian government to deal with the emergency of the coronavirus, I reproach myself even if nobody suffers from it"). Items were rated on a 7-point Likert scale (1 = Completely disagree; 7 = Completely agree). The items were averaged.

**6.2. Predictor**

**6.2.1. Perceived mortality rate (PMR)**

Participants rated two items: "In your personal opinion, what is the mortality rate of COVID-19 per 100 people?" and "Considering only people with similar characteristics to you (for instance by gender, age), what is the mortality rate of COVID-19 per 100 people?", answered over a range of values ranging from 0 to 100%. Responses were averaged.

**6.3. Moderator**

**6.3.1. Natural order of things (NOT)**

Participants were invited to think about the emergency due to the spread of coronavirus in Italy and to indicate their agreement with the following statement: "It is in the natural order of things that, sooner or

later, an epidemic like this occurs". Answers to this item were provided on 7-point Likert scale ranging from 1 (Completely disagree) to 7 (Completely agree).

**6.4. Mediator**

**6.4.1. Conspiracy beliefs (CB)**

We used an extended version of the 14-item scale already used in previous research (Leone et al., 2018; Leone et al., 2019). This scale taps the adherence to conspiratorial explanations of a multiplicity of events and concerns such as economic crises (e.g., "The financial crises of the last decade have been deliberately caused by political and financial authorities"). To address issues related to the COVID-19 pandemic, we added three items (i.e., "Coronavirus is a U.S. bacteriological weapon to hit China"; "Coronavirus is a Chinese bacteriological weapon accidentally escaped from a laboratory"; "COVID-19 is little more than a flu sold as a global pandemic to terrorize us and rule the world through fear"). Items were rated on a 5-point Likert scale ranging from 1 (Completely disagree) to 5 (Completely agree). Responses were averaged.

**7. Results**

Descriptive statistics and correlations between variables are shown in Table 1. Analyses were conducted with the R package lavaan (Rossee, 2012).

The predicted relationships were investigated by means of a parsimonious path analysis model where we tested a moderated mediation pattern (Fig. 1).

Robust maximum likelihood estimation was used. Model fit was satisfactory ( $\chi^2[8] = 14.04$ ,  $p = .08$ ; CFI = 0.99; TLI = 0.97; SRMR = 0.033; RMSEA = 0.035, 90%CI = 0.000, 0.060). Results of the path model are summarized in Table 2.

Significant main effects on conspiracy beliefs for both perceived mortality rate and beliefs in a natural order were found. This means that the more participants perceived the risk of death associated with COVID-19 as salient, the more they endorsed conspiracy beliefs; conversely, the more participants considered a pandemic as part of an overarching natural order, the less they endorsed conspiracy beliefs. Consistent with our research hypotheses, the positive association of perceived mortality rate with conspiracy beliefs was significantly moderated by beliefs in a natural order. As showed in Fig. 2, the slope was smaller at high ( $\beta = 0.18$ ,  $se = 0.043$ ,  $z = 4.26$ ,  $p < .001$ , 95%CI = 0.098, 0.266) compared to low ( $\beta = 0.36$ ,  $se = 0.057$ ,  $z = 6.31$ ,  $p < .001$ , 95%CI = 0.248, 0.471)

**Table 1**  
Intercorrelations and 95%CIs.

Variables	1	2	3	4	5	6
1. PMR	–					
2. NOT	–.03 (–.11, .05)	–				
3. CB	.26*** (.18, .33)	–.11** (–.19, –.03)	–			
4. UA	.03 (–.05, .11)	.12*** (.04, .20)	.19*** (.12, .27)	–		
5. LS	–.11** (–.19, –.03)	–.01 (.07)	–.31*** (–.38, –.23)	–.62*** (–.68, –.56)	–	
6. GF	.05 (–.03, .13)	–.02 (–.10, .05)	–.14*** (–.22, –.06)	–.42*** (–.50, –.35)	.49*** (.42, .56)	–
Mean	6.08	4.72	1.82	2.17	6.11	5.78
SD	8.45	1.56	0.70	1.04	0.92	1.04
$\alpha$	.74	–	.94	.74	.92	.80

