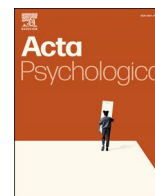




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Light and Dark core of personality and the adherence to COVID-19 containment measures: The roles of motivation and trust in government

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ABSTRACT

The present study investigated the relationship between the Light and Dark Core of personality and self-reported adherence to COVID-19 containment measures. A gender-balanced representative sample of 600 Slovaks participated in the study. We formulated a mediation model, hypothesising that the relationship between Light and Dark Core and self-reported adherence is mediated by the motivation to comply with the measures. The results of structural equation modelling showed that self-reported adherence was positively related to the Light Core and this relationship was also mediated by motivation. The Dark Core, in turn, showed a negative relationship with the adherence, while no mediation was found. Importantly, the findings of both Light and Dark Core models remained robust after including trust in government. The present study contributes to theory by providing first results corroborating the existence of Light Core of personality. The findings of this study can also help to better shape the communications about containment measures to address both individuals with high levels of benevolent and malevolent traits.

1. Introduction

The outburst of the COVID-19 pandemic put the global community under a serious threat from a rapidly spreading acute respiratory disease. To protect the citizens, governments around the world adopted stringent measures to contain the virus transmission. The extant literature points to the importance of communicating measures as protecting the most vulnerable individuals to increase motivation to adhere (Blagov, 2020). Yet, some people objected to complying even when severe penalties for non-compliance were imposed (Zajenkowski et al., 2020). This raises questions concerning the reasons underlying the mixed response to health communications and negative incentives.

Since adherence to containment measures can be considered a prosocial behaviour (Dinić & Bodroža, 2021), the Dark Triad attracted much attention as a construct that demonstrates predominantly negative relations with pro-sociality and health outcomes (Blagov, 2020; Neumann et al., 2020). Along with other malevolent characteristics, DT forms a broad disposition referred to as a Dark Core (Bader et al., 2021). Less is known, however, about the role of light personality traits, such as Light Triad, empathy and altruism, in adherence to containment measures. Complementing the limited picture provided by Dark Core

literature, we introduce and explore the existence of a new theoretical construct of Light Core that captures the bright side of human personality.

The present study contributes to the current knowledge by investigating the relationships of the broader constructs of Light and Dark Cores of personality and self-reported adherence to COVID-19 containment measures. In this study, the Light Core comprises the Light Triad, sympathy, altruism, and affective empathy, while the Dark Triad, ability to emotionally manipulate, and selfishness form the Dark Core. We proposed a mediation model (see Fig. 1) that directly builds on the literature concerning the impact of the Dark and Light Triads on a wide spectrum of behaviours (e.g., March & Marrington, 2021; Musek & Grum, 2021; Neumann et al., 2020; Sevi et al., 2020). However, this study goes beyond observing direct relations of the Light and Dark Cores and adherence, and also investigates the mediating role of motivation in this relationship. Furthermore, since trust in government was shown to be a significant driver of both motivation and compliance (e.g., Bearth et al., 2021), we included it as a control variable in the model. Finally, the present study contributes to the theory by exploring and comparing the Light and Dark Core constructs. Specifically, in the context of the COVID-19 pandemic, we investigated whether the Light Core explains

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the adherence to containment measures above and beyond the Dark Core.

1.1. Dark Core and the adherence to COVID-19 containment measures

The Dark Triad (DT), introduced by Paulhus and Williams (2002), comprises subclinical traits of Machiavellianism (defined as a manipulative personality), narcissism (grandiosity, entitlement, dominance and superiority) and psychopathy (high impulsivity and thrill-seeking along with low empathy and anxiety) with strong relations to a wide variety of behaviours, such as riskier sexual behaviour, using drugs, less healthy lifestyle, or unethical and criminal behaviour (Blagov, 2020; Hardin et al., 2021; Kaufman et al., 2019).

Going beyond the standard DT facets, growing evidence suggests that DT traits along with other malevolent characteristics form a broad dispositional tendency referred to as a Dark Core (DC, Bader et al., 2021; Moshagen et al., 2018, 2020). Importantly, the DC fares better in explaining a range of behavioural outcomes, including dishonest and selfish behaviour, than do other constructs such as the HEXACO Honesty-Humility or the Five Factor Model (Moshagen et al., 2018).

One of the important factors that joins the DC, along with DT characteristics, is selfishness. Generally, the relation between DT, selfishness and other associated socially aversive outcomes is well documented. Specifically, Kaufman et al. (2019) observed that DT is significantly positively related to a series of selfish outcomes, such as conspicuous consumption, aggression and utilitarian moral reasoning that subordinates an individual to the greater good. Unsurprisingly, the DT predicted selfish behaviour, particularly pathological selfishness. The findings substantiate the belief that individuals with a strong DT personality pursue their own goals or follies and, given their lack of empathy, they do not consider the negative social consequences of their actions. Consequently, they are unlikely to be dissuaded by the vision of hurting others. In the pandemic context, such individuals are less likely to be involved in socially beneficial or protective behaviour, unless it sustains their egos or satisfies particular goals.

This may be also due to DT facets, particularly narcissism, being positively related to the desire to preserve social status even through emotional manipulation (Waddell et al., 2020). Indeed, using network analysis, Marcus et al. (2018) corroborated the view that manipulation is the most central among the DT traits, suggesting that it may represent another important factor of the DC. Together with callousness, it linked

all three DT dimensions considerably better than, for instance, spitefulness or aggressiveness. The analysis showed that without interpersonal manipulation in the model, DT facets would lose their connectedness.

To delve deeper into the personality foundations of adherence to containment measures, the current study combines DT characteristics with selfishness and emotional manipulation to represent the DC construct. The studies on COVID-19 pandemic suggest that DC could be, indeed, associated with the lower adherence to containment measures. In particular, the negative effects of DT traits were corroborated during the COVID-19 pandemic. There is growing evidence that Machiavellianism and psychopathy predict lower engagement in social distancing and cleanliness, including washing hands and disinfecting frequently touched surfaces and objects (Blagov, 2020; Hardin et al., 2021; Nowak et al., 2020; Triberti et al., 2021; Zajenkowski et al., 2020). The recent studies show that, at the beginning of the COVID-19 pandemic, DT traits were positively related to self-serving but socially harmful behaviours, such as stockpiling of food, hygienic products and personal protective equipment (e.g., Hardin et al., 2021; Nowak et al., 2020). Overall, the literature indicates that, with regard to behaviour affecting others, the effect of DT traits on compliance may be explained by selfishness, including prioritisation of own family, and less empathic concern (Schiffer et al., 2021).

