The Dark Triad trait of psychopathy and message framing predict risky decision-making during the COVID-19 pandemic

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The effects of framing on risky decision-making have been studied extensively in research using Kahneman and Tversky's (1981) hypothetical scenario about a contagious Asian disease. The COVID-19 pandemic offers a unique opportunity to test how message framing affects risky decision-making when millions of real lives are at stake worldwide. In a sample of US adults ($N = 294$), we investigated the effects of message framing and personality (Dark Triad traits) in relation to risky decision-making during the COVID-19 crisis. We found that both gain- and loss-framing influenced risk choice in response to COVID-19. People were more risk-averse in the loss condition of the current study compared to the benchmark established by Tversky and Kahneman (1981). Among the Dark Triad traits, psychopathy emerged as the significant predictor of risk taking, suggesting that people who score high in psychopathy are more likely to gamble with other people's lives during the COVID-19 crisis. We suggest that both voters and pandemic-related public awareness campaigns should consider the possibility that decision-makers with psychopathic tendencies may take greater risks with other people's lives during a pandemic. In addition, the framing of public-health messages should be tailored to increase the chances of compliance with government restrictions.

Keywords: Message framing effect; Dark triad; Risky decision-making; Pandemic; COVID-19.

Beginning in December 2019, countries around the world started to recognise and respond to the health crisis posed by the novel Coronavirus Disease (COVID-19). The pandemic that resulted from the COVID-19 outbreak has directly and indirectly affected people's health and the global economy. According to the Johns Hopkins coronavirus resource centre, by the end of January 2021, there were 100 million confirmed cases of COVID-19 globally, with 25 million of those cases in the United States (coronavirus.jhu.edu). The economic impact of the COVID-19 pandemic has been devastating. The Dow Jones Industrial Average incurred the third-largest daily percentage loss in its history when news of the pandemic broke worldwide (Imbert, 2020). In addition, the pandemic has affected the jobs of millions of people across the United States and, according to the US Bureau of Labor Statistics (2020), the unemployment-rate rose from 4.4% before the pandemic (March 2020) to 14.7% during the pandemic (April 2020).

Peoples' behavioural response to a health crisis depends on how people perceive threat and their level of risk tolerance. Public-health messages can be framed such that people can be influenced either to follow the health recommendations or to ignore them. Furthermore, certain individual differences in personality may influence decision-making, with implications for both

adaptive behavioural responses (e.g., social distancing) and maladaptive behavioural responses (e.g., impulsive shopping). The purpose of the present study was to examine the effects of both message framing, as explained by the *prospect theory*, (Kahneman & Tversky, 1979), and the Dark Triad personality traits on risky decision-making in response to the current global pandemic.

THE FRAMING EFFECT AND RISKY DECISION-MAKING

During periods of uncertainty such as a global pandemic (COVID-19), research (e.g., Rothman & Salovey, 1997) have demonstrated that the effectiveness of health-related messaging is dependent on how the message is framed. Prospect theory predicts that people are more likely to make risky choices when information is negatively framed (i.e., the *framing effect*) due to the phenomena of loss aversion. The framing effect refers to a cognitive bias that affects the degree to which individuals are inclined to make risk-seeking or risk-averse choices based on how a scenario is presented (Tversky & Kahneman, 1981).

A meta-analysis of 136 empirical studies ($N = 30,000$) revealed a small to moderate effect size of framing on decision-making (Kühberger, 1998). It shows that framing is a reliable phenomenon, and that emphasising the positive aspects (i.e., gain frames) of identical problems does lead to more risk aversion, whereas emphasising equivalent negative aspects (i.e., loss frames) lead to riskier decisions. Regarding the practical implications of this work, a more recent meta-analysis of 94 peer-reviewed articles concluded that gain-framed messages were more likely than loss-framed message to encourage preventative behaviour (Gallagher & Updegraff, 2012). More recently, a few studies have explored the effects of framing on decision-making during the COVID-19 pandemic. For example, Jordan et al. (2020) conducted a study during the early phase of the COVID-19 pandemic (April 17–30, 2020) and found that when a health message was framed in a way that led to a perceived public threat from COVID-19, people were willing to engage in more preventative measures. Hameleers (2021) examined how framing a policy preference in terms of gains and losses on a hypothetical COVID-19 policy would affect decision-making. His results indicated that when the public-health message was framed as a loss (triggering loss aversion), more risk-seeking policy interventions were preferred by individual decision-makers.