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

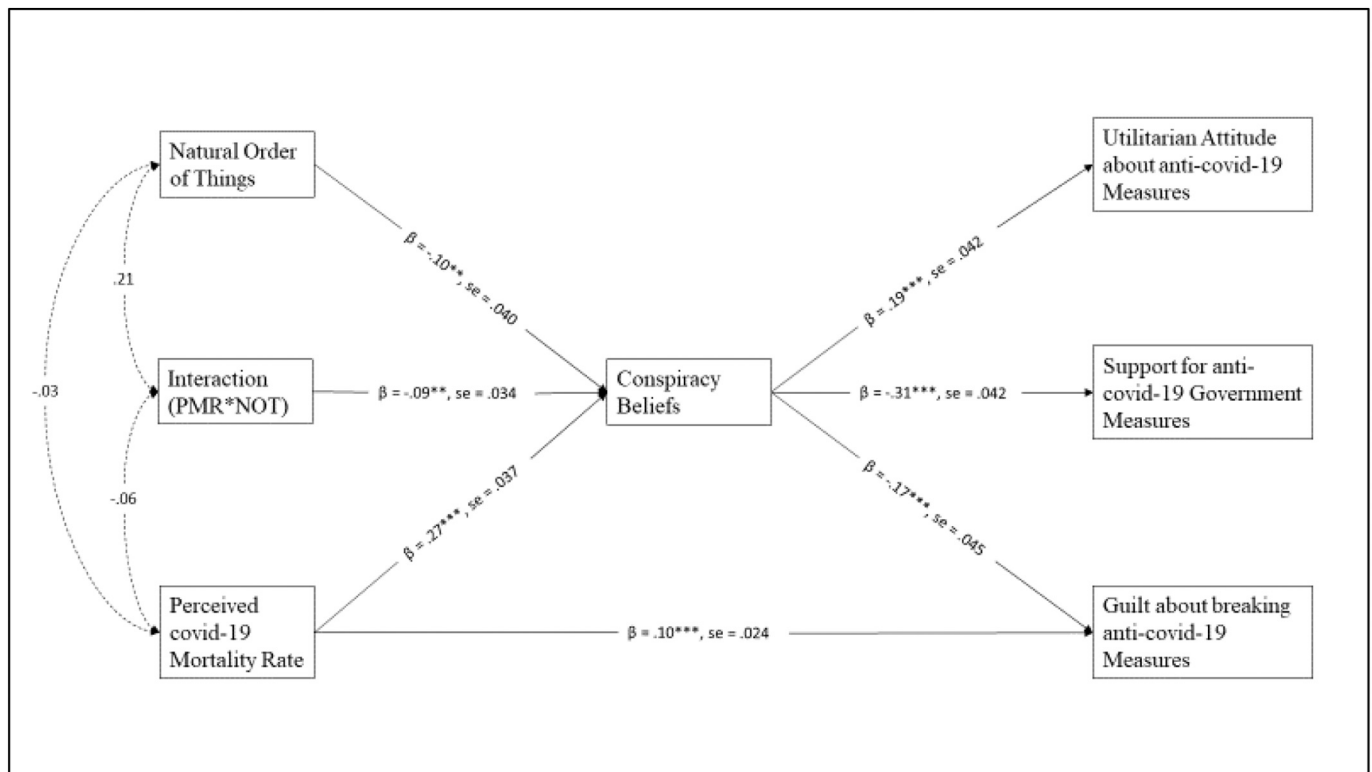


Fig. 1. Path analysis model. Note.  $^{**}p < .01$ ;  $^{***}p < .001$ .

Table 2  
Results of the path analysis model.