1.2. The role of Light Core in containing the COVID-19 pandemic

Since DT traits' relationship with adherence to containment measures is modest (Zajenkowski et al., 2020) and the elevated levels of those traits are typically found in only 5 to 25% of individuals (Neumann et al., 2020), the picture provided by the DT literature is necessarily limited. In addition, much less is known about how the benevolent traits contribute to adherence to containment measures. Given that adherence comes at a certain cost to an individual and is perceived as a prosocial and selfless behaviour, it is likely associated with light traits (Blagov, 2020; Pfattheicher et al., 2020).

To capture the bright side of human nature, Kaufman et al. (2019) proposed a novel concept of the Light Triad (LT) including benevolent and prosocial dimensions. The concept comprises items conceptually opposite – but not simple reverse – to the original DT dimensions. After achieving an experts' agreement and conducting both exploratory and confirmatory factor analysis, authors proposed a three-dimensional

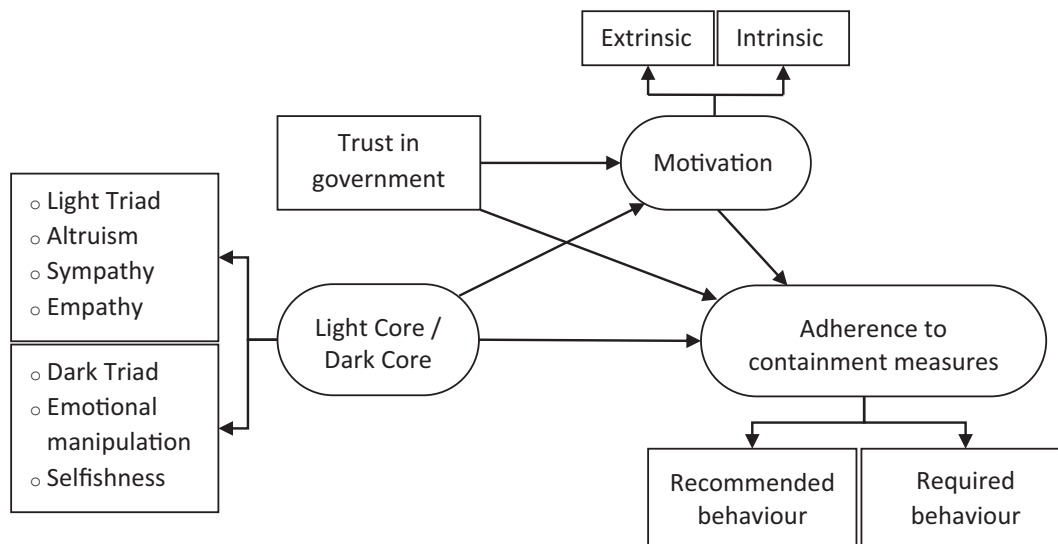


Fig. 1. Proposed mediation model

Note: The model was investigated separately for Light Core and Dark Core personality traits. Trust in government was included as a covariate.

Light Triad scale. The three dimensions reflect an individual's stable dispositions to believe in the fundamental goodness of humans (Faith in Humanity), value the dignity and worth of each individual (Humanism), and treat people as ends unto themselves (Kantianism). The authors claimed that, though showing contrasting behavioural outcomes, the LT is not reducible to DT (Kaufman et al., 2019). In their validation study, the concept explained a number of benevolent phenomena (e.g., compassion, sympathy or altruism) above and beyond the explanation provided by the DT, HEXACO Honesty-Humility or Big Five Agreeableness.

Pre-pandemic studies provided considerable evidence that LT dimensions correlate positively with pro-sociality. For instance, the LT was strongly and positively related to empathy, compassion and altruism, and negatively to selfishness (Kaufman et al., 2019). In fact, the strong link of the LT and other benevolent traits has brought us to believe that, analogously to DC, LT could form a conceptually opposite construct of Light Core (LC) along with the benevolent factors, such as empathy, compassion, and altruism. The question remains whether such a new LC construct could potentially explain complying behaviour beyond the DC.

Although to our knowledge there is no research investigating LT's relationship with adherence to containment measures, other benevolent traits strongly related to LT, such as empathy and altruism, resulted in explaining a considerable portion of the complying behaviour. For instance, in a cross-cultural study, individuals scoring high in empathy reported wearing face masks more frequently and, hence, were more likely to be motivated by care for others (Zirenko et al., 2021). Similarly, Pfattheicher et al. (2020) observed that not only empathy was positively related to self-reported distancing and wearing a face mask but also inducing empathy was shown to increase the endorsement of those containment measures.

The role of empathy in prosocial behaviour is well explained by the empathy-altruism hypothesis (Batson et al., 2015) stating that empathic concerns make individuals more sensitive to how negatively their behaviour may affect others' welfare. Empirical studies lend credence to the view. For instance, O'Brien et al. (2021) established that prosocial personality including altruism predicted more positive reactions to containment measures, such as calls to wear a mask or isolate, and a greater sense of personal responsibility for preventing the virus spread. Likewise, individuals scoring higher in altruism showed more willingness to follow social distancing recommendations and refrained from dining in restaurants (Cato et al., 2020).

1.3. Motivation and trust in relation to the adherence to containment measures

1.3.1. Motivation

Though personality could account for as much as 30% of variation in adherence, even amidst the pandemic and the trauma it created, it is unlikely that personality traits could be easily affected and changed (Martinsen et al., 2021). Thus, responding to low adherence requires investigating factors that drive the relationship between personality and adherence that could be addressed by interventions more directly. For instance, Martela et al. (2021) stressed the importance of intrinsic motivation in following containment measures, particularly those that cannot be controlled nor punished by the authorities. Internal motivation not only fosters compliance with such measures but also makes volitional changes lasting, possibly through supporting an individual's sense of autonomy as opposed to being coerced. Though external pressures can temporarily increase motivation, compliance is likely to erode quickly without internalisation. Communications underlying individuals' agency in containing the pandemic and protecting others' health may increase motivation by creating a sense of relatedness and common fate and, thus, providing a meaningful rationale for adherence. Concurrently, the extant literature on empathy indicates that communications highlighting that containment measures save lives and protect

others evoke more empathic concern and, therefore, strengthen the intrinsic motivation to comply (Bellato, 2020).

