



Relationships between Dark Triad and negative emotions during COVID-19 lockdown: The chain mediating roles of negative coping and state boredom

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Abstract

Personality is distal vulnerability of negative emotions and vital to mental health. Dark Triad was significantly correlated with negative emotions, whereas the mechanisms beneath the relationships were less clear. Based on life history strategy theory (LHS) and cognitive vulnerability-transactional stress model, the study explored the relationships between Dark Triad and negative emotions and investigated the roles of negative coping style and state boredom in the relationships aforementioned during the strict period of COVID-19 lockdown in China. 464 participants ($M_{age} = 36.78$ years; $SD = 10.53$) finished a package of measurements online including Depression Anxiety and Stress Scale (DASS-21), Short Dark Triad (SD3), Multidimensional State Boredom Scale (MSBS), and Simplified Coping Style Questionnaire (SCSQ). The results showed there were positive relationships between Dark Triad and depression, anxiety and stress. Moreover, the relationships between Dark Triad and negative emotions were sequentially mediated by negative coping style and state boredom. The present study offered fascinating perspectives in the relationships between Dark Triad and negative emotions, and revealed how Dark Triad affected depression, anxiety and stress during the initial phase of COVID-19 pandemic and strict lockdown among Chinese population. The present results may provide important implications for the prevention and intervention of depression, anxiety and stress during COVID-19 pandemic and lockdown. Specifically, the intervention strategies that focus on reducing Dark Triad, negative coping and boredom may help offset occurrence of negative emotional states.

Keywords Dark Triad · Depression · Anxiety · Stress · Coping style · State boredom

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Introduction

Depression, anxiety and stress are typically known as negative emotions (Geng et al., 2020) and overlap extensively with general psychological distress being shared (Anyan & Hjemdal, 2016; Hankin et al., 2004; Henry & Crawford, 2005). With the outbreak of COVID-19 pandemic, China quickly started the lockdown and people in China had to stay at home, suffering from fear of infection, enormous negative news, and no face-to-face interaction with other people, which made the negative emotions overwhelmingly prevalent. For example, during COVID-19 lockdown, more than one half of Chinese healthcare workers had symptoms of depression and anxiety (Lai et al., 2020; Xiao et al., 2020), and the general public was no exception (Hou et al., 2020; Wang et al., 2020). Diverse detrimental outcomes generated following depression, anxiety and stress, including but not limited to insomnia (Alvaro et al., 2013), and suicidal behaviors (Frison & Eggermont, 2016). Identifying the potential risks of these negative emotions is a priority issue to prevention and intervention for mental health problems, especially during the stressful worldwide pandemic period.

Dark Triad and negative emotions

Dark Triad, a subclinical maladaptive and socially aversive personality cluster, is composed of three distinct but overlapping traits including Machiavellianism, narcissism, and psychopathy (Paulhus & Williams, 2002; Rahafar et al., 2017). Machiavellianism is uniquely characterized by cynicism, hypocrisy and manipulation (Gómez-Leal et al., 2019), narcissism focuses on self-exaggeration and pursuit of superiority (Yang et al., 2019), and psychopathy refers to callousness, impulsivity, aggression and antisocial behaviors (Rahafar et al., 2017). Common cores among them are empathy deficit, low agreeableness, selfish behaviors and cold interpersonal orientation (Furnham et al., 2014; Paulhus & Williams, 2002).

Life history strategy theory (LHS) is a mid-level evolutionary theory that describes the trade-offs individuals make in energy allocation toward different life tasks: (a) maintaining and facilitating their own growing, and (b) devoting to mating and parenting (Rushton, 1985). The particular pattern of energy allocation depends on the harshness and unpredictability of the environment (Ellis et al., 2009). Accumulation of multiple risks would construct environment with insufficient and unpredictable resources and motivate individuals to select fast life history strategy (Ellis et al., 2009; Furnham et al., 2013). These individuals produce more offspring, but invest less in each offspring, have preference for immediate satisfaction and short-term

benefits (Carter et al., 2014; Ellis et al., 2009; Furnham et al., 2013; Rauthmann & Kolar, 2013), but reduce allotment of energy to development which may therefore be associated with lower ability to obtain resources, status, long-term mates (Wilson et al., 1996), and mental well-being (Martin et al., 2012). Evidences have shown that Dark Triad is the indicator of the fast life history strategy (Jonason et al., 2010; McDonald et al., 2012).

Literature related to Dark Triad and depression, anxiety, and stress is sprouting up since COVID-19. However, these mainly involved the negative effects of dark traits on depression and anxiety (Gogola et al., 2021; Lyons et al., 2019), and the negative effects of single Dark Triad trait on negative emotions (Saltoğlu & Uysal Irak, 2020; Truhan et al., 2022). Studies regarding the effects of whole Dark Triad on three negative emotions and their mechanisms are limited. To our knowledge, merely one study has surveyed the potential mechanisms beneath the relationships between Dark Triad and negative emotions from perspectives of maladaptive and adaptive cognitive emotion regulation strategy (Mojsa-Kaja et al., 2021), but it is not adequate and comprehensive to understand the mechanisms. Additionally, most studies regarding Dark Triad have been conducted using western populations, with few using Chinese populations, especially in the initial period of COVID-19 pandemic with strict COVID-19 lockdown regulations in China. Culture would exert its influence on the personality and psychopathology (Lewis-Fernández & Kleinman, 1994). Thus the current study aimed to explore the relationships between Dark Triad and depression, anxiety and stress during the initial phase of COVID-19 pandemic (from 20th February to 10th March, 2020) among Chinese population and the underlying mechanisms.