Mediator model										
CB										
	$\beta$	se	p		se	p		se	p	
PMR	.27	.037	<.001							
NOT	-.10	.040	.01							
PMR*NOT	-.09	.034	.009							
Outcomes model										
		UA			LS			GF		
CB	.19	.042	<.001	-.31	.042	<.001	-.17	.045	<.001	
PMR	-	-	-	-	-	-	.10	.024	<.001	
Indexes of Moderated Mediation										
		UA			LS			GF		
PMR*NOT	-.017	.007	.016	.027	.011	.011	.015	.007	.028	
Conditional Indirect effects										
		UA			LS			GF		
PMR*NOT(-1SD)	.07	.018	<.001	-.11	.023	<.001	-.06	.018	.001	
PMR*NOT(+1SD)	.03	.012	.003	-.06	.016	.001	-.03	.011	.006	

values of the moderator.

Turning to mediation, conspiracy beliefs were found to be negatively associated with support for the anti-COVID-19 measures and with guilt feeling linked to the possibility of harming other people and not respecting the lockdown rules. Conspiracy beliefs were also positively related to economic utilitarian attitudes.

Indexes of moderated mediation were all significant. Perceived mortality rate indirectly related with assumption of a utilitarian “economy-first” stance. This association was positive and significant both when beliefs in the natural order were weak or strong. However, when participants looked at the pandemic emergency as something that was outside of the natural order of reality (i.e., weak beliefs in a natural order), they were significantly more in favor of sacrificing human lives

for the benefit of the country’s economy in respect to those with strong beliefs in a natural order ( $\beta_{diff} = 0.034, se = 0.014, z = 2.40, p = .016, 95\%CI = 0.006, 0.062$ ). Perceived mortality was indirectly and negatively associated with the support for the lockdown measures and with related feeling of guilt: as regard the support for restrictive measures, the indirect effect of perceived mortality rate was significant regardless of whether participants viewed the pandemic advent as part of the natural order of things or not. However, they were significantly less favorable to the lockdown rules when they had weak beliefs of the pandemic belonging to a natural order ( $\beta_{diff} = -0.054, se = 0.021, z = -2.54, p = .01, 95\%CI = -0.096, -0.012$ ). Similarly, we witnessed negative and significant low and high conditional indirect effects of perceived mortality rate on guilt feeling. Even in this case, participants stated that they

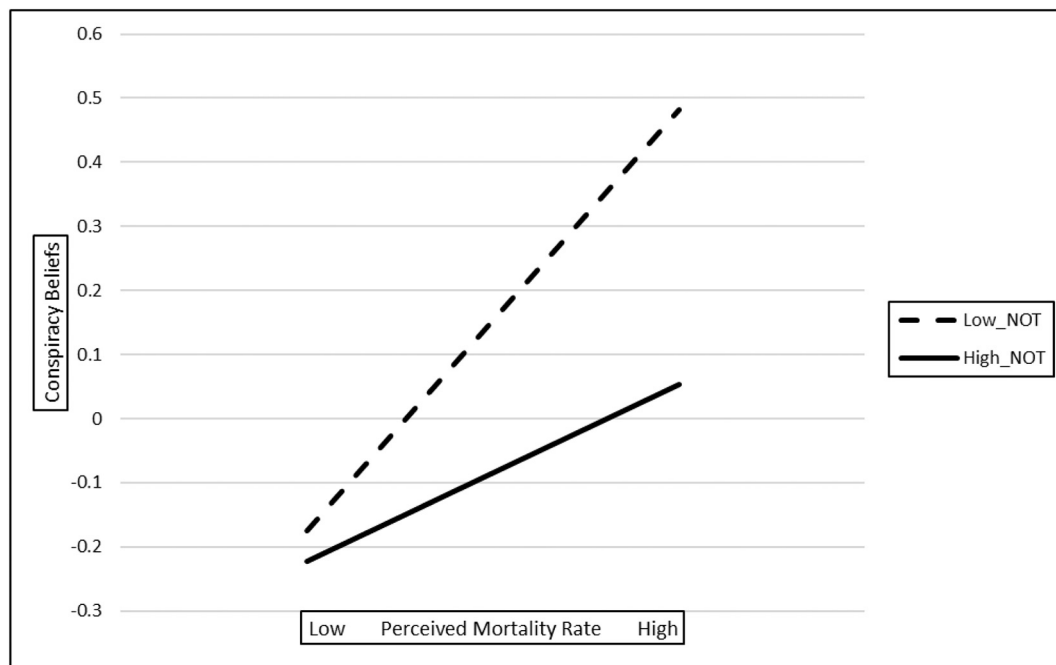


Fig. 2. Conditional effects of COVID-19 Perceived Mortality on Conspiracy Beliefs as a function of the natural order of things (NOT).