However, Blagov (2020) found that individuals with dark traits – compared to those scoring high on benevolent traits – reported lower appeal of compassion-framed communications, indicating that individuals with high levels of malevolent traits may feel less motivated to comply for others' sake. Consequently, they should be addressed differently. For example, the DT literature indicates that narcissists could be persuaded by self-serving motivations to adhere to measures primarily associated with greater social visibility and recognition (Schiffer et al., 2021). It remains unclear; however, what could motivate people scoring low on narcissism but high on other malevolent traits and so less interested in maintaining reputation. Triberti et al. (2021) speculated that those individuals could be convinced by communications underlying self-centred motivations, including work productivity, vision of faster return to normality and, eventually, extrinsic motivations including negative incentives.

1.3.2. Trust in government

Even the best-tailored communications appealing to either prosocial or egoistic motivations are bound to fail when the authority issuing them is deemed untrustworthy (Bearth et al., 2021). The importance of trust in government in the adherence could be explained by the belief that containment measures are designed to curb the virus transmission and serve the community interests. Hence, even stringent, coercive measures could be voluntarily accepted – despite negative incentives – when imposed by a trustworthy entity (Martela et al., 2021). During the COVID-19 pandemic, the relationship between trust and adherence with containment measures was illustrated at both regional and individual level. For instance, based on the European Social Survey and Eurobarometer data, Bargain and Aminjonov (2020) observed that the effect of travel bans was stronger in regions with greater pre-pandemic trust in government. Similarly, in a cross-national study, Alfaro et al. (2020) observed that trust at a country level explains the reduction in mobility above and beyond governmental regulations. That is, in regions with higher levels of trust, individuals were more likely to reduce mobility before governments put lockdowns in force and kept it lower even after lockdowns had been lifted.

At the individual level, Uddin et al. (2021) indicated that trust in government is strongly related with the willingness to adhere across a wide spectrum of measures, including distancing, personal protection and hygiene. Pak et al. (2021) found that the importance of trust increases with the measures' stringency: the more restrictive the regulations, the more trust relates with adherence. Likewise, Bearth et al. (2021) observed that individuals scoring high in trust in government were also more accepting of containment measures and reported more compliance. The finding was further corroborated among young individuals for whom lower trust in government was related to reduced willingness to adhere to distancing measures (Nivette et al., 2021).

2. Model and hypotheses

To integrate the findings on the relations between light and dark personality traits, motivation, trust in government and self-reported adherence to containment measures, we proposed a mediation model, shown in Fig. 1. The model was tested separately for Light Core and Dark Core latent constructs. The Light Core comprised LT, sympathy, altruism, empathy, while the Dark Core consisted of DT, selfishness and ability to emotionally manipulate, respectively. We then separately investigated the role of the LC and DC in adherence to containment measures. Based on studies investigating the roles of malevolent (Blagov, 2020; Hardin et al., 2021; Nowak et al., 2020; Triberti et al., 2021; Zajenkowski et al., 2020) and benevolent traits (Cato et al., 2020; O'Brien et al., 2021; Pfattheicher et al., 2020; Zirenko et al., 2021) in the adherence to containment measures, we expected the DC to be negatively (H1) and the LC to be positively related to self-reported adherence

to containment measures (H2).

Apart from the direct relations between the LC and DC and self-reported adherence to containment measures, we aimed to investigate the mediating role of motivation for these relationships. In line with the empathy-altruism hypothesis, greater levels of empathy and concern for others might motivate individuals with strong LC to comply with the containment measures. The extant literature explains that in caring more for others, such individuals may have a stronger motivation to adhere to containment measures to avoid harming others (Cato et al., 2020). This could, however, not be the case of individuals with strong DC. Previous research indicated that all three DT dimensions are linked by low empathy and, thus, those high in DC could be less motivated to adopt behaviour that predominantly benefits other people for whom they otherwise have little concern (Triberti et al., 2021). They might be motivated with external incentives to a certain degree, but adherence is likely to erode quickly with only extrinsic motivations (Martela et al., 2021). Therefore, individuals scoring high in DC may be generally less motivated to comply with containment measures. Accordingly, we hypothesised that motivation plays a mediating role in the case of the relationship between LC and adherence (H3) but not for the relationship between DC and adherence (H4).

Finally, to provide a more thorough picture of the relationships between LC and DC, motivation, and adherence, we also included trust in government in our analysis. The literature suggests that trust in government plays a key role regarding the adherence (Alfaro et al., 2020; Pak et al., 2021; Uddin et al., 2021). Moreover, it is believed that communicating containment measures by trustworthy leaders and policymakers helps to better internalise these restrictions (Martela et al., 2021), indicating that trust in government may also relate to individuals' motivation to comply. Due to these possible outcomes, we have decided to include trust in government in our mediation models to see whether the relationships between LC and DC, motivation, and adherence remain robust.

3. Methods

3.1. Participants and procedure

A representative sample of 600 Slovaks (300 men, 300 women) aged 18 to 86 years ($M = 43.12$, $SD = 15.48$) were recruited by an external research agency to complete an online survey hosted on Qualtrics. The agency provided incentives for the participants consistent with local market conditions. The design of the study was approved by the ethical committee of the Centre of Social and Psychological Sciences, Slovak Academy of Sciences. The participants were not deceived at any point. They were informed that the data will remain confidential and that they can leave the survey at any moment. After signing an informed consent form and reading the general instructions, the participants responded to questions about sex, age, education and marital status. All items included in the online survey were compulsory. The survey contained three attention check items. Individuals who failed to select correct answers were excluded. The complete questionnaire in English along with the dataset is available at Open Science Framework repository (https://osf.io/67uh9/?view_only=6a9201f529d449b39b22261c78c89df8).

3.2. Measures

3.2.1. Light Core

3.2.1.1. Light Triad. A 12-item Light Triad Scale developed by Kaufman et al. (2019) was used to measure the LT. The scale measures three dimensions, namely Faith in Humanity, representing believing in the fundamental goodness of humans (e.g. "I tend to see the best in people"); Humanism, measuring how much an individual values the dignity and

worth of each individual (e.g. "I tend to treat others as valuable"); and Kantianism, representing the tendency to treat others as ends unto self (e.g. "I prefer honesty over charm"). The participants responded on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*).

3.2.1.2. Sympathy and Altruism. The Sympathy and Altruism subscales from the IPIP-NEO personality inventory (Maples et al., 2014) were used to gauge individuals' sympathy and altruism. Individuals scoring high in sympathy are compassionate and strongly affected by others' sufferings (e.g. "I am someone who suffers from others' sorrows"). Altruism reflects individuals' tendency to help others in a generous and selfless way (e.g. "I am someone who loves to help others"). Both subscales consist of four items and were answered on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*).