The mediating role of negative coping style

Some researchers demonstrated that maladaptive personality is a distal factor vulnerable to negative emotions (Hankin & Abramson, 2001; Hankin et al., 2004). Based on cognitive vulnerability-transactional stress model (Hankin & Abramson, 2001; Hankin et al., 2004), negative events and personality stimulate individuals' negative vulnerability, i.e., mainly negative coping style and dysfunctional attitudes, which lead to increased negative emotions. Thus we postulated negative coping style may mediate the relationships between Dark Triad and depression, anxiety, and stress.

Coping styles reflect individuals' strategies to deal with life events (Lazarus & Folkman, 1987) and intentional regulations including adjustment of evaluation on stressful events and of behavioral and emotional reactions to events (Neufeld, 1989). Such efforts can be described as negative

or positive (Berman et al., 1996). Negative coping (e.g., distraction, withdrawal, self-criticism, aggression, blaming others, wishful thinking, resignation) consists of asocial or antisocial avoidant behaviors that are not focused on the stressor itself, and positive coping strategies (e.g., problem-solving efforts, seeking information, social support) include prosocial behaviors focused on self-care or changing the problem situation (Dempsey, 2002). In general, it has been shown that positive, problem-focused strategies have been related to better outcomes, whereas negative, avoidant strategies have been associated with greater difficulties (Altshuler & Ruble, 1989). Negative coping could cause failure in dealing with external and internal stimuli, which may immerse individuals in negative states (Zhang et al., 2021). Empirical studies have shown depression was positively associated with avoidant and emotion-focused coping strategies (Nagase et al., 2009), and depression and anxiety were also positively correlated with negative coping style (Shao et al., 2020).

Strong correlations between coping styles and Dark Triad have also been evidenced. For example, Machiavellianism was correlated with emotional coping strategies (Rim, 1992). Recently, researchers found Machiavellianism and psychopathy were negatively associated with task-oriented coping and positively with the emotional-oriented coping process suggesting a more emotional reaction to stress, which was consistent with Rim's finding, whereas narcissism was associated with task-oriented and emotional-oriented coping (Birkas et al., 2016). Furthermore, empirical studies also have revealed the mediating effect of coping style on the relationships between dark personalities and negative outcomes. For instance, coping flexibility could mediate the relationship between narcissism and psychological health (Ng et al., 2014), and maladaptive coping styles could mediate the negative effects of secondary psychopathy on depression, anxiety and stress (Saltoğlu & Uysal Irak, 2020).

The mediating role of state boredom

State boredom refers to temporary aversive state of wanting and mainly originates from monotonous and repeated stimulus, and engagement deficiencies in activities (Eastwood et al., 2012; Miao & Xie, 2019). State boredom is mainly caused by two factors: external factors (including novel stimuli in the surrounding environment, the difficulty of tasks, and people's desire for novelty, excitement, and control) and internal factors (including intrinsic motivation, values and beliefs, and the ability to regulate and control, such as the ability of emotion introspection and emotion regulation (Eastwood et al., 2007; Gosline, 2007), and cognitive skills necessary to intrinsically generate interest

(Goldberg et al., 2011; Zhou et al., 2012). Researchers emphasized that the ability to cognitively generate interest or entertainment may be more effective in reducing boredom than adjusting the external environment to be more varied and stimulating (Polly et al., 1993). In the investigation of cognitive components associated with boredom, researchers found that the dogmatic cognitive style (individuals high in dogmatism are less receptive to novel stimuli (Smithers & Loble, 1978; Vacchiano et al., 1969) and think less clearly and efficiently (Plant et al., 1965)) decreased the perception of stimuli in the environment, which was likely to induce the boredom (Leong & Schneller, 1993). Accordingly, it is reasonable that one's coping style would also be related to boredom. Certain coping styles, such as negative coping involved avoidance and passivity, may reduce the likelihood of interactions with external world and further trigger the state boredom. The significant association between coping style and boredom has been evidenced (Yan et al., 2021). And another study showed that boredom proneness was negatively associated with effective emotion regulation strategies (Zhao et al., 2016).

