Dark personality traits and cyber aggression in adolescents: A moderated mediation analysis of belief in virtuous humanity and self-control

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ABSTRACT

Cyber aggressive behavior among adolescents is a widespread concern. However, little is known about the influencing factors and psychological mechanism of cyber aggressive behavior in adolescents. This study examined whether dark personality traits would be associated with cyber aggression in adolescents, whether belief in virtuous humanity would mediate the relationship between dark personality traits and cyber aggression, and whether self-control would play a moderating role in the links. A total of 675 Chinese college students completed a series of anonymous questionnaires regarding dark personality traits, belief in virtuous humanity, self-control, and cyber aggression. Results showed the following: (1) dark personality was positively related to cyber aggression in adolescents; (2) belief in virtuous humanity mediated the relationship between dark personality traits (i.e., Machiavellianism and psychopathy) and cyber aggression; (3) self-control play a moderating role in the relationship between dark personality traits (i.e., Machiavellianism and psychopathy) and cyber aggression, and the relationship between belief in virtuous humanity and cyber aggression. This study could help demonstrate the risk and protective factors and psychological mechanism of cyber aggressive behavior in adolescents. Some theoretical and practical implications and limitations were also discussed.

1. Introduction

In recent years, with the rapid development of internet information technology, the internet has provided great convenience for people's life. For children and adolescents, the internet is a double-edged sword. On the one hand, the internet can help children and adolescents meet the needs of seeking knowledge and communicating with others. During the COVID-19 epidemic, Chinese children and adolescents received education and communicated with their classmates and teachers online at home, which made up for the lack of education and interpersonal communication caused by not being able to go to school. On the other hand, the internet also brings a series of negative problems, such as cyber aggression. Children and adolescents can be both perpetrators and victims of cyber aggression (Hertz & David-Ferdon, 2011; Mishna, Khourykassabri, Gadalla, & Daciuk, 2012; Vandebosch & Cleemput, 2009). Previous studies have found that approximately 52% of adolescents reported that they had attacked others in social media (Festl & Quandt, 2013), and about 75% of adolescents reported that they had suffered cyber aggression in the process of using the internet (Chapin, 2016). Victims of cyber aggression may experience various negative emotions (e.g. angry, sad, depressed, and afraid) (Juvonen &

Gross, 2008; Sontag, Clemans, Graber, & Lyndon, 2011), some psychiatric and psychosomatic problems (e.g. insomnia, headaches, substance abuse, and eating disorder) (Fosse & Holen, 2006; Sourander et al., 2010; Wang, Nansel, & Iannotti, 2011), several social function disorders (e.g. high level of social anxiety, poor concentration, and losing interest in things) (Beran & Li, 2005; Spears, Slee, Owens, & Johnson, 2009), and suicidal ideation (Hinduja & Patchin, 2010; Schenk & Fremouw, 2012).

Therefore, the influencing factors and psychological mechanism of cyber aggression in adolescents must be explored to find the protective factors that can reduce their cyber aggressive behaviors.

1.1. Dark personality traits and cyber aggression

Cyber aggressive behavior is defined as a new form of aggressive behavior based on the development of the internet, which involves the use of internet and mobile phones to harm others intentionally (Grigg, 2010; Jin, Lu, Zhang, Wu, & Jin, 2018; Zhao & Gao, 2012). Cyber aggression is a derivative form of traditional aggression. The General Aggression Model (GAM), which is a comprehensive and integrative contemporary psychological theory for understanding aggression