3.2.1.3. Empathy. The empathic concern subscale from the Interpersonal Reactivity Index (Davis, 1980) was used to measure individuals' empathy. The subscale measures the tendency to experience feelings of warmth, compassion and concern for unfortunate others (e.g. "I often have tender, concerned feelings for people less fortunate than me"). The subscale consists of seven items and was answered on a 5-point scale (1 = *does not describe me well*, 5 = *describes me very well*).

3.2.2. Dark Core

3.2.2.1. Dark Triad. A 27-item Short Dark Triad scale developed by Jones and Paulhus (2014) was used to measure DT characteristics. The scale consists of three dimensions, as follows; Machiavellianism, capturing individuals' manipulateness, lack of morality and cynical worldview (e.g. "I like to use clever manipulation to get my way"); Narcissism, measuring grandiosity and tendency to admire one's self-image (e.g. "I know that I am special because everyone keeps telling me so"); and Psychopathy, measuring impulsivity and callousness (e.g. "I like to get revenge on authorities"). The participants responded on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*).

3.2.2.2. Emotional manipulation. A 10-item Emotional Manipulation Scale (Austin et al., 2007) was used to measure individuals' ability to emotionally manipulate others. The scale measures the ability to influence another individual's feelings and behaviour for one's own benefit (e.g. "I know how to make another person feel uneasy"). The participants responded on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*).

3.2.2.3. Selfishness. A 24-item Selfishness Questionnaire (Raine & Uh, 2019) was used to measure individuals' selfishness defined as an excessive focus on one's own welfare, regardless of the wellbeing of other persons. The scale consists of three subscales, namely egocentric selfishness (e.g. "I care for myself much more than I care for others"), adaptive selfishness (e.g. "At the end of the day, I care mostly for myself, my family, and friends who can help me") and pathological selfishness (e.g. "If I'm honest, there are times when I put myself first, even if it's someone else's loss"). The participants responded on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*).

3.2.3. Motivation

A 19-item Treatment Motivation Scale was adapted to measure individuals' motivation to adhere to the pandemic measures (Apóstolo et al., 2007). The original scale was used to examine the specific motivations to adopt a healthy lifestyle regarding diabetes treatment, glucose control and practising exercises. We adapted the scale to enquire about the motivations to adhere to the containment measures. The scale measures both autonomous intrinsic motivation (e.g. "I believe I will improve my health by doing it") and controlled extrinsic motivation (e.g. "Other people would be furious at me if I didn't"). The participants

responded on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*).

3.2.4. *Trust in government*

Given the focus of this study, we aimed to investigate individuals' trust in the government's efficiency in managing the COVID-19 pandemic. Therefore, we combined three questions used by Saechang et al. (2021), two questions by Pak et al. (2021) and one question by Han et al. (2021). The questions were adapted in a way that they retrospectively asked about trust during the second wave of the COVID-19 pandemic (e.g. "How much did you believe in the capacity of the current government to effectively cope with the second wave of the COVID-19 pandemic in terms of the policy?"). The participants responded on a 5-point scale (1 = *did not trust at all*, 5 = *trusted completely*).

3.2.5. *Adherence to containment measures*

3.2.5.1. *Recommended behaviour.* To measure the individuals' willingness to adhere to the hygiene recommendations to reduce the spread of the COVID-19 virus during the second wave of the pandemic, we created a set of 10 recommendations that combined items used by Jordan et al. (2020) with the recommendations issued by the World Health Organisation (WHO) and the Ministry of Health of the Slovak Republic (e.g. "I washed my hands with soap every time I have touched an item that was touched by other people"). The participants indicated how often they adhered to the recommendations during the second wave of the pandemic using a 5-point scale (1 = *not at all*, 5 = *always*).

3.2.5.2. *Required behaviour.* Excepting voluntary hygienic recommendations, we asked individuals about their willingness to adhere to the containment measures required by the Slovak government during the second wave of the pandemic. We created a set of 10 items that reflected the most stringent restrictions the government has taken (e.g. "I entered the facilities and their exterior parts only with a valid confirmation of a negative result of a COVID-19 test"). The participants responded to how often they adhered to the restrictions during the second wave of the pandemic using a 5-point scale (1 = *not at all*, 5 = *always*).

3.3. *Statistical analyses*

To explore the role of LC and DC personality traits in the adherence to containment measures, we tested two separate mediation models (see Fig. 1) using the structural equation modelling carried out in Amos SPSS 21.0 software. The models included LC (or DC, respectively) as a predictor (X) of the adherence (Y) and motivation to comply (M) as a mediator. Since previous studies showed trust in government significantly related to the adherence, we included this factor as a covariate.

Following Hooper et al.'s (2008) recommendations, we evaluated the overall fit of the models using a Chi-square test, root mean square approximation error (RMSEA), standardised root mean square residual (SRMR), comparative fit index (CFI), and Normed-fit index (NFI). To examine the mediation, we adopted a percentile-based bootstrapping estimation approach with 2000 samples (Hayes & Scharkow, 2013). If the relative indirect effect was different from zero according to percentile-based bias-corrected bootstrap confidence intervals (CIs), we concluded that the mediation was present (see Hayes & Preacher, 2014). The models were based on maximum likelihood (ML) estimation without the missing values.

4. Results

4.1. *Descriptive statistics*

A correlation matrix along with the descriptive statistics and reliability coefficients for the predictors, mediator and outcome variables is

Table 1
Descriptive statistics and correlation matrix.