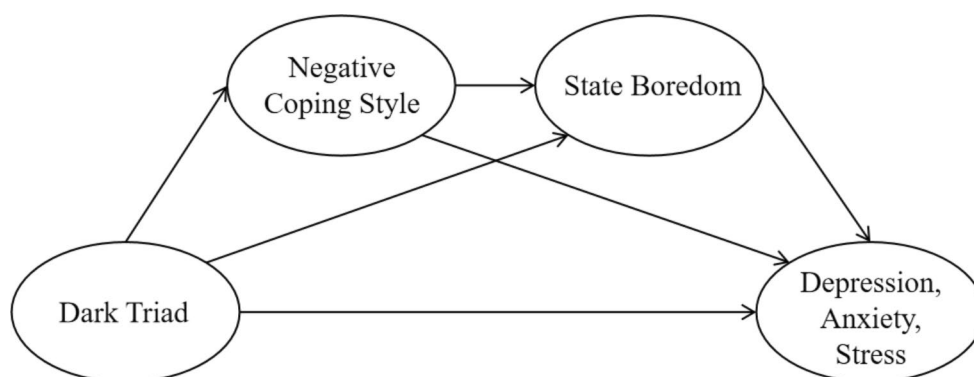
In addition to the cognitive variables, the relationships between personality variables to boredom proneness were also evidenced. For example, Individuals who are less sociable, exhibit low levels of persistence, and experience many problems with inhibitory control of impulses are more prone to boredom (Leong & Schneller, 1993). And it has also been demonstrated dark traits were correlated with boredom (Ma et al., 2021). For example, Machiavellianism is positively associated with boredom (Lee, 2019; Oprea et al., 2019); psychopaths are prone to disinhibition and boredom susceptibility (Paulhus & Williams, 2002), which may be explained by their excitement-seeking tendencies (Hare, 1991); and narcissism (self-awareness creates personal evaluation and/or dwelling on the self (Seib & Vodanovich, 1998)) could also increase the likelihood of boredom (Eisnitz, 1974; Weinberger & Muller, 1974).

Regarding of the outcomes of boredom, evidence has shown that boredom could negatively influence individuals' mental health (Zhou et al., 2012). For instance, negative affect was reliably related to boredom (Raffaelli et al., 2018), and abundant literature has shown state boredom was positively correlated with stress, depression and anxiety (Chao et al., 2020; German & Latkin, 2012; Lee & Zelman, 2019; Sommers & Vodanovich, 2000; Yang et al., 2020).

The present study

The current study aimed to explore the relationships between Dark Triad and depression, anxiety and stress during the initial phase of COVID-19 among Chinese population and the sequential mediating effects of negative coping

Fig. 1 The hypothesized model



style and state boredom. Based on life history strategy theory, cognitive vulnerability-transactional stress model, and the literature aforementioned about the associations among the Dark Triad, negative coping style, boredom, and negative emotions, we hypothesized that present study provided three hypotheses: (1) Dark Triad would be positively associated with depression, anxiety, stress, negative coping style, and state boredom, (2) negative coping style would be also positively associated with state boredom, (3) negative coping style and state boredom would separately mediate and sequentially mediate the relationships between Dark Triad and depression, anxiety, and stress (Fig. 1). We attempted to provide suggestions about the prevention and intervention for mental problems during COVID-19 lockdown.

Method

Participants and procedures

A cross-sectional survey was conducted with convenience sampling to evaluate psychological responses of Chinese people during the period of strict COVID-19 quarantine (from 20th February, 2020 to 10th March, 2020). The study was conducted online to avoid face-to-face interactions and informed consents were obtained before survey. All procedures were coherent to the ethical standards of the institutional research committee and to the 1964 Helsinki declaration. A total of 464 participants aging from 14 to 71 years old ($M=37.68$, $SD=10.53$) were recruited in the study, and the sample consisted of 53.2% ($N=247$) female and 46.8% ($N=217$) male. In addition, the sample included 2.6% ($N=12$) healthcare worker, 6.1% ($N=28$) manager fighting against the epidemic, and 91.4% ($N=424$) general population.

Materials

Depression Anxiety and Stress Scale (DASS-21)

The DASS-21, the brief version of the Depression Anxiety Stress Scales-42, is a 21-item questionnaire validated in Chinese population to measure three negative emotions recently in the public domain with three subscales: depression, anxiety, and stress (Gong et al., 2010; Lovibond & Lovibond, 2002; Shah et al., 2021). Depression subscale is implemented to estimate anhedonia, inertia, self-deprecation and devaluation of life (e.g., *I felt that I had nothing to look forward to*). Anxiety subscale is used to measure autonomic arousal, situational anxiety, and experiences of anxiousness (e.g., *I felt scared without any good reason*). Stress subscale is employed to estimate persistent and non-specific arousal, difficulty of unwinding and mood changes (distress, irritability and impatience) (e.g., *I tended to overreact to situations*) (Lovibond & Lovibond, 2013). Items were rated on a 4-point Likert scale (0 = “did not apply to me”, 3 = “applied to me very much of the time”) and high subscale scores indicate high level of depression, anxiety, or stress. In this study, the Cronbach’s α were great for three subscales (depression: 0.91; anxiety: 0.90; stress: 0.88).

Short Dark Triad (SD3)

The SD3 is a 27-item questionnaire revised in China to evaluate maladaptive personality tendency (Geng et al., 2015; Paulhus & Jones, 2011) with three dimensions: Machiavellianism (e.g., *I like to use clever manipulation to get my way*), psychopathy (e.g., *I like to get revenge on authorities*), and narcissism (e.g., *People see me as a natural leader*). Items were rated on a 7-point Likert scale (1 = “strongly disagree”, 7 = “strongly agree”) and high SD3 scores indicate high level of Dark Triad. In this study, the Cronbach’s α was 0.84 for total scale, suggesting acceptable internal consistency reliability of SD3.