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(Anderson & Carnagey, 2004), indicates that individual personality is an important antecedent variable that affects aggression. Some personality variables are considered risk factors that can increase the likelihood of aggression, whereas other personality variables are considered protective factors that can decrease the likelihood of aggression (Allen, Anderson, & Bushman, 2018). Previous studies have found that some dimensions of the "Big Five" personality model (e.g., high agreeableness, high conscientiousness, and low neuroticism) are negatively associated with aggression (Allen et al., 2018; Cavalcanti & Pimentel, 2016; Gilbert & Daffern, 2011). Everything has two sides, and individual personality also has a dark side, such as cynical and strategic Machiavellianism, erratic and antisocial psychopathy, and grandiose and entitled narcissism (Paulhus & Williams, 2002). These traits are called the dark triad of personality (Paulhus & Williams, 2002), which share a number of features (e.g., malevolent disposition toward society, emotional coldness, duplicity, and aggressiveness) and can predict a wide range of negative outcomes (Oboyle, Forsyth, Banks, & Mcdaniel, 2012; Paulhus & Williams, 2002). Many previous studies have found a significantly positive correlation between dark triad personality traits and physical and verbal aggression in real life (Jones & Neria, 2015; Pailing, Boon, & Egan, 2014; Van Geel, Goemans, Toprak, & Vedder, 2017). Studies have indicated that online aggressive behaviors are more likely to occur than face-to-face offline aggressive behaviors (Law, Shapka, Domene, & Gagne, 2012). Previous empirical studies have shown that a significantly positive correlation exists between adolescents' dark triad personality traits and cyber aggression (Pabian, De Backer, & Vandebosch, 2015; Van Geel et al., 2017). Therefore, this study inferred that *dark personality traits in adolescents (i.e., Machiavellianism, psychopathy, and narcissism) could be considered risk factors that can increase the likelihood of cyber aggression* (Hypothesis 1).

1.2. Belief in virtuous humanity as a mediator

Previous studies have revealed the relationship between dark triad personality traits in adolescents and their cyber aggression (Pabian et al., 2015); however, the potential psychological mechanism of dark triad personality traits on cyber aggression in adolescents is unclear. In cyberspace, many factors will affect individuals' interpersonal beliefs, which have an important impact on their psychology and behavior (Han, Sun, Gao, Zhou, & Jou, 2019). Belief in virtuous humanity, as a type of subjective cognitive factors, reflects one's perceptions and expectations regarding the essential goodness, trustworthiness, and dependability of others in one's social world (Lopez, Melendez, Sauer, Berger, & Wyssmann, 1998; Yao & Enright, 2020; Zhang, Zhao, & Xu, 2016). Paulhus and Williams (2002) indicated that individuals with dark personality traits share a tendency to be callous, selfish, and malevolent in their interpersonal dealings and tend to see others as malevolent, untrustworthy, ruthless, and aggressive (Brankley & Rule, 2014). That is, instead of reflecting on their own malevolent behaviors, individuals with high score of dark personality traits believe that others are untrustworthy and malevolent. Thus, dark personality traits in adolescents could be speculated as negatively related to their belief in virtuous humanity.

In addition, on the basis of the internal working model (Lopez et al., 1998), individuals who have high level of belief in virtuous humanity may be more likely to behave prosocially and less likely to possess self-focused goals and aggressive strategies (Yao & Enright, 2020; Zhang et al., 2016). Prior research has revealed that students are less likely to be engaged in cyber aggression when they perceive their school climate as trusting and pleasant, and their friends as trustworthy and helpful (Wang, Iannotti, & Nansel, 2009; Yang, Wang, & Lei, 2020). Therefore, adolescents' belief in virtuous humanity can be considered a protective factor that can decrease the likelihood of their cyber aggression.

On the basis of the above discussion, dark personality traits in adolescents (i.e., Machiavellianism, psychopathy, and narcissism) can be negatively associated with belief in virtuous humanity, which in turn

can decrease their cyber aggression. This speculation is actually consistent with the general aggression model, that is, individuals' personality factors may affect their cognition and then affect their aggressive behaviors (Allen et al., 2018; Cavalcanti & Pimentel, 2016). To the best of our knowledge, the mediating role of belief in virtuous humanity in the link between dark personality traits in adolescents and their cyber aggression has not yet been explored in previous studies. Accordingly, this study proposed the following:

Hypothesis 2. That adolescents' belief in virtuous humanity mediates the association between dark personality traits and cyber aggression.

1.3. Self-control as a moderator

Dark personality traits in adolescents may increase the likelihood of cyber aggression. However, this notion does not imply that all adolescents are equally influenced by this effect. Some protective factors may play a significant role in reducing the effects of dark personality traits. The present study tested whether self-control would moderate the direct and indirect relationships between dark personality traits in adolescents and their cyber aggression.