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1 Government trust	2.40	1.19	(0.95)																
2 Recommended behaviour	3.88	0.82	0.27***	(0.91)															
3 Required behaviour	4.03	0.80	0.36***	0.59***	(0.85)														
4 Extrinsic motivation	3.33	0.85	0.50***	0.51***	0.50***	(0.76)													
5 Intrinsic motivation	3.23	1.06	0.53***	0.58***	0.57***	0.85***	(0.95)												
6 LT_Humanism	3.17	0.85	0.10*	0.11**	0.08	0.21***	0.18***	(0.76)											
7 LT_Faith in humanity	3.76	0.66	0.14***	0.20***	0.15**	0.30***	0.27***	0.48***	(0.69)										
8 LT_Kantianism	3.79	0.67	0.05	0.14**	0.11**	0.15***	0.16***	0.28***	0.46***	(0.60)									
9 Altruism	4.10	0.66	0.07	0.22***	0.11**	0.15***	0.14***	0.35***	0.47***	0.35***	(0.74)								
10 Sympathy	3.71	0.72	0.12**	0.18***	0.09*	0.15***	0.15***	0.30***	0.49***	0.34***	0.55***	(0.71)							
11 Empathy	3.81	0.60	0.10*	0.22***	0.15***	0.17***	0.16***	0.27***	0.46***	0.35***	0.60***	0.69***	(0.72)						
12 DT_Machiavellianism	3.26	0.64	-0.04	-0.09*	-0.15***	0.08	0.01	-0.19***	-0.04	-0.14***	-0.06	-0.15***	-0.22***	(0.76)					
13 DT_Narcissism	2.64	0.62	0.03	0.07	-0.07	0.11**	0.05	0.12**	0.13**	-0.09*	0.13**	0.04	0.04	0.26***	(0.74)				
14 DT_Psychopathy	2.05	0.63	-0.08*	-0.18**	-0.24***	-0.09*	-0.10*	-0.19***	-0.20***	-0.20***	-0.30***	-0.26***	-0.36***	0.43***	0.28***	(0.75)			
15 Emotional manipulation	2.54	0.87	<0.01	-0.07	-0.12**	0.04	<0.01	-0.06	-0.07	-0.14***	-0.16***	-0.14***	-0.19***	0.51***	0.37***	0.61***	(0.90)		
16 Selfishness	2.75	0.64	-0.05	-0.13**	-0.12**	0.05	0.01	-0.23***	-0.25***	-0.25***	-0.34***	-0.36***	-0.43***	0.60***	0.14***	0.57***	0.54***	(0.90)	

Note: LT – Light Triad, DT – Dark Triad, values in parentheses report McDonald's omega reliability coefficients.

* p < .05.
** p < .01.
*** p < .001.

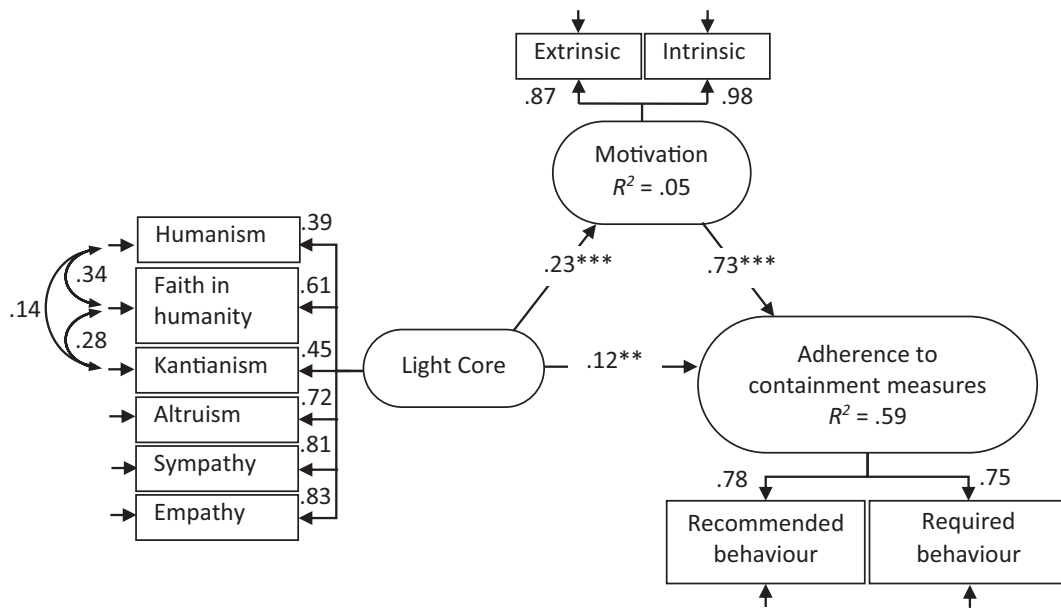


Fig. 2. Standardised direct coefficients and factor loadings for the Light Core mediation model. Note: ** $p < .01$, *** $p < .001$.

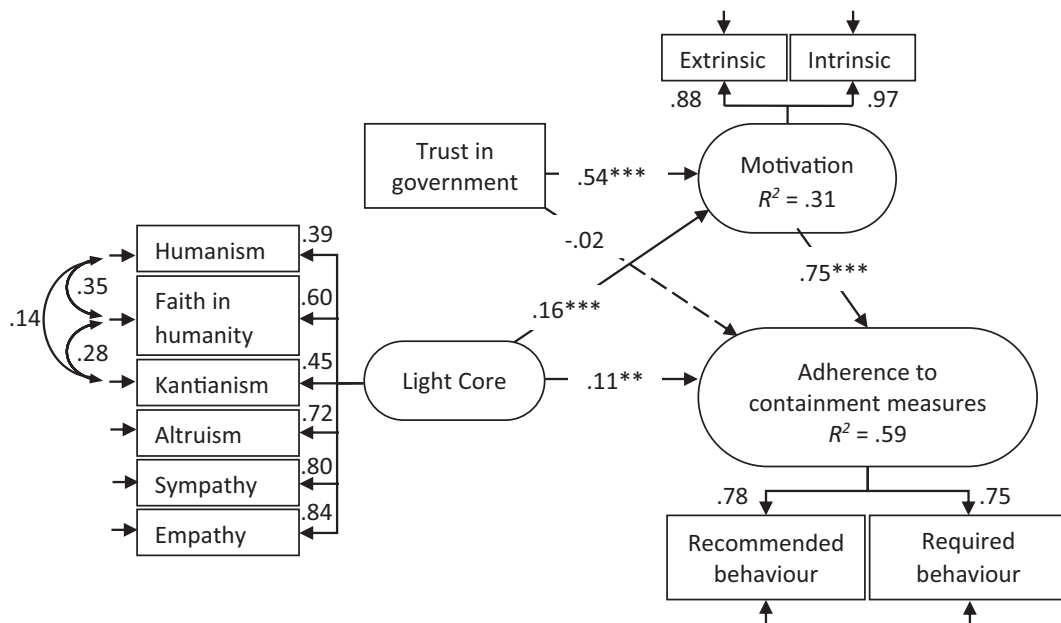


Fig. 3. Standardised direct coefficients and factor loadings for the Light Core mediation model including trust in government as a covariate. Note: Paths that are not statistically significant ($p > .05$) are illustrated with dashed line. ** $p < .01$, *** $p < .001$.

reported in Table 1. As expected, LC traits positively related with each other, showing moderate to strong correlations. A very similar pattern was found within the DC traits where the weak-to-strong correlations between the factors were found. Generally, the LC showed positive relationships with self-reported adherence to both recommended and required behaviours, while the DC correlated negatively. Furthermore, there was a positive moderate relationship between motivation and self-reported adherence. Consistent with previous studies (e.g. Gerymski & Krok, 2019; Kaufman et al., 2019; Lukić & Živanović, 2021), the LT Kantianism subscale showed a rather low reliability.