Table 1 Means (*M*), standard deviations (*SD*), and correlations between study variables (*N*=464)

	1	1a	1b	1c	2	3	4	5	6
1 DT	-								
1a mach	0.78***	-							
1b psych	0.75***	0.36***	-						
1c narci	0.73***	0.32***	0.38***	-					
2 NCS	0.29***	0.27***	0.26***	0.12**	-				
3 BO	0.34***	0.28***	0.37***	0.11*	0.41***	-			
4 DEP	0.35***	0.19**	0.48***	0.12**	0.38***	0.57***	-		
5 ANX	0.33***	0.16**	0.48***	0.12*	0.34***	0.54***	0.86***	-	
6 STR	0.37***	0.22***	0.49***	0.13**	0.40***	0.61***	0.86***	0.88***	-
<i>M</i>	63.35	25.44	15.43	22.49	17.79	81.12	10.03	10.17	11.25
<i>SD</i>	11.78	5.85	4.94	4.82	4.38	23.91	3.84	3.87	4.00

Note: DT = Dark Triad, mach = Machiavellianism, psych = Psychopathy, narci = Narcissism, NCS = Negative Coping Style, BO = State Boredom, DEP = depression, ANX = anxiety, STR = stress

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Multidimensional State Boredom Scale (MSBS)

The MSBS is a 24-item questionnaire, revised and validated in Chinese population to assess state boredom recently (Fahlman et al., 2013; Liu et al., 2013) with five subscales: inattention (e.g., *I find it hard to focus my attention*), time perception (e.g., *Time passed very slowly*), low arousal (e.g., *I feel bored*), high arousal (e.g., *I feel anxious*), disengagement (e.g., *I had to do some things worthless to me*). Items were rated on a 7-point Likert scale (1 = “strongly disagree”, 7 = “strongly agree”) and high MSBS scores indicate more state boredom. In this study, the Cronbach’s α was 0.94 for total scale, suggesting great internal consistency reliability of MSBS.

Simplified Coping Style Questionnaire (SCSQ)

The SCSQ is a 20-item questionnaire, revised and validated in Chinese population (Xie, 1998), to assess regulatory function with two subscales: positive coping style (12 items; e.g., *I try to see things on the bright side*) and negative coping style (8 items; e.g., *I try to forget the whole thing*). Items were rated on a 4-point Likert scale (1 = “not use”, 4 = “always use”) and high subscale scores indicate high tendency of negative or positive coping style. In this study, only the subscale of negative coping style was used and the Cronbach’s α for this was 0.79, suggesting acceptable internal consistency reliability.

Data analyses

Preliminary analyses were performed via IBM SPSS (version 25). Zero-order Correlation were proceeded via Pearson Correlation and examination of common method biases was conducted via Harman’s one-factor test. Then, Structural Equation Modeling were conducted via Mplus (version 8.3)

with bootstrapping 1000 samples. In the SEM frame, latent Dark Triad was specified as independent variable, and latent variables for depression, anxiety and stress were specified as dependent variables. We investigated the indirect effects of negative coping style and state boredom in the relationships between Dark Triad and depression, anxiety and stress. Goodness of Model fit was obtained including Chi-Square (χ^2), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), SRMR (Standardized Root Mean Square Residual) and Root Mean Square Error of Approximation (RMSEA).

Results

Descriptive statistics

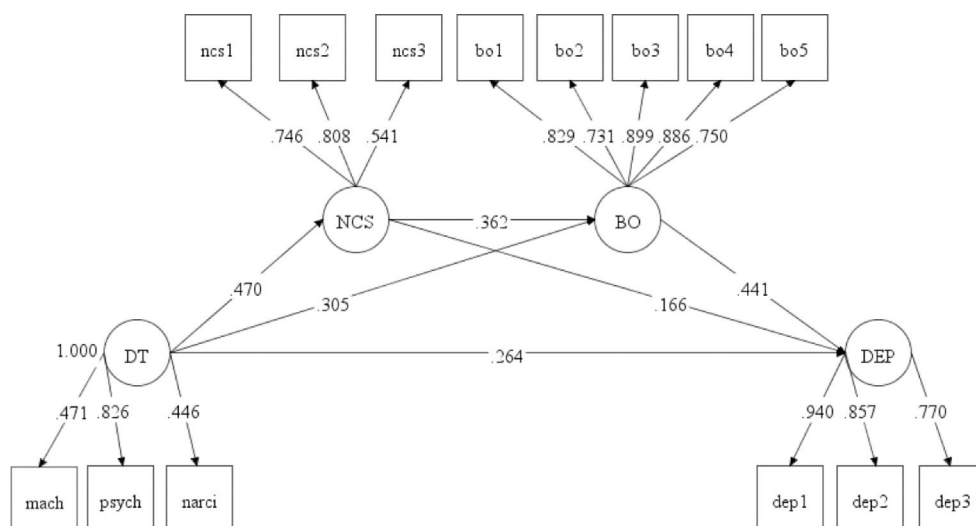
Analysis of common method biases indicated that 19 factors were extracted with eigenvalue more than one and accounted for 64.16% of total variance. The first factor explained 23.39% of variance, less than 40%, suggesting there was no serious common methodology deviation in the present study.