felt less guilty when they endorsed weak (vs. strong) beliefs in a natural order ( $\beta_{diff} = -0.029$ ,  $se = 0.013$ ,  $z = -2.20$ ,  $p = .028$ ,  $95\%CI = -0.055$ ,  $-0.003$ ). Finally, analyses revealed that perceived mortality rate was directly and positively associated with guilt, whilst, as reported above, the indirect effect was in the opposite – negative – direction. This fits with a suppression pattern of effects where the mediated effect through conspiracy beliefs overturned completely the positive effect of the perceived mortality rate on feeling of guilt. Specifically, keeping constant the value of the moderator, the indirect effect of perceived mortality rate on guilt was equal to a significant  $\beta$  of  $-0.045$ , while the correlation among these variables was a positive  $.05$  – and not significant. In other words, disease concerns increased along with the guilt linked to breaking the restrictive norms and harming someone. However, the same concerns led people to adopt conspiracy beliefs to explain the occurrence of the pandemic and, ultimately, it reduced their sensitivity to guilt. Perceived death-rate appears as a double-edged sword.

## 8. Discussion

The COVID-19 pandemic will produce a great variety of psychological consequences, which researchers are beginning to investigate. In the present work, we specifically focused on conspiracy thinking and its negative consequences on compliance with restrictive rules.

We found that perceptions of mortality rate associated with COVID-19 corresponded to greater tendency to adopt conspiracy beliefs. As anticipated in the introduction, the adoption of conspiratorial explanations could have contributed to alleviate concerns produced by mortality salience, restoring a sense of control and understanding.

At the same time, we also found that conspiracy beliefs were negatively associated with beliefs that pandemic falls within the “natural order of things”. This means that, concerning the pandemic, some individuals did not experience a wide gap between what happened and what should have happened. Hence, leaving aside the objective negative consequences of the pandemic, needs for control, understanding and reassurance are not profoundly invalidated for those individuals: compensatory strategies are thus less central for psychological functioning.

Consistently, we found that beliefs in the natural order of things moderated the relationship between the perceived mortality rate and

conspiracy beliefs. More specifically, viewing COVID-19 spread as an event belonging to the natural order radically reduced the tendency to adhere to conspiracy beliefs.

Conspiracy beliefs were also negatively correlated with the support for anti-COVID-19 measures, the guilt in causing harm to other people and not respecting the restrictive measures as well as they were positively related to the adoption of utilitarian attitudes that prioritize economic over safety concerns. These results were consistent with previous literature which highlighted how conspiracy ideations can favor the adoption of risky and irresponsible behaviors (e.g., Oliver & Wood, 2014). In the present work, they were translated into the reduction of psychological factors that could be relevant to inhibit risky behaviors related to the COVID-19 disease.

Combining all these findings, a complex pattern emerged. When participants believed that the pandemic did not belong (vs. belong) to natural order of things, the perceived risk of the pandemic, – through the mediation of beliefs in conspiracies - reduced support for anti-COVID-19 restrictions, the feelings of guilt for not observing restrictions and decreased favor toward political measures that benefited public health rather than economy.

These findings are novel under several respects. First, consistently with previous evidence, results show that conspiracy thinking may operate as solution to preserve a sense of meaning, control and reassurance that might be threaten by momentous events. Relatedly, these results also shed light on the inherent contradiction at the core of conspiracy ideation: although individuals try to achieve a sense of psychological well-being and protection through conspiracy thinking, they tend to behave in ways that put them and others in harm's way. In addition, failure to comply with the anti-COVID-19 restrictions or an overemphasis to the economic costs of anti-COVID measures could imply consequences that could paradoxically increase uncertainty, loss of control over the surrounding environment, and exacerbate conflict in the community.