Self-control is widely regarded as a protective factor (Baumeister & Exline, 1999; Baumeister, Vohs, & Tice, 2007; Tangney, Baumeister, & Boone, 2004), which can restrain individuals' negative impulse (e.g., selfishness and aggressiveness) and make them behave in accordance with the social norms and values (Denson, Dewall, & Finkel, 2012; Dewall, Finkel, & Denson, 2011). A large number of studies have shown that as a type of self-regulation ability, self-control can effectively regulate individuals' aggressive impulses and behaviors (Denson et al., 2012; Denson, Capper, Oaten, Friese, & Schofield, 2011; Dewall et al., 2011). That is, individuals with high self-control level can effectively regulate their internal impulses and reduce their aggressive behaviors. By contrast, for individuals with low self-control level, their internal regulation will fail, which may increase their aggressive behaviors. The risk-protective model focuses on the interaction between protective factors and risk factors and points out that the protective factors can play a significant buffering role in the link between risk factors and adverse consequences (Fergus & Zimmerman, 2005; Hollisterwagner, Foshee, & Jackson, 2001). According to the risk-protective model, self-control, as a protective factor, may play a buffering role in the effects of dark personality traits in adolescents on their cyber aggression. Previous studies have revealed that self-control can moderate the effects of dark personality traits on violent delinquency (Flexon, Meldrum, Young, & Lehmann, 2016; Wright et al., 2017), where high self-control buffer the such effects on delinquency, whereas low self-control amplified the effects. Thus, this study proposed the following:

Hypothesis 3. Adolescents' self-control moderates the direct relationship between dark personality traits and cyber aggression.

Furthermore, a large amount of evidence has shown that self-control can inhibit individuals' internal impulses and regulate their behaviors (Baumeister et al., 2007; Denson et al., 2011; Dewall et al., 2011), whereas little evidence has indicated that self-control can change people's existing beliefs. Given the lack of evidence to show that dark personality traits interact with self-control in predicting belief in virtuous humanity, we did not test this effect. However, given that belief in virtuous humanity is a protective factor that may decrease the likelihood of cyber aggression in adolescents, this study tested whether self-control can moderate the relationship between adolescents' belief in virtuous humanity and cyber aggression under the theoretical framework of the protective-protective model (Hollisterwagner et al., 2001; Li et al., 2013). The protective-protective model focuses on the interaction between protective factors and protective factors, and indicates that the predictive role of a protective factor (e.g., Belief in virtuous humanity) against outcome variables (e.g., cyber aggression) may vary with the level of another protective factor (e.g., self-control)
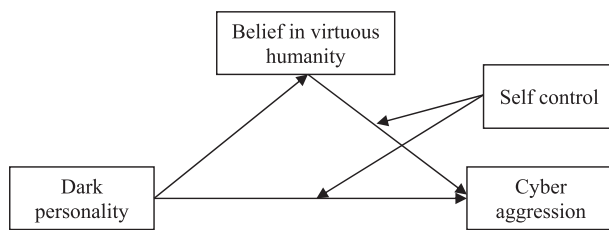
Fig. 1. The proposed moderated mediation model.

([Hollisterwagner et al., 2001; Li et al., 2013](#)). In the previous discussion, it has been speculated that belief in virtuous humanity is a protective factor which can negatively predict adolescents' cyber aggression. Meanwhile, previous studies have shown that self-control, as a protective factor, can significantly negatively predict aggressive behavior ([Denson et al., 2011; Wright et al., 2017](#)). Therefore, on the basis of the protective-protective model, this study proposed that the interaction of belief in virtuous humanity and self-control would significantly predict adolescents' cyber aggression. That is, *self-control may moderate the relathionship between belief in virtuous humanity and cyber aggression in adolescents* (Hypothesis 4).

Combined with the above assumptions, this study constructed a moderated mediation model ([Fig. 1](#)) to examine the mediating (belief in virtuous humanity) and moderating (self-control) mechanisms of dark personality traits on cyber aggression in adolescents. This moderated mediation model can help us to understand the influencing factors and psychological mechanism of adolescents' cyber aggression more comprehensively, and can lay a scientific foundation for psychological intervention to reduce adolescents' cyber aggressive behaviors.