Results of Pearson Correlation were presented in Table 1. As expected, Dark Triad and its components were positively associated with depression, anxiety, and stress. Negative coping style and state boredom were both positively correlated with Dark Triad and its components, and depression, anxiety and stress. Additionally, negative coping style was positively correlated with boredom.

The sequential mediating role of negative coping style and state boredom

Structural Equation Modeling was conducted to explore the mediating role of negative coping style and boredom in the relationships between Dark Triad and depression, anxiety

Fig. 2 The mediating model for Dark Triad and depression. *Note:* DEP=depression, All path coefficients were standardized, same as below



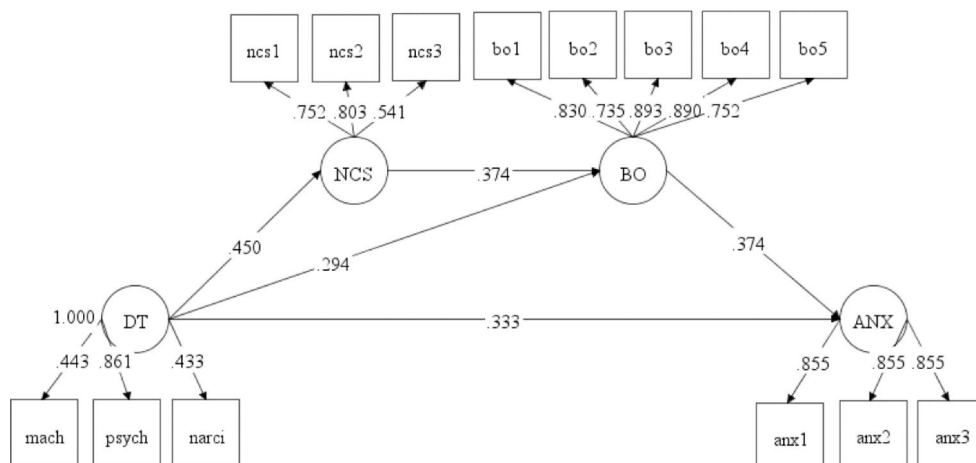
and stress. Study variables enrolled in the model were latent variables. Dark Triad was measured by three dimensions: Machiavellianism, psychopathy, and narcissism. Questionnaire of negative coping style is one-dimensional and homogenous, thus items were packaged through correlation method to get three indicators of negative coping style. Boredom was represented by five dimensions including inattention, time perception, low arousal, high arousal, and disengagement. Additionally, depression, anxiety and stress were separately packaged through correlation method to get three indicators.

Firstly, we tested the model regarding Dark Triad as independent variable, and depression as dependent variable. It was found that the model fit well ($\chi^2/df=3.679$, CFI=0.946, TLI=0.930, SRMR=0.051, RMSEA=0.076). As shown in Fig. 2, there was a significantly direct effect of Dark Triad on depression (effect=0.26, 95% CI [0.116, 0.386]), and three indirect effects of Dark Triad on depression including the mediating role of negative coping style (effect=0.08, $p=0.018$, 95% CI [0.019, 0.154]), mediating role of

boredom (effect=0.14, $p<0.001$, 95% CI [0.079, 0.209]), and sequential mediating role of negative coping style and boredom (effect=0.08, $p<0.001$, 95% CI [0.047, 0.124]). The 95% confidence intervals for these paths did not involve zero (Table 2), indicating mediating roles of negative coping style, boredom and chain mediating role of two mediators aforementioned in the relationship between Dark Triad and depression were significant. There was no significant difference in three indirect effects ($ps>0.05$). Additionally, the model accounted for 51.7% of variances in depression, suggesting the relationships proposed were informative.

Then the model of Dark Triad and anxiety was conducted and results were represented in Fig. 3. It was found that fitness of model was acceptable ($\chi^2/df=4.064$, CFI=0.937, TLI=0.919, SRMR=0.055, RMSEA=0.081). There was a significantly direct effect for Dark Triad on anxiety (effect=0.33, 95% CI [0.197, 0.468]), and two indirect effects for Dark Triad on anxiety including, including mediating role of boredom (effect=0.11, 95% CI [0.062, 0.172]), and sequential mediating role of negative coping

Fig. 3 The mediating model for Dark Triad and anxiety. *Note:* ANX = anxiety



style and boredom (effect=0.06, 95% CI [0.039, 0.111]). Results indicated that the mediating role of boredom and chain mediating role of negative coping style and boredom in the relationship between Dark Triad and anxiety were significant. There was no significant difference in two indirect effects ($ps > 0.05$). However, the mediating role of negative coping style in the relationship aforementioned was not significant, since the 95% interval confidence concluded zero (Table 2). Additionally, the model accounted for 46.7% of variances in anxiety, suggesting the relationships proposed were informative.