This speaks to the necessity to prevent and counteract the diffusion of conspiracy thinking and the fake news that are often associated to this way of explaining events.

Here, we addressed this issue at least partially. We showed that, to prevent appeal to conspiracy thinking, it is not strictly necessary to address directly risk perception. Instead, our data suggest that a key

variable is how the pandemic is framed within a larger worldview (i.e., natural order of things). In the present case, we considered individual differences in belief that the pandemic belongs to the natural order of things. However, building on present findings, it could be worth to examine whether social interventions designed to promote this belief might efficaciously reduce endorsement of conspiracy and, hopefully, their negative consequences.

Besides the specific issue of pandemic and conspiracy thinking, to our knowledge, this is the first empirical research examining belief that a specific event falls into a given “natural order of things”. It could be particularly fruitful to examine further the psychological role of this belief. As we outlined in the introduction, a personal “natural order of things” corresponds with the set of expectations about how the world should function. The word “should” entail a moral dimension which could profoundly affect how individuals relate to any event. A dramatic event could be tolerated, accepted, and understood if it belongs to the set of events that we deemed legitimate to happen, even if these events are intrinsically unfair or unfavorable. For example, a profoundly unjust and upsetting event such as being left right before the wedding, could be accepted more easily if the person believes that this event, and more in general unjust behaviors, belong to the set of events that are not illegitimate to happen in the world. Future work should examine more closely the implications for well-being and psychological adjustment of beliefs related to the “natural order of things”.

The main limitation of the present study lies in the correlational and cross-sectional nature of the data, which prevented us from making causal inferences. As indicated by Maxwell et al. (2011), cross-sectional data are not entirely recommended for performing mediation. However, the main aim of this work was to establish a model of associations that operate through indirect (i.e., conspiracy beliefs) and moderated (i.e., natural order) paths and this can be achieved satisfactory even with correlational data. In the future, experimental research would be needed to test whether interventions to reduce conspiracy thinking based on present findings can be effective.

Another limitation of the present study concerns the measures used to detect the constructs of interest. They have never been used in previous works and are therefore not accompanied by evidence about their validity. Nevertheless, they were all accompanied by high reliability values. Moreover, they were built specifically to detect issues associated with COVID-19 and administered in a data collection which was conducted just a week after the advent of the pandemic in Italy. Future studies would be needed to provide further empirical validity in support of the measures used in the research.

## 9. Conclusion

Presently, approved vaccination against COVID-19 exist, but any vaccine will be less effective if a rather large portion of population will not recur to it. Lockdown countermeasures are not popular and are very difficult to implement. However, apparently, they work if a very large majority of the population stick with rules. Under this light, conspiracy thinking is not just a matter of having different opinions about a specific event, it is a matter of public health and its impact should be not underestimated. In the context of the COVID-19 pandemic, any knowledge that could help us to contrast their endorsement could contribute to the global fight against COVID-19.

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## Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

## Declaration of competing interest

The authors declare that they have no conflict of interest.