1.4. The present study

Taken together, the present study has two main research questions. First, the current study tested whether belief in virtuous humanity will mediate the relationship between dark personality traits in adolescents and cyber aggression. Second, we tested whether adolescents' self-control will moderate the association between dark personality traits and cyber aggression and between belief in virtuous humanity and cyber aggression. The moderated mediation model ([Fig. 1](#)) was established to address the questions.

2. Method

2.1. Participants

The sample consisted of 675 Chinese college students (296 males, 379 females) aged from 17 to 22 years old ($M = 19.64$, $SD = 1.39$). The survey was made available to these participants via a survey website. Of all the participants, 22.70% were freshmen, 42.50% sophomores, 21.50% juniors and 13.30% seniors. The average time the participants spent using the Internet was 7.12 h ($SD = 2.66$), ranging from 1 to 16 h.

2.2. Measures

2.2.1. Dark personality traits

The present study used the Dark Triad Dirty Dozen scale ([Jonason & Webster, 2010](#)) to assess adolescents' dark personality traits. This scale consists of three subscales: Machiavellianism (include 4 items, e.g., "I tend to manipulate others to get my way."), psychopathy (include 4 items, e.g., "I tend to lack remorse."), and narcissism (include 4 items, e.g., "I tend to seek prestige or status."). The participants were asked to indicate the extent to which they agree or disagree with each item on a seven-point Likert scale (1 = totally disagree, 7 = totally agree). In the present study, the scale demonstrated acceptable reliability (Cronbach's

alphas were 0.84, 0.63, and 0.81 for subscales of Machiavellianism, psychopathy, and narcissism, respectively), and adequate structural validity (model fit indices: $\chi^2/df = 2.57$, GFI = 0.97, TLI = 0.96, CFI = 0.97, RMSEA = 0.05).

2.2.2. Belief in virtuous humanity

The perception of virtuous humanity questionnaire ([Zhang et al., 2016](#)) was used to assess the level of adolescents' belief in virtuous humanity. The measurement consists of six items, which are mainly used to measure the individuals' perception of virtuous humanity (e.g., "I believe that human nature is virtuous."). The participants rated the items on a six-point Likert scale (1 = totally disagree, 6 = totally agree). The higher the aggregated score was, the more adolescents believe that humanity is virtuous. The Cronbach's alpha was 0.81 for the current sample. The confirmatory factor analysis (CFA) showed that the structure validity of this questionnaire was good (model fit indices: $\chi^2/df = 3.66$, GFI = 0.99, TLI = 0.97, CFI = 0.99, RMSEA = 0.06).

2.2.3. Self-control

The current study used the Chinese version of self-control scale ([Tan & Guo, 2008](#)) to measure adolescent's self control level. This Chinese version scale consists of 5 subscales and 19 items (e.g., "People would say that I have iron self-discipline."), which was revised from the Self-Control Scale ([Tangney et al., 2004](#)). The participants responded to the items through a five-point Likert scale (1 = not at all like me, 5 = very much like me), and their responses were summed to index the ability of self-control. The Cronbach's α was 0.84 for the current sample. The goodness of fit ($\chi^2/df = 2.95$, GFI = 0.94, IFI = 0.92, CFI = 0.92, RMSEA = 0.05) of CFA in present study demonstrated that this scale has an adequate structural validity.

2.2.4. Cyber aggression

The Adolescent Online Aggressive Behavior Scale ([Zhao & Gao, 2012](#)) was used to examine adolescents' cyber aggression in this study. The scale is a 31-item self-report questionnaire, which consists of two subscales: instrumental aggression (15 items; e.g., "In order to get the results I want, I often insult and scold others when playing online games.") and reactive aggression (16 items; e.g., "When I am offended by others, I will deliberately disclose others' private information on the Internet."). The participants responded to each item through a four-point scale ranging from 1 (never) to 4 (always), with higher scores indicating higher levels of cyber aggression. The Cronbach's alpha coefficients of the instrumental aggression and reactive aggression were 0.89 and 0.91 in the current study, respectively. The Cronbach's α of the entire scale was 0.94. The CFA indicated that the structure validity of this scale was good (model fit indices: $\chi^2/df = 2.94$, GFI = 0.91, NFI = 0.92, TLI = 0.93, CFI = 0.95, RMSEA = 0.05).

2.3. Procedure

This investigation was approved by the relevant institutional ethics committees of the first author's University. All the participants voluntarily participated in this study, and they were free to withdraw from this study at any time. After obtaining the informed consent, the participants independently and anonymously completed the self-report questionnaires within 20 min. Upon completion, participants were debriefed and thanked.

2.4. Statistical analysis

Relevant data analyses were performed in SPSS 22.0 and the PROCESS macro for SPSS ([Hayes, 2013](#)). First, we applied Harman's single-factor test with exploratory factor analysis to check for common method bias. Second, the descriptive statistics and intercorrelations for all variables were calculated. Third, Model 4 of the PROCESS macro was adopted to analyze the mediating effect of belief in virtuous

humanity. Finally, Model 15 was used to test the moderated mediating effect. The bias-corrected bootstrapping method was used, and 95% confidence intervals were calculated with 5000 random samples. If the 95% bias-corrected confidence interval for the parameter estimate did not contain zero, then the effect was statistically significant (Mallinckrodt, Abraham, Wei, & Russell, 2006). To facilitate the analyses, all study variables were standardized as z scores.

3. Results

3.1. Common method deviation test

In this study, we applied Harman's single-factor test with an exploratory factor analysis, which is one of the most widely used exploratory methods to check for common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The result showed that the first factors explained by the unrotated and rotated variables were 20.19% and 14.28%, respectively. Both variables were lower than the critical 40% threshold. Thus, the bias effect was insignificant in this study.

3.2. Descriptive analyses

Table 1 presents the means, standard deviations, and correlation coefficients among the major variables. The results showed that dark personality traits (i.e., Machiavellianism, psychopathy, and narcissism) were significantly positively correlated with cyber aggression, but negatively correlated with belief in virtuous humanity (exclude narcissism) and self-control. Belief in virtuous humanity was negatively correlated with cyber aggression but positively correlated with self-control. Self-control was negatively correlated with cyber aggression. These results indicated that the higher scores on dark triad personality traits indicate higher cyber aggression. Therefore, Hypothesis 1 was supported.

3.3. Testing for the mediating role of belief in virtuous humanity

To reveal how dark personality traits (i.e., Machiavellianism, psychopathy, and narcissism) affect cyber aggression, we explored the mediating role of belief in virtuous humanity between dark personality traits and cyber aggression. The SPSS macro program PROCESS (Model 4; Hayes, 2013) was used to test these mediation models after controlling for age and gender. The results are presented in Table 2. First, Machiavellianism was negatively related to belief in virtuous humanity ($\beta = -0.34$, $t = -9.21$, $p < 0.001$), which in turn was negatively associated with cyber aggression ($\beta = -0.19$, $t = -5.04$, $p < 0.001$). The positive direct association between Machiavellianism and cyber aggression remained significant ($\beta = 0.25$, $t = 6.52$, $p < 0.001$). Thus, belief in virtuous humanity partially mediated the relationship between Machiavellianism and cyber aggression (indirect effect = 0.06, SE = 0.01, 95% CI = [0.04, 0.10]). The mediation effect accounted for 20.58% of the total effect of Machiavellianism and cyber aggression. Second, psychopathy was significantly negatively associated with belief in virtuous humanity ($\beta = -0.37$, $t = -10.21$, $p < 0.001$), which in

turn was significantly negatively related to cyber aggression ($\beta = -0.16$, $t = -4.31$, $p < 0.001$). The positive direct association between psychopathy and cyber aggression remained significant ($\beta = 0.30$, $t = 7.97$, $p < 0.001$). Therefore, belief in virtuous humanity partially mediated the relationship between psychopathy and cyber aggression (indirect effect = 0.06, SE = 0.02, 95% CI = [0.04, 0.09]). The mediation effect accounted for 16.55% of the total effect of psychopathy and cyber aggression. Third, the results showed that narcissism was not significantly negatively associated with belief in virtuous humanity ($\beta = 0.03$, $t = 0.79