Moreover, the model of Dark Triad and stress was conducted and results were represented in Fig. 4. The fitness of model was acceptable ($\chi^2/df=3.467$, CFI=0.948, TLI=0.934, SRMR=0.049, RMSEA=0.073). There was a significantly direct effect for Dark Triad on anxiety (effect=0.30, 95% CI [0.167, 0.431]), and three indirect effects for Dark Triad on anxiety including the mediating role of negative coping style (effect=0.07, 95% CI [0.007, 0.136]), mediating role of boredom (effect=0.15, 95% CI [0.089, 0.223]), and sequential mediating role of negative coping style and boredom (effect=0.08, 95% CI [0.052, 0.138]). The 95% confidence intervals for these paths did not involve zero (Table 2), indicating mediating roles of negative coping style, boredom and chain mediating role of both mediators aforementioned in the relationship between Dark Triad and depression were significant. There was no significant difference in three indirect effects ($ps > 0.05$). Additionally, the model accounted for 59.4% of variances in stress, suggesting the relationships proposed were informative.

Discussion

The present study offered fascinating perspectives in the relationships between Dark Triad and negative emotions during the initial phase of COVID-19 pandemic and strict

lockdown among Chinese population. Basically consistent with the hypotheses, results revealed that Dark Triad was positively correlated with depression, anxiety and stress, and negative coping style and state boredom separately and also sequentially mediated the relationships between Dark Triad and depression, anxiety and stress. The study provided new proofs to life history strategy theory and cognitive vulnerability-transactional stress model.

The current study showed during the COVID-19 quarantine and strict lockdown, Dark Triad and its three components were positively associated with depression, anxiety and stress among Chinese population. Present results about the positive relationships between Machiavellianism and narcissism and negative emotions were consistent with previous studies (Gogola et al., 2021; Lyons et al., 2019), which were also detected during COVID-19 pandemic. However, the present result about the positive associations between psychopathy, measured by SD3, and negative emotions was not accordant with previous studies (Mojsa-Kaja et al., 2021; Saltoğlu & Uysal Irak, 2020). The study conducted by Mojsa-Kaja et al. (2021) showed psychopathy, measured by Dirty Dozen (DD), was not significantly associated with stress and anxiety, and in the study of Saltoğlu and Uysal Irak (2020), primary psychopathy was not associated with anxiety and depression, but secondary psychopathy was significantly correlated with depression, anxiety and stress, which was consistent with the present result. The discrepancy may be attributed to the difference in the measurements of psychopathy. Because the DD is more likely to be used to measure the primary psychopathy, but the psychopathy subscale of SD3 emphasizes the impulsivity, rendering the psychopathy closer to secondary than to primary psychopathy (Hicks et al., 2007; Jones & Paulhus, 2014; Newman et al., 2005), whereas the psychopathy subscale of DD could assess callousness but fails to assess the impulsivity (Miller et al., 2012). That is, the secondary psychopathy was positively correlated with negative emotions, whereas

Fig. 4 The mediating model for Dark Triad and stress. Note: STR = stress

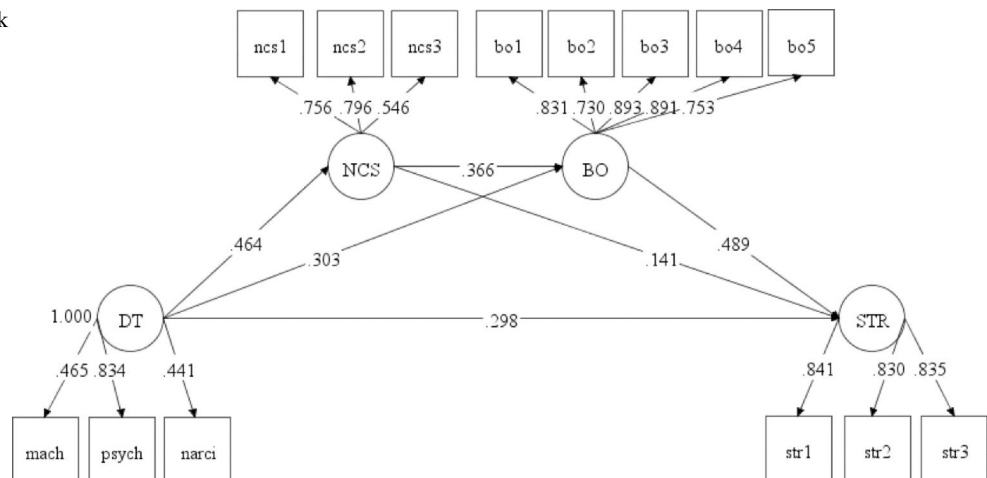


Table 2 Mediating effect analyses

	Effect	SE	<i>p</i>	95%CI
DV: Depression				
DT → NCS → Depression	0.08	0.03	0.018	[0.019, 0.154]
DT → BO → Depression	0.14	0.03	<0.001	[0.079, 0.209]
DT → NCS → BO → Depression	0.08	0.02	<0.001	[0.047, 0.124]
DV: Anxiety				
DT → NCS → Anxiety	0.06	0.03	0.083	[-0.003, 0.127]
DT → BO → Anxiety	0.11	0.03	<0.001	[0.062, 0.172]
DT → NCS → BO → Anxiety	0.06	0.02	<0.001	[0.039, 0.111]
DV: Stress				
DT → NCS → Stress	0.07	0.03	0.047	[0.007, 0.136]
DT → BO → Stress	0.15	0.03	<0.001	[0.089, 0.223]
DT → NCS → BO → Stress	0.08	0.02	<0.001	[0.052, 0.138]

Note: DV=Dependent Variable, DT=Dark Triad, NCS=Negative Coping Style, BO=State Boredom

the primary psychopathy was not robustly associated with negative emotions.