## References

- Bogart, L. M., Galvan, F. H., Wagner, G. J., & Klein, D. J. (2011). Longitudinal association of HIV conspiracy beliefs with sexual risk among black males living with HIV. *AIDS and Behavior*, 15(6), 1180–1186. <https://doi.org/10.1007/s10461-010-9796-7>.
- Burke, B. L., Martens, A., & Faucher, E. H. (2010). Two decades of terror management theory: A meta-analysis of mortality salience research. *Personality and Social Psychology Review*, 14(2), 155–195. <https://doi.org/10.1177/1088868309352321>.
- Dweck, C. S. (2017). From needs to goals and representations: Foundations for a unified theory of motivation, personality, and development. *Psychological Review*, 124(6), 689–719. <https://doi.org/10.1037/rev0000082>.
- Einstein, K. L., & Glick, D. M. (2015). Do I think BLS data are BS? The consequences of conspiracy theories. *Political Behavior*, 37(3), 679–701. <https://doi.org/10.1007/s11109-014-9287-z>.
- Hofstadter, R. (1966). The paranoid style in American politics. In *The paranoid style in American politics and other essays* (pp. 3–40). New York: Knopf.
- Hume, D. (1978). A treatise of human nature [1739]. British Moralists, 1650, 1800.
- Jolley, D., & Douglas, K. M. (2014). The effects of anti-vaccine conspiracy theories on vaccination intentions. *PLoS One*, 9(2). <https://doi.org/10.1371/journal.pone.0089177>.
- Landau, M. J., Kay, A. C., & Whitson, J. A. (2015). Compensatory control and the appeal of a structured world. *Psychological Bulletin*, 141(3), 694–722. <https://doi.org/10.1037/a0038703>.
- Lerner, M. J. (1980). The belief in a just world. In *The Belief in a Just World* (pp. 9–30). Boston, MA: Springer. [https://doi.org/10.1007/978-1-4899-0448-5\\_2](https://doi.org/10.1007/978-1-4899-0448-5_2).
- Leone, L., Giacomantonio, M., & Lauriola, M. (2019). Moral foundations, worldviews, moral absolutism and belief in conspiracy theories. *International Journal of Psychology*, 54(2), 197–204. <https://doi.org/10.1002/ijop.12459>.
- Leone, L., Giacomantonio, M., Williams, R., & Michetti, D. (2018). Avoidant attachment style and conspiracy ideation. *Personality and Individual Differences*, 134, 329–336. <https://doi.org/10.1016/j.paid.2018.06.043>.
- Maxwell, S. E., Cole, D. A., & Mitchell, M. A. (2011). Bias in cross-sectional analyses of longitudinal mediation: Partial and complete mediation under an autoregressive model. *Multivariate Behavioral Research*, 46(5), 816–841. <https://doi.org/10.1080/00273171.2011.606716>.
- Moore, G. E. (2014). *Some main problems of philosophy*. Routledge.
- Newheiser, A. K., Farias, M., & Tausch, N. (2011). The functional nature of conspiracy beliefs: Examining the underpinnings of belief in the Da Vinci code conspiracy. *Personality and Individual Differences*, 51(8), 1007–1011. <https://doi.org/10.1016/j.paid.2011.08.011>.
- Oliver, J. E., & Wood, T. (2014). Medical conspiracy theories and health behaviors in the United States. *JAMA Internal Medicine*, 174(5), 817–818. <https://doi.org/10.1001/jamainternmed.2014.190>.
- Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling and more. Version 0.5–12 (BETA). *Journal of Statistical Software*, 48(2), 1–36.
- Schoemann, A. M., Boulton, A. J., & Short, S. D. (2017). Determining power and sample size for simple and complex mediation models. *Social Psychological and Personality Science*, 8(4), 379–386. <https://doi.org/10.1177/1948550617715068>.
- Tangney, J. P. (1994). The mixed legacy of the superego: Adaptive and maladaptive aspects of shame and guilt. In J. M. Masling, & R. F. Bornstein (Eds.), *Empirical perspectives on object relations theory* (pp. 1–28). <https://doi.org/10.1037/11100-001>.
- Tomaka, J., & Blascovich, J. (1994). Effects of justice beliefs on cognitive appraisal of and subjective physiological, and behavioral responses to potential stress. *Journal of Personality and Social Psychology*, 67(4), 732–740. <https://doi.org/10.1037/0022-3514.67.4.732>.
- van Prooijen, J. W., & Douglas, K. M. (2017). Conspiracy theories as part of history: The role of societal crisis situations. *Memory Studies*, 10(3), 323–333. <https://doi.org/10.1177/1750698017701615>.
- van Prooijen, J. W., & Jostmann, N. B. (2013). Belief in conspiracy theories: The influence of uncertainty and perceived morality. *European Journal of Social Psychology*, 43(1), 109–115. <https://doi.org/10.1002/ejsp.1922>.