Before testing the LC and DC mediation models, we checked for multivariate normality and multicollinearity. The highest Cook's Distance was 0.024, suggesting no potential outliers. To check for multicollinearity, all LC and DC personality traits, trust in government, and

extrinsic and intrinsic motivation served as independent variables, while adherence to containment measures was entered as a dependent variable. The VIF values of extrinsic and intrinsic motivation were 3.98 and 3.96, respectively, indicating a collinearity problem. All tolerance values were above 0.1 (ranging from 0.25 to 0.76). Considering a high collinearity and correlation ($r = 0.85$) between extrinsic and intrinsic motivation, we decided to include these two factors into one joint latent factor of motivation in the further analyses. Finally, before testing the mediation models, we performed CFA for both LC and DC latent constructs solely to see whether the data fit with these hypothesised constructs. After minor adjustments, both models showed good model fit (see supplementary materials at Open Science Framework repository https://osf.io/67uh9/?view_only=6a9201f529d449b39b22261c78c89df8).

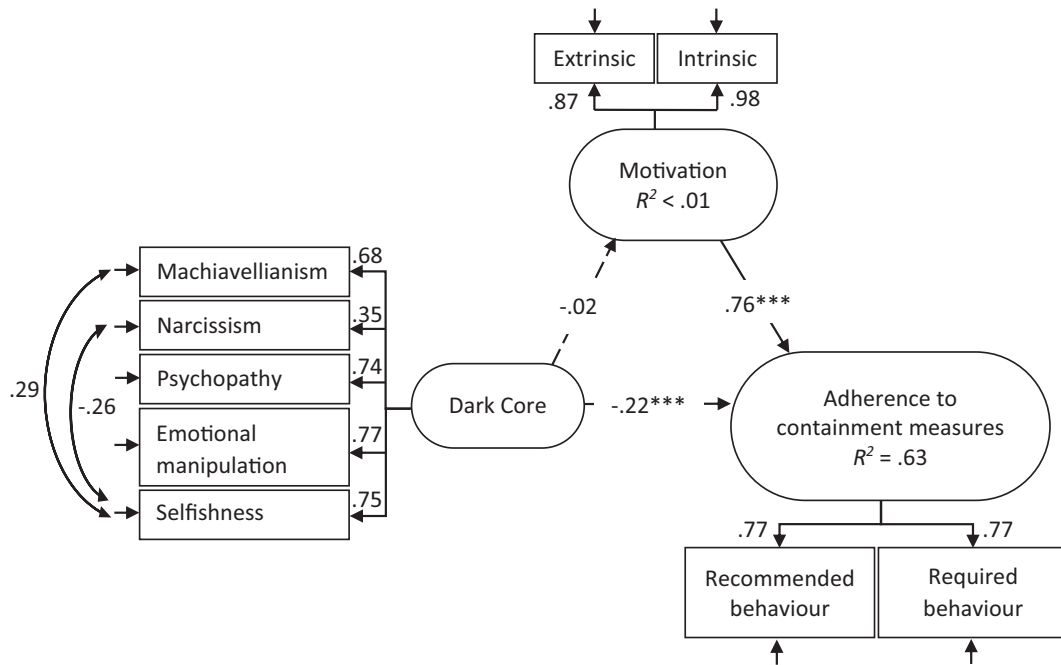


Fig. 4. Standardised direct coefficients and factor loadings for the Dark Core mediation model. Note: Paths that are not statistically significant ($p > .05$) are illustrated with dashed line. *** $p < .001$.

4.2. Light Core mediation model

4.2.1. Model without trust in government as a covariate

In the first step, we tested the LC mediation model without trust in government. The results of the structural equation modelling (SEM) showed that the fit of the measurement model was not satisfactory ($\chi^2 = 5.58$; $df = 32$; $p < .001$; $SRMR = 0.05$; $CFI = 0.95$; $NFI = 0.93$; $RMSEA = 0.087$; $RMSEA\ 90\% \text{ CI} [0.075, 0.100]$; $PCLOSE < 0.001$). The reason for this was a high covariance in the error terms between the LT subscales. Since these subscales measure one common factor of LT, it seemed justifiable to add a link between the error terms and again check the fit of the model. The adjusted model showed a good overall fit with the data ($\chi^2 = 2.69$; $df = 29$; $p < .001$; $SRMR = 0.05$; $CFI = 0.98$; $NFI = 0.97$; $RMSEA = 0.053$; $RMSEA\ 90\% \text{ CI} [0.039, 0.067]$; $PCLOSE = 0.34$); hence, we decided to keep these error terms linked in further analyses.

Fig. 2 presents the standardised direct effects between the factors. The LC positively related both with motivation to comply and self-reported adherence to the measures. LC accounted for 5.3% of the motivation variance. Finally, the motivation positively related with the adherence. Together, the two predictors (LC, motivation) accounted for 59% of the adherence variance.

Except for the direct relationships, we examined the specific indirect mediating effect of the LC on adherence through the motivation to comply. It was shown that the relationship between the LC and adherence was significantly mediated by the motivation (*Unstandardised estimate* = 0.19; *Standardised estimate* = 0.17; $p < .01$; $95\% \text{ CI} [0.101, 0.240]$), indicating that individuals scoring higher on LC showed greater motivation, while the higher motivation was associated with the increase in the self-reported adherence.

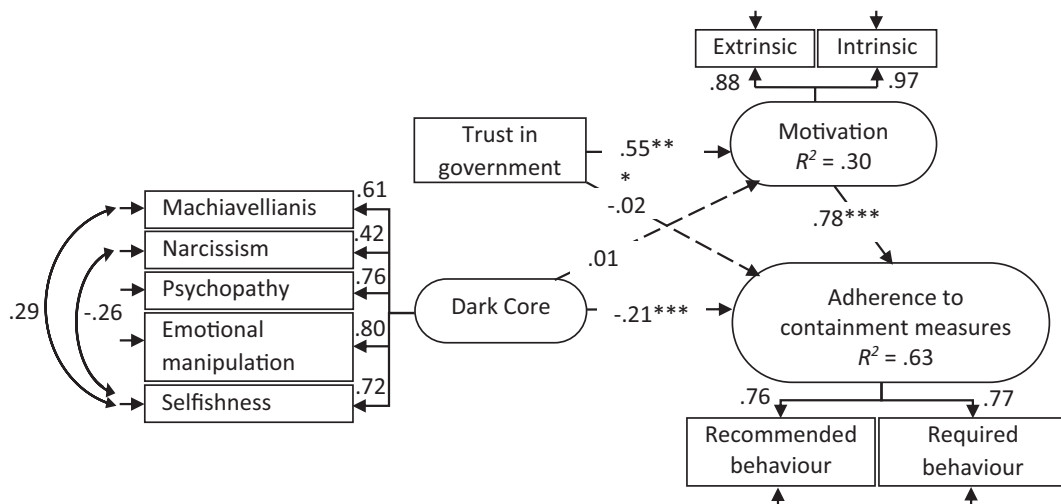


Fig. 5. Standardised path coefficients and factor loadings for the Dark Core mediation model including trust in government as a covariate. Note: Paths that are not statistically significant ($p > .05$) are illustrated with dashed line. *** $p < .001$.