Besides, the mediating analyses showed the relationships between Dark Triad and negative emotions were partially mediated by negative coping style and state boredom, which indicated Dark Triad could not only directly predict negative emotions, but also indirectly predict them through negative coping style and state boredom. This could be interpreted by life history strategy theory (LHS). According to the theory, early-life experiences sensitized people to adversity (Birkás et al., 2020), thus individuals higher in Dark Triad, who possess fast life-history strategy caused by hard and unpredictable life in childhood and focus on immediate benefits at the expense of long-term relationship (Wilson et al., 1996) and mental well-being (Martin et al., 2012), could be relatively higher in depression, anxiety, and stress when confronted with the stressful COVID-19 pandemic and strict lockdown.

The positive relationship between Dark Triad and negative coping style revealed in the present study indicated individuals higher in Dark Triad did not focus on the stressor itself during the COVID-19 pandemic. The result was also consistent with previous studies. For example, Birkás and colleagues (2020) found Dark Triad could predict low coping ability, and Saltoğlu and Uysal Irak (2020) found that psychopathy was correlated with avoidance coping style, which also indicated people higher in the Dark Triad traits could not deal with the stressors well. Moreover, the present result was also supported by cognitive vulnerability-transactional stress model (Hankin & Abramson, 2001; Hankin et al., 2004) positing negative events and personality could stimulate individuals' negative vulnerability, i.e., mainly negative coping style and dysfunctional attitudes.

The positive relationship between Dark Triad and state boredom found in the current study indicated that individuals higher in Dark Triad were prone to boredom during the COVID-19 pandemic. The result was also supported by previous studies. For example, researchers have shown that Machiavellianism and psychopathy were positively correlated with boredom (Ma et al., 2021), and narcissism could also increase the likelihood of boredom (Eisnitz, 1974; Weinberger & Muller, 1974). The relationship between Dark Triad and state boredom may be explained by the dissatisfaction of the desire of individuals higher in Dark Triad for the novelty, excitement, and control during the COVID-19 pandemic and strict lockdown (Hare, 1991; Zhou et al., 2012), which could be confirmed by the finding that high boredom proneness was correlated with low control (Dahlen et al., 2004).

Consistent with the hypotheses, the results also showed the negative coping style and state boredom sequentially mediated the relationships between Dark Triad and depression, stress, and anxiety, and at the same time, the negative coping style mediated the relationships between Dark Triad and depression and stress, but not anxiety, and the state boredom mediated the relationships between Dark Triad and depression, stress, and anxiety. The results indicated that during COVID-19 pandemic and lockdown period, people high in Dark Triad were prone to use negative coping style including dealing with the external and internal stimuli negatively, which could enhance the levels of depression, anxiety and stress directly and indirectly by enhancing the level of state boredom which could also be positively influenced by the Dark Triad directly.

Firstly, findings regarding mediating role of negative coping style in the relationships between Dark Triad and negative emotions, indicating Dark Triad was a distal risk factor of negative emotions through the negative coping style. These provided new proofs to cognitive vulnerability-transactional stress model (Hankin & Abramson, 2001; Hankin et al., 2004). Negative events and personality stimulate individuals' negative vulnerability, i.e., mainly negative coping style and dysfunctional attitudes, which lead to increased negative emotions, such as boredom, depression, anxiety, and stress.

Additionally, the mediating effect of negative coping style revealed in the current study was consistent with the previous findings. For example, one prior study found that maladaptive cognitive emotion regulation strategies (i.e., rumination, catastrophizing, other-blame), which are also representatives of negative coping and focus on the negative aspect of the stressor, mediated the relationships between narcissism/Machiavellianism and depression, anxiety and stress (Mojsa-Kaja et al., 2021). In our study, the negative coping style contained taking rest, waiting for time and

fantasizing, which stressed the distraction from the stressor. The result also indicated that during the stressful COVID-19 pandemic, the distraction-related negative coping not only could induce the depression, stress and anxiety, but also enhance the level of state boredom. These two findings indicated that when confronted with stressful circumstances, individuals higher in Dark Triad tend to use negative coping including avoidant behaviors that are not focused on the stressor itself, which could induce the negative emotions. Besides, the finding by Mojsa-Kaja and colleagues (2021) indicated thinking about the negative aspect of the stressor could cause stress, anxiety and depression, and another finding that maladaptive coping behaviors including efforts to withdraw from the stressful situation and avoid seeking solutions may result in failure to resolve the stressful situation and be associated with anxiety (Mahmoud et al., 2012), both are supported by the present result.

However, in the mediation model for the anxiety, the path from negative coping style to anxiety was not significant, which indicated that after controlling the effects of Dark Triad and state boredom, there was no significant relationship between negative coping style and anxiety. The result was inconsistent with the findings by Mojsa-Kaja (2021) and Mahmoud (2012) who found the mediating effect of negative coping on the association between stressors and anxiety. The discrepancy may be interpreted by different predictors of anxiety used in the studies, and may be also explained by the effect of boredom on anxiety. But the current result was also consistent with some other previous studies. For example, in one review, the author argued that avoidance-oriented coping may be initially appropriate as a reaction to stress, but in the long run task-oriented coping is most efficacious (Endler, 1997). Another study showed that behavioral avoidance coping was unrelated to changes in anxious symptoms (Blalock & Joiner, 2000). All in all, the effect of coping style on anxiety needs to be explored further in the future studies.