DARK TRIAD PERSONALITY TRAITS AND RISKY DECISION-MAKING

Because people can vary greatly in their tendency to either engage in or avoid risky behaviours, a further question of interest is how people's personality traits might influence their decisions to take risks in the disease problem, which in turn might affect their adaptive responses. We specifically examined the traits found in one widely known model of personality—the Dark Triad personality traits (Paulhus & Williams, 2002).

The Dark Triad personality traits, which include subclinical narcissism, psychopathy and Machiavellianism, are related to low honesty-humility and living a *fast life*—the kind of lifestyle posited by an evolutionary psychology theory which argues that fast life individuals are more likely than slow life individuals to seek short-term gains, and are also more likely to engage in high-risk-seeking behaviour (Book et al., 2015). A number of behavioural studies have examined each of the Dark Triad traits, either alone (Berg et al., 2013; Foster, Shenesey, & Goff, 2009) or in combination with each other (Malesza & Kalinowski, 2019). Their findings suggest that the three Dark Triad traits predispose people to take higher risks (Vollrath et al., 1999) and engage in more impulsive behaviour (Crysel et al., 2013).

Cumulative research over the past decade has documented that the Dark Triad traits are related to moral disengagement (Jonason et al., 2015), diminished empathy and remorse (Wai & Tiliopoulos, 2012), limited self-control (Jonason et al., 2010), disinhibited, bold and risky behaviour (Britt & Garrity, 2006; Foster, Misra, & Reidy, 2009; Lakey et al., 2008; Muris et al., 2017; Sekścińska & Rudzinska-Wojciechowska, 2020; Schreer, 2002). For these reasons, during a period of a worldwide pandemic, individuals with higher levels of Dark Triad traits might be more likely to engage in high-risk and more impulsive behaviours that can put other people's welfare at risk. The current pandemic is not an exception to this norm. Recent evidence suggests that individuals with higher levels of the Dark Triad traits are more likely to engage in risky behaviours such as ignoring social distancing recommendations and refusing to wear masks in public during the pandemic (Carvalho & Machado, 2020; Zajenkowski et al., 2020).

Among the Dark Triad traits, psychopathy should be particularly related to risky decision-making because individuals with high levels of psychopathy are not able to regulate their impulses effectively and therefore tend to take needless risks for minimal gains (Hare & Neumann, 2008; Jones & Paulhus, 2011). In addition, narcissistic individuals tend to have a false illusion of control, display overly optimistic bias in their decision-making, and downplay potential chances of loss, with all these factors contributing to riskier behaviour (Campbell, Goodie, & Foster, 2004; Crysel et al., 2013; Lakey et al., 2008). Although evidence regarding the relationship between Machiavellianism and risk taking is less straightforward (Crysel et al., 2013; Jones

& Paulhus, 2011), Machiavellians are famous for adapting to the requirements of a given situation and quickly changing their tactics in order to gain benefits for themselves (Christie & Geis, 1970; Jones & Paulhus, 2009).

THE PRESENT STUDY

In the current investigation, we examined the extent to which framing effects and Dark Triad personality traits influence decision-making during the COVID-19 pandemic crisis. We replicated the classic Asian Disease Problem to assess the influence of framing on decision-making during the ongoing COVID-19 pandemic. According to construal-level theory (CLT), threats (i.e., COVID-19) that are perceived to be imminent influence how people make decisions. In addition, in the context of this problem, we explored the impact of Dark Triad traits on risky decision-making.

Although recent studies have examined the effects of message framing on decision-making during the COVID-19 pandemic, the results appear to vary based on the level of uncertainty in each society and in each phase of the pandemic (e.g., Hameleers, 2021; Jordan et al., 2020; Sanders et al., 2020). For example, people were not affected by loss framing when asked about their lockdown preference and their intention to adhere to public-health guidelines (e.g., they were not likely to be risk-seeking when presented with a loss-framed message) (Sanders et al., 2020). To our knowledge, no previous study has examined how framing under these conditions (i.e., the ongoing pandemic) implicate behaviour in selfish, callous and impulsive individuals (i.e., in individuals with higher levels of the Dark Triad traits). Therefore, examining the Dark Triad traits and message framing during the COVID-19 pandemic has the potential to offer novel insights[1] regarding the question of how individual differences can influence people's response to uncertainties caused by the pandemic (e.g., financial and health uncertainties).

We chose to examine the Dark Triad traits rather than the traits of impulsivity and risk-seeking alone. Impulsivity and risk taking tend to be symptomatic of, and therefore confounded with, specific pathological conditions (e.g., Bipolar Disorder, Borderline Personality Disorder) (Arnett, 1992; Eskander et al., 2020). In contrast, the Dark Triad traits are a constellation of three conceptually distinct but empirically overlapping non-pathological

personality traits that measure a life-long pattern of selfish, callous and impulsive behaviour (Muris et al., 2017) in functioning members of the society. Furthermore, it is not well-understood how individuals with higher levels of the Dark Triad traits will respond in a framing task where there is no direct benefit to the self.

To summarise, we tested two hypotheses based on the theoretical assumptions described above:

H1. We predicted that most people would avoid risky decisions irrespective of frames during the COVID-19 pandemic crisis, that is, most individuals would select the risk-averse option in both a gain frame and a loss frame. We further predicted that, compared to the results for the classic disease problem that were reported by Tversky and Kahneman (1981), most people would prefer the more risk-averse decision options even under the loss-frame scenario during the pandemic. This prediction derives from the psychological distance hypothesis of CLT, which suggests that there should be differences in the way people make decisions during a real crisis as compared to a hypothetical one.

H2. We predicted that each of the three Dark Triad traits would predict risk taking during the COVID-19 pandemic crisis. Specifically, we predicted that individuals with higher levels of Dark Triad traits would display more risk taking under uncertainty in the modified disease problem. As previously mentioned, the rationale for this prediction is that individuals with higher levels of the Dark Triad traits are more inclined to take risks than the normal population. Although there are typically no framing effects for individuals with higher levels of the Dark Triad traits in loss-frame condition, the observed tendency in the general population to seek greater risk-aversion in the loss-frame condition should differentiate individuals high in Dark Triad traits from those with lower levels of Dark Triad traits due to the predicted attenuated effects of construal on individuals with higher levels of the Dark Triad traits.

METHOD

Participants

Institutional review board approval was obtained for all aspects of the study. We recruited a sample of 294 participants from the United States (M_{age} = 39.01,

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[1] One study has examined the relationship between framing effects and all three Dark Triad traits (Deutchman & Sullivan, 2018). However, the study used a prisoner's dilemma task—a task in which joint outcomes are determined by the independent decisions of two individuals. As another point of difference, whereas a disease problem task assesses framing effects in terms of risk-seeking and risk-aversion, a prisoner's dilemma task assesses framing effects in terms of cooperation and defection.

SD_{age} = 13.75, age range: 18–78) via Amazon's Mechanical Turk data collection platform (MTurk). About 67.7% (N = 199) of the respondents were female and 32.3% (N = 95) were male. Data were collected during the 2-day period of March 25–26, 2020. These dates followed soon after news reports of panic-buying, plummeting stocks and the deployment of the National Guard and lockdowns issued by several states in response to COVID-19 (Knowles et al., 2020).

Materials and procedure

Participants were directed to a Qualtrics link to complete an online survey that included measures of the Dark Triad traits in addition to outcome measures from the disease problem. We used the brief Dirty Dozen scale to assess Dark Triad traits (Machiavellianism, narcissism and psychopathy) due to its concise nature and its acceptable reliability (Jonason & Webster, 2010).

The disease problem (Tversky & Kahneman, 1981) was chosen for its specific relevance to the COVID-19 pandemic, and because framing effects on risk-seeking and risk-aversion are well-established for this problem (Kühberger, 1998). This problem was modified by using the name "COVID-19" instead of the original name "Asian Disease."

Dirty Dozen Scale

The 12-item Dirty Dozen scale (Jonason & Webster, 2010) measures the three Dark Triad personality traits: Machiavellianism (e.g., "*I have used flattery to get my way*"), subclinical psychopathy (e.g., "*I tend to be callous or insensitive*"), and subclinical narcissism (e.g., "*I tend to want others to admire me*"). Each of the three traits is measured with four items. Participants were instructed to respond to all items using a 7-point Likert-scale (1 = *Strongly Disagree*; 7 = *Strongly Agree*). The scores for each Dark Triad trait were computed by averaging the scores for their respective four items.

Disease problem (modified)

In the original disease problem (Tversky & Kahneman, 1981), participants were instructed to "Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people." To modify the task to be relevant to COVID-19, we instead instructed participants to "Imagine that the U.S. is preparing for a larger spread of COVID-19 (the Coronavirus), which is expected to kill 600 people." Then, participants were randomly assigned to be in either

the "gain frame" or the "loss frame," which presented the same outcomes. However, the gain frame presented two outcomes worded in terms of people being saved, whereas the loss frame presented the same two outcomes worded in terms of people dying. In the original Tversky and Kahneman (1981) study, 72% of participants selected programme A (risk-averse) and 28% selected programme B (risk-seeking) in the gain frame; whereas, 22% selected programme A (risk-averse) and 78% selected programme B (risk-seeking) in the loss frame:

Two alternative programmes to combat the disease have been proposed. Assume the exact scientific estimate of the consequences of the programmes are as follows. Choose the one that you think is the better option:

Gain Frame:
Programme A: "200 people will be saved".
Programme B: "there is a 1/3 probability that 600 people will be saved, and a 2/3 probability that no people will be saved."
Loss Frame:
Programme A: "400 people will die".
Programme B: "there is a 1/3 probability that nobody will die, and a 2/3 probability that 600 people will die."

All procedures performed in studies involving human participants were in accordance with the ethical standards of the University of Texas at Arlington Institutional Review Board and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed Consent: Informed consent was obtained from all individual participants included in the study.

RESULTS

Data screening

The survey included several attention checks (e.g., "What is the capital of France?" and "If you are paying attention, please choose "strongly agree"). Data were not recorded for participants who failed any of the attention checks. After the data for those participants were excluded, 281 participants (193 females and 88 males) remained, and their data were used in the analyses reported below.

Assumptions of normality were assessed for all measures in the present study before to conducting the statistical analyses. Histograms of each variable confirmed that normality assumptions were met, apart from Machiavellianism and psychopathy—which both had slightly positively-skewed distributions (Table 1). Following the recommendations of Tabachnick and Fidell (2013), these

Table 1
Means, standard deviations, and alpha coefficients for untransformed variables

Variables	M	SD	α
Machiavellianism	2.84	1.40	.83
Psychopathy	2.61	1.38	.83
Narcissism	3.48	1.48	.87

Table 2
Summary of risk seeking preference for the Asian disease problem in benchmark T&K study and COVID-19 study

			COVID-19 study	
Frame	T&K	Total	Low psychopathy	High psychopathy
Gain	28%	34% ($N = 48/142$)	24% ($N = 13/54$)	44% ($N = 19/43$)
Loss	78%	65% ($N = 90/139$)	59% ($N = 27/46$)	74% ($N = 34/46$)

Note. T&K refers to results from the Tversky and Kahneman (1981) benchmark study. Low ($N = 100$) and high psychopathy ($N = 89$) refers to participants categorised as scoring .5 standard deviations below or above the mean on the psychopathy measure, respectively.

two variables were transformed to meet the assumptions of normality.[2]

Data analysis

In the gain frame, 66.2% ($N = 94$) of participants chose the risk-averse outcome and 33.8% ($N = 48$) of participants chose the risk-seeking outcome. In the loss frame, 35.3% ($N = 49$) of participants chose the risk-averse outcome and 64.7% ($N = 90$) of participants chose the risk-seeking outcome. Both gain- and loss-framing influenced risk choice in response to COVID-19 compared to one another ($\chi^2(1) = 26.91$, $p < .001$) and to 50/50 chance (gain: $\chi^2(1) = 14.90$, $p < .001$; loss: $\chi^2(1) = 12.09$, $p < .001$). Because age and gender were not significant predictors of risky decision-making in either frame, the results we report are not qualified by either of these sociodemographic variables. The results of our two specific hypothesis tests are reported below.

We tested the hypothesis that during the COVID-19 pandemic crisis more individuals will choose a risk-averse outcome in the gain frame condition as well as in the loss-frame condition compared to the classic Tversky and Kahneman (1981) benchmark results. As predicted by prospect theory, more participants chose the risk-averse option in the gain frame. Specifically, there were no significant differences between the proportion of people who chose the risk-averse option in the gain frame during the COVID-19 pandemic crisis and the original Tversky and Kahneman (1981) study, $\chi^2(1) = 2.37$, $p = .12$. In contrast to prospect theory and in line with our prediction, when compared to the benchmark established by Tversky and Kahneman (1981), participants were more likely to choose the risk-averse outcome in the loss frame during the COVID-19 pandemic crisis, $\chi^2(1) = 14.23$, $p < .001$, $\varphi = .32$.

When the scenarios were framed (using the COVID-19 prompt) as gains (people will be saved), people responded as predicted—they preferred risk aversion to risk seeking choices. However, when questions were framed (using the COVID-19 prompt) as losses (people will die), people responded in an unexpected manner. They, too, were more likely to select the risk-averse outcome compared to the benchmark established by Tversky and Kahneman (1981).

We used a logistic regression analysis to test the hypotheses that (1) both gain- and loss-framing influenced risk choice in response to COVID-19, compared to one another; and (2) individuals with increased Dark Triad traits would be more likely to take risks in a time of actual disease threat within the gain as well as in the loss frame of the modified disease problem. In addition, Reyna and Panagiotopoulos (in press) have suggested that there should be an interaction between psychopathy and framing effects on decision-making. Specifically, they propose that framing effects should not be evident in individuals with higher levels of psychopathy. To further examine the relationship between the three Dark Triad traits and framing effects on risk taking, we therefore also included interaction products for each of the three Dark Triad traits and frame as predictors in the model.[3] In sum, the logistic regression model included the framing condition, the three Dark Triad traits, and the interactions between frame and each of the three Dark Triad traits.

The overall model was significant, $-2LL = 352.76$, $\chi^2(7) = 36.70$, $p < .001$, $R^2 = .12$ (Cox & Snell) .16 (Nagelkerke). Frame was a significant predictor of risk seeking in the model, $b = 1.28$, $SE = .26$, Wald $= 24.40$, $p < .001$, Exp(B) $= 3.58$. Psychopathy was also a significant predictor of risk taking in the model, $b = 1.00$, $SE = .41$, Wald $= 6.03$, $p = .01$, Exp(B) $= 2.71$.[4] (See Table 2 for a summary of risk seeking preferences by frame and levels of psychopathy).

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[2] The significant results of all analyses that included the transformed variables were also found to be significant in the analyses of the original, untransformed data (Appendix S1).

[3] The three Dark Triad traits were each centred on the mean prior to analysis. Frame was also centred and dummy coded so that the loss frame was coded as −1, and the gain frame was coded as 1.

[4] Machiavellianism, narcissism, and the interactions between frame and each of the three Dark Triad traits were not significant predictors of risk taking.

DISCUSSION

People's diverse reactions during this pandemic provided a real-world opportunity to study the effects of framing and individual differences on decision-making regarding a real (versus hypothetical) threat. In the present investigation, we examined the extent to which personality differences in Dark Triad traits and framing affect risky decision-making during the COVID-19 pandemic crisis. Below, we discuss our findings, the strengths and limitations of the current study, and directions for future research.

Our results indicated that even during a period of an actual threat (e.g., a health crisis), the way in which a question is framed influences risk-based decision-making. When the disease problem was framed in a gain scenario (lives saved), individuals were more likely to avoid the probabilistic option and instead opted for the certain option, thereby displaying a bias toward risk-aversion. On the other hand, when the disease problem was framed in a loss scenario (lives lost), individuals were more likely to take greater risks.

This pattern of results replicates that obtained in Tversky and Kahneman's (1981) original study with respect to the gain frame condition and, to a lesser extent, the loss-frame condition. Specifically, we found that the type of framing condition (i.e., gain or loss) did influence individuals' decision to be risk-seeking or risk-averse. On the other hand, our results differed in one respect from those of Tversky and Kahneman (1981): when we compared the frequency of risk seekers in the two studies, we found that during an ongoing health crisis (when the actual threat of the disease is high), greater percentage of people chose to be risk-averse when the question was posed in terms of people dying (loss frame).

These findings suggest two things. The first is that when people are facing a threat to the self, they may be inclined to avoid risks. The second is that threats that are *imminent* may be evaluated differently than threats in the distant future. Some researchers suggest that CLT can better explain people's behaviour during an actual crisis as experienced directly by the perceiver (Weber, 2010). Specifically, those who use CLT (Trope & Liberman, 2000, 2003) use the construct of psychological distance to explain people's decision-making process. According to CLT, psychological distance moderates the perceived risk associated with an event (Trautmann & van de Kuilen, 2012). The implications of these findings are profound in suggesting that simple message framing can influence behavioural responses that can either hinder or improve people's compliance with recommended actions.

To explore some of the individual-difference variance in the effects reported above, we also examined the relationship between the Dark Triads and risky decision-making during the COVID-19 pandemic crisis. Among the Dark Triad traits, we found psychopathy to be the only significant predictor of more risky decision-making, such that individuals who scored higher in non-clinical psychopathy displayed greater risk-seeking. Although all of the Dark Triad traits have been found to correlate positively with risk-taking behaviour (Crysel et al., 2013), psychopathy has also been linked to (1) the failure to regulate impulses effectively, (2) taking needless risks for minimal gains, (3) high impulsivity and (4) a disposition toward reckless, inappropriate, immoral or even violent conduct (Christie & Geis, 1970; Hare, 1999; Jones & Paulhus, 2011).

Moreover, personality and cognitive theorists have suggested that psychopathic individuals differ from narcissists and Machiavellians, in addition to most individuals, in their processing of framed messages (Carre & Jones, 2017; Reyna & Panagiotopoulos, in press). Specifically, theorists have argued that psychopaths make decisions using a verbatim (i.e., word-for-word, calculated), rather than gist (i.e., meaningful, semantically influenced) approach. Previous research suggests that individuals who prefer to use verbatim thinking tend to resist framing effects (Rivers et al., 2008). In partial support of this theory, our results showed that framing did not interact with psychopathy to predict risk seeking decisions. Compared to neurotypical individuals, individuals with greater tendencies toward psychopathy were more likely to choose the risk-seeking option in both the gain and loss frames.

In most previous research, narcissism and psychopathy are both related to increased risk taking. However, people who score high in psychopathy take risks in different contexts and for different reasons than do people who score high in narcissism. The motives and emotions that accompany the risks they take are also distinctly different: the risk taking of narcissists relates more to their novelty-seeking and reward dependency, whereas the risk taking of psychopaths relates more to their poor impulse control and their lack of remorse and empathy for others (Jones & Paulhus, 2011).

Implications

This present study provides insight to governmental agencies and healthcare professionals in regard to framing public policy and guidelines related to public-health crises such as COVID-19. Our research suggests that using positive framing encourages behavioural compliance of safety protocols. In agreement with earlier research, the way a message is framed plays a crucial role in how people react to the message. People tend to be risk averse when there is a high level of certainty regarding threats in the environment. Because the final outcomes of epidemics are rarely certain, we would expect people to be more risk seeking during periods of uncertainty. The uncertainty associated with epidemics could bias people toward partaking in

risky behaviours, such as not wearing a mask or choosing not to get vaccinated. These risk seeking behaviours can further deteriorate the health of a community and unnecessarily burden the healthcare system. Therefore, in the event of future pandemics, it is important to convey to the public that the degree of uncertainty associated with pandemics can lead them to engage in riskier behaviours, but that these behaviours are counterproductive. Moreover, since individuals with psychopathic tendencies are more likely than others to make choices that put other people's lives at greater risk, these messages should be framed in order to increase the chances of their compliance with government restrictions.

We should also consider the effects of the personalities of those in public office who make decisions that affect the health of the community as a whole. The public's control over these individuals is limited, but we have some influence on them both through elections and through letters, news media, and social media. We cannot always know whether a particular leader has risk-taking psychopathic tendencies but at times we can deduce those tendencies from their previous actions. In that case, the leader's health-related decisions should be scrutinised carefully.

Strengths, limitations and directions for future research

There are two notable strengths of the present investigation. First, to our knowledge, this study is among the first to examine the time-critical insights into the effect of message framing and personality on risky decision-making in an actual health pandemic crisis (i.e., when the perceived threat is real and not imaginary). The timing[5] of the data collection for this study adds additional value to our understanding the effects of message framing in extreme uncertain situations. Most researchers have examined this effect in hypothetical scenarios outside an actual pandemic context. In contrast, the present study was conducted when uncertainty surrounding COVID-19 was at its peak. The Dow Jones Industrial Average incurred the third-largest daily percentage loss and largest daily point loss on March 16th, 2020, a week prior to our data collection (Imbert, 2020). Furthermore, at the time of data collection, news media reported panic-buying and the first lockdowns in the United States (Knowles et al., 2020).

A second strength of this investigation is that we tested predictions derived from both personality and cognitive theories to explain risky decision-making in reaction to a pandemic. Our findings are consistent with previous research on the relationships between Dark Triad traits and risk behaviour during global pandemics (e.g., Blagov, 2020; Stadler et al., 2020; Zajenkowski et al., 2020), and therefore add to the current understanding of how some personality traits can predispose people to endorse risky decision-making in response to real and present health threats.

There are three major limitations of the present investigation. First, to make our results comparable to previous ones, we measured individuals' responses to the disease problem as it was phrased nearly 40 years ago. It is possible that the deviation of results from the original Tversky and Kahneman (1981) study is, to some extent, due to cultural change over time. Alternatively, we note again that our results can be explained by CLT, which states that events that are perceived as an immediate threat result in adaptive behaviour (McDonald et al., 2015; Trope & Liberman, 2010). We believe that people do indeed respond differently when the threat is real (e.g., COVID-19) instead of hypothetical (e.g., Asian Disease Problem), but future research will be needed to measure other predictions made by CLT. For instance, how does spatial location influence decisions (e.g., when the threat is only in another country, rather than in one's own country)? (Trope & Liberman, 2010).

A second limitation is our use of a brief measure of the Dark Triad traits (i.e., the Dirty Dozen scale). Despite the acknowledged advantages of this scale (e.g., Jonason & Luévano, 2013), the Dirty Dozen scale has been criticised for capturing some, but not all, of the elements of each of Dark Triad trait (e.g., Maples et al., 2014; Miller et al., 2012). It is therefore desirable to replicate the present findings using longer more reliable scales to measure the Dark Triad traits.

A third limitation concerns the generality of our findings. Because our sample was limited to US-located participants, the results might be affected by the cultural context in which these data were collected. Moreover, detailed information about the participants such as their individual involvement, their healthcare insurance and their psychological distance from the situation were not recorded; all these life-circumstance differences could also plausibly affect risky decision-making in an ongoing pandemic. Future research should try to replicate these findings in other cultural contexts and in more representative samples. To further enhance generality, outcome data using actual behavioural measures are needed to complement these findings. Finally, the study captures data from only one period during the pandemic. We therefore encourage future researchers to examine the longitudinal effects of a pandemic from its earliest stages through the recovery stage.

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[5] This time period was marked by the declaration of the national emergency, extreme fear, lockdown, and sudden shortage of supplies, accompanied by a sharp but expected rise in the unemployment rate.

CONCLUSION

The COVID-19 outbreak poses an international health crisis. To implement appropriate strategies, an understanding of how trait-like individual differences influence people responses to health messages is especially important. We examined whether the framing of the scenario and the influence of the Dark Triad traits make a difference in risk-averse or risk-seeking decisions in response to COVID-19 pandemic. Our findings are consistent with those of other recent studies (e.g., Carvalho & Machado, 2020; Zajenkowski et al., 2020) in suggesting that people with higher levels of trait psychopathy engage in more risky behaviour and therefore less compliance behaviours such as adherence to recommended containment measures. Therefore, we can use our knowledge of personality to suggest that decision-makers with psychopathic tendencies may take unnecessary risks with other people's lives during a pandemic. In addition, we can use our knowledge of framing effects to increase the likelihood of more of the public complying with government restrictions.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix S1. Transformed data analysis

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