4.2.2. Model including trust in government as a covariate

Next, trust in government was added as a covariate to the mediation model. The model fit was good ($\chi^2 = 2.76$; $df = 37$; $p < .001$; $SRMR = 0.06$; $CFI = 0.98$; $NFI = 0.97$; $RMSEA = 0.054$; $RMSEA\ 90\% CI [0.042, 0.067]$; $PCLOSE = 0.27$). Even after controlling for the effect of trust in government, the LC still positively related both with motivation and the self-reported adherence (see Fig. 3). Trust in government positively related with motivation to comply. It is worth noting that the explained variance of motivation has increased from 5.3% to 31%. The association of trust in government with the self-reported adherence was non-significant. The motivation significantly positively related with the self-reported adherence. The explained variance of the adherence to containment measures (59%) remained the same as in the model without trust in government.

Finally, after including trust in government in the model, the relationship between the LC and the adherence was still mediated by motivation (*Unstandardised estimate* = 0.11; *Standardised estimate* = 0.12; $p < .01$; $95\% CI [0.069, 0.185]$).

4.3. Dark Core mediation model

4.3.1. Model without trust in government as a covariate

As for the LC, we first tested the DC mediation model without trust in government. The results of the SEM suggested a poor model fit ($\chi^2 = 6.43$; $df = 24$; $p < .001$; $SRMR = 0.05$; $CFI = 0.95$; $NFI = 0.94$; $RMSEA = 0.095$; $RMSEA\ 90\% CI [0.081, 0.110]$; $PCLOSE < 0.001$). We ascertained that there was a high correlation of the error terms between Selfishness and Machiavellianism, and Selfishness and Narcissism. Correlating these error terms increased the model fit substantively ($\chi^2 = 3.80$; $df = 22$; $p < .001$; $SRMR = 0.04$; $CFI = 0.97$; $NFI = 0.97$; $RMSEA = 0.068$; $RMSEA\ 90\% CI [0.053, 0.084]$; $PCLOSE = 0.03$), so we linked these error terms in further analyses.

Fig. 4 presents the standardised direct effects between factors. The DC negatively related with self-reported adherence, but did not significantly relate with motivation to comply with the measures, explaining a negligible amount of variance ($R^2 < 0.01$). Considering the direct effects of the motivation, we found a very similar pattern as in the LC model, i.e. it was strongly associated with the adherence. Finally, DC and motivation together accounted for 63% of the self-reported adherence variance.

Using a percentile-based bootstrapping estimation method with 2000 samples, we investigated the specific indirect mediating effect of the DC on the adherence through motivation. We revealed considerably different findings than for the LC model. We did not find a significant indirect mediating effect of the DC on the adherence through motivation (*Unstandardised estimate* = 0.01; *Standardised estimate* = 0.01; $p = .83$; $95\% CI [-0.059, 0.078]$).

4.3.2. Model including trust in government as a covariate

As a second step, trust in government was added as a covariate to the DC mediation model. The model fit was good ($\chi^2 = 3.41$; $df = 29$; $p < .001$; $SRMR = 0.04$; $CFI = 0.97$; $NFI = 0.96$; $RMSEA = 0.065$; $RMSEA\ 90\% CI [0.050, 0.077]$; $PCLOSE = 0.05$). After adding trust in government as a covariate, the DC still negatively related with self-reported adherence and its relationship with motivation remained non-significant (see Fig. 5). Considering trust in government, we found a very similar pattern as in the LC model, i.e. it positively related with motivation, but did not significantly relate with self-reported adherence. Finally, motivation was strongly associated with the adherence and, together with DC and trust in government, it explained 63% of the adherence variance.

After including trust in government as a covariate, the specific indirect mediating effect of the DC on adherence through motivation remained non-significant (*Unstandardised estimate* = 0.01; *Standardised estimate* = 0.01; $p = .83$; $95\% CI [-0.059, 0.078]$).

5. Discussion

The objective of the paper was to investigate how LC and DC are related with the self-reported adherence to the COVID-19 containment measures. Going beyond observing direct relations of the LC and DC and the adherence, we also investigated the mediating role of motivation in these relationships. To investigate the robustness of our models, we included trust in government as an important factor for both motivation and compliance. Apart from corroborating the previous findings concerning the negative relation of DC and adherence, our results provide support for the existence of LC and highlight its importance in beneficial and socially concerned behaviour. The study also expands the current knowledge about malevolent and benevolent personality characteristics by exploring and comparing how Light and Dark Core differ in their relationship with the adherence. Most notably, the results suggest that individuals with high levels of benevolent and malevolent characteristics differ in the level of motivation towards the adherence to containment measures. This indicates the practical importance of better shaping the communications about containment measures to address motivations of both individuals with high levels of malevolent and benevolent characteristics.

5.1. Light Core, Dark Core, and adherence to containment measures

The study indicates that both LC and DC are related with responses to the threat posed by the COVID-19 pandemic. In line with the literature, LC was positively related to self-reported adherence to containment measures (Cato et al., 2020; O'Brien et al., 2021; Pfattheicher et al., 2020), while DC showed a negative relationship (Blagov, 2020; Hardin et al., 2021; Triberti et al., 2021; Zajenkowski et al., 2020), supporting our hypotheses H1 and H2. Given the prosocial nature of adherence to containment measures, the results suggest that individuals scoring high on LC may be prone to be oriented pro-socially. In turn, those scoring high on DC display a tendency to behave in a socially aversive manner. The findings are consistent with the literature on DT and malevolent or careless attitudes towards containment measures and hygiene (Nowak et al., 2020; Schiffer et al., 2021).

The reason why LC may have a substantively different relationship with the adherence than DC could be explained by the empathy-altruism hypothesis (Batson et al., 2015). Since empathic concerns associated with LC make individuals more sensitive to how negatively their behaviour may affect others' welfare, individuals with benevolent traits naturally tend to behave in a harmless and protective way towards others. In addition, previous studies showed that malevolent characteristics exhibit strong relations to various negative health-related behaviours, such as riskier sexual behaviour, using drugs, or less healthy lifestyle (Blagov, 2020; Hardin et al., 2021; Kaufman et al., 2019). Our results expand these findings by showing that these individuals may also have somewhat careless and risky attitudes when it comes to avoiding and spreading the COVID-19 disease.

5.2. The role of motivation and trust in government

Aware of the relatively constant nature of personality characteristics (Martinsen et al., 2021), we investigated the mediating role of motivation in the relation between LC and DC and self-reported adherence to containment measures. The importance of motivation mediating the relation between personality and behaviour lies in the possibility of addressing it directly through interventions and targeted communication strategies (Bellato, 2020; Martela et al., 2021).

As hypothesised, motivation mediated the relationship between LC and the adherence, supporting H3. Individuals scoring high in LC showed stronger motivation to comply with the containment measures, while the motivation was associated with higher reported adherence. In

contrast, motivation was unrelated to DC and no mediation was found in the DC model, supporting H4. Consistent with the empathy-altruism hypothesis, this suggests that individuals with stronger LC characteristics sympathise more with others and have more concern for their wellbeing (Martela et al., 2021). Hence, the motivation has a greater potential to prompt in them durable behavioural changes in a socially desirable direction.

Another important finding is that the relationships between LC and DC, motivation, and self-reported adherence remained robust after including trust in government in the model. Previous studies suggest that trust in government plays an important role when it comes to both the motivation (Bellato, 2020; Martela et al., 2021) and the actual or self-reported adherence (Alfaro et al., 2020; Pak et al., 2021; Uddin et al., 2021). Indeed, our results indicate that trust in a government's ability to manage the pandemic was strongly related to the motivation to comply, considerably stronger than LC or DC. However, contrary to previous studies showing that trust in government is directly related to adherence (Bearth et al., 2021; Pak et al., 2021; Uddin et al., 2021), we found no such a direct relationship. Instead, while LC and DC show stronger direct relations with self-reported adherence, trust in government appears to be potentially a key factor in enhancing an individuals' motivation to comply, but not – at least not directly – the actual adherence.

Noteworthy, the study was performed in Slovakia, a country scoring low in trust in government. According to the most recent OECD data, with only 30.74% citizens trusting the government, Slovakia ranked sixth worst among all 41 countries that participated in the survey in 2020 (OECD, 2020). For comparison, even amidst the pandemic, the leading countries – Switzerland and Norway – outperformed Slovakia by 53.9 and 52.2%, respectively. In addition, a fine grained longitudinal data collected in Slovakia indicate that, during the pandemic, trust in government eroded significantly (data available at <http://sasd.sav.sk/en/>). Starting from 54.4% in April 2020, the score has dramatically fallen to only 17.2% in May 2021 when our data was collected. Given the low trust level, our results indicate that there is a considerable potential to promote adherence to containment measures by increasing trust in government among Slovak citizens.

5.3. Study limitations

Despite our best efforts, this study has some limitations. First of all, the study is cross-sectional and, thus, it is impossible to draw conclusions about causal relations between the investigated phenomena. Future longitudinal studies could reveal whether changes in motivation and/or trust in government actually elicit relevant observable behavioural responses.

Additionally, our sample could be considered as WEIRD (Western, Educated, Industrialised, Rich, and Democratic) and recently there appeared concerns about generalizability of personality research beyond such a specific cultural context (Henrich et al., 2010). Alper and Yilmaz (2019) indicated that the relations between Big Five traits and moral as well as political beliefs are not stable across the cultures. On the contrary, other research corroborates the view that – despite some cultural differences – there is a considerable consistency in how DT traits are related, for instance, to a parent-child relationship (Tajmiriyahi et al., 2021). Given the mixed nature of the results and the fact the evidence from non-Western cultures is still scant, further research is needed to delve deeper into the cross-cultural variability of personality characteristics and related behavioural outcomes.

Furthermore, the LT Kantianism subscale had a markedly low reliability, which did not even pass the commonly used cut-off value of 0.7 (Kline, 1999). Considering the previous studies using the LT scale (Gerymski & Krok, 2019; Kaufman et al., 2019; Lukić & Živanović, 2021), this is not surprising. Since high measurement error can reduce the predictive power of a measure (Goodwin & Leech, 2006; John & Soto, 2007), it is likely that relationships detected with the problematic

subscale are actually larger. It seems, thus, that the properties of the LT scale require detailed investigation and the scale itself needs to be developed further. Consequently, the present findings concerning LT should be interpreted with utmost caution.

Finally, the last limitation concerns the structure of the DC model. The analysis showed that the RMSEA coefficient suggested a poor model fit, which may indicate that our model – especially the DC latent factor – was slightly miss-specified. Even though the literature suggests that researchers should be cautious when interpreting a large RMSEA index while working with small models (Shi et al., 2019), we also believe a little cautiousness should be employed when interpreting the results of the DC model. Since some of the DC factors' error terms showed a high correlation, future research is needed to investigate the relationships between these characteristics and discover whether they indeed represent a common latent factor of DC.

6. Conclusions

The study results may become an important signal for governmental and institutional agents involved in containing the COVID-19 pandemic. Since there is no universally accepted effective treatment, containment measures are the prime weapon in the fight against the disease. Understanding the factors that are related with the adherence can help with flattening the pandemic curve and has the potential to protect health and save lives. The study may suggest that increasing motivation to comply may have practical consequences for promoting the adherence. Our results suggest that framing communications about containment measures as saving lives and protecting others, may especially suit individuals with high levels of benevolent traits who already report enhanced care for others. On the other hand, increasing motivation among individuals scoring high on DC may be more challenging. Since these individuals seem to be more reluctant to adhere to the measures, finding effective motivational strategies for this group seems to be even more important than for individuals with benevolent traits. However, this study provides no answer to the question of how to motivate individuals high on malevolent traits to adhere to containment measures. Nevertheless, it appears that trust in government could provide a considerable impulse in enhancing the motivation to comply and possibly also the adherence itself. A future research is needed to investigate this vital issue not only in the pandemic context but also in relation to various forms of socially-oriented and compassionate behaviour.

Study registration

The study was not pre-registered.

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CRedit authorship contribution statement

Matúš Grežo: Conceptualization, Methodology, Investigation, Resources, Formal analysis, Writing – original draft, Writing – review & editing. **Magdalena Adamus:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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