More importantly, the present study showed the state boredom could mediate the effects of negative coping style on depression, anxiety and stress, which stimulated by the Dark Triad during the stressful COVID-19 pandemic. The result indicated that compared with Dark Triad and negative coping style, the state boredom was the more proximal vulnerable factor for the development of depression, anxiety and stress, which was consistent previous studies. For example, some researchers found boredom proneness mediated relationships between problematic smartphone use with depression and anxiety (Elhai et al., 2018), another study showed the effect of stressors on emotional distress (such as depression, fear, and compulsion-anxiety) was mediated by boredom proneness (Yan et al., 2021). Besides, as has been evidenced, state boredom could be caused by external

(such as novelty of stimuli, people's desire for novelty, excitement, and control) and internal factors (such as cognitive skills to intrinsically generate interest)(Goldberg et al., 2011; Zhou et al., 2012). In the present study, during the period of strict COVID-19 lockdown, almost all the people in China had to stay at home with no face-to-face interaction with other people. Thus individuals, especially higher in Dark Triad, had less likelihood to get the new things, which increased the dissatisfaction of their desire for novelty, excitement, and control, further leading to state boredom. Additionally, individuals who possess negative coping style (such as taking rest and waiting for time) caused by Dark Triad, tend to do nothing helpful to change the stressful and harsh circumstances repeatedly occurred during the strict COVID-19 lockdown, and then lead to the higher level of state boredom. Regarding with the reason why boredom influences negative emotions, Seib and Vodanovich (1998) have made a tentative explanation. They believed that individual's "self-awareness (an awareness of internal states, e.g., thoughts, emotions)" would directly lead to people's judgment and evaluation of their own emotions, and when the individuals are high in boredom, their "self-awareness" is relatively negative (i.e., focusing on deficiencies and faults), making themselves fall into the abyss of negative emotion (Seib & Vodanovich, 1998; Zhou et al., 2012).

Implications

The study revealed the relationships between Dark Triad and negative emotions and revealed how higher Dark Triad cause higher level of negative emotions from perspectives of negative coping style and state boredom during the initial period of strict COVID-19 quarantine in China. The present results had important implications for the prevention and intervention of depression, anxiety and stress during COVID-19 pandemic and lockdown. Specifically, the intervention strategies that focus on reducing Dark Triad, negative coping and boredom may help offset occurrence of negative emotional states.

The psychological counselors and therapists could work on cognitive vulnerability (i.e., negative coping style) of maladaptive population through Cognitive Behavior Therapy (CBT) to weaken the cognitive process from Dark Triad to negative emotions. Additionally, one previous study found that mindfulness could reduce boredom proneness (Yang et al., 2021), thus we suggest public to trial mindfulness practices to transfer attention to present moment and decrease state boredom, which could further decrease negative emotions. Furthermore, one longitudinal study found that intervention on agreeableness would drop the level of Dark Triad (Hudson, 2022), thus we also suggest individuals with maladaptive personality to participate in

intervention for agreeableness to decrease tendency of Dark Triad and further experience few negative emotions. These results may shed light on interventions for mental health-care and promote psychological health in public during post- COVID-19 Era.

Limitations and future directions

Several limitations of present study should be taken in consideration. Firstly, this study is cross-sectional, so the results should be interpreted with caution; Longitudinal and experimental designs are urgent to address this problem. Then, all data were gathered via self-report and online survey; Future studies can collect data from various informants. Tendency of Dark Triad was regarded as continuous variable in the current study, and future study could distinguish different levels of Dark Triad population and their difference in negative emotions could be represented by reaction time of individuals spending in decision-making behaviors. Moreover, the present study did not measure boredom proneness of participants as control variable, and subsequent study could take it into consideration to clarify the role of state boredom in the relationships between Dark Triad and negative emotions. Additionally, the current data were collected during the early stage of COVID-19 pandemic, future study could consider comparing the emotional states in different COVID-19 pandemic stages, such as early, middle, and post stages, and even after the pandemic.

Conclusion

Based on life history strategy theory and cognitive vulnerability-transactional stress model, the present study constituted a chain mediation model, and revealed the positive relationships between Dark Triad and negative emotions and the psychological mechanism beneath the relationships from the perspectives of negative coping style and state boredom, which offered an elaborate understanding of the relationships between Dark Triad and negative emotions during the period of COVID-19 strict lockdown in China. These findings provided new proofs to life history strategy theory and cognitive vulnerability-transactional stress model, and implications for individuals susceptible to mental problems and clinical psychological workers that reducing negative coping and boredom may have positive and effective impacts on reducing depression, anxiety, and stress during the period of COVID-19 pandemic and strict lockdown.

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Data Availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Interest declarations The authors declares that there is no conflict of interest.

Ethical approval All procedures performed in the study were in accordance with the ethical standards of the Research Ethical Committee in Zhengzhou University (Reference Number: 126), 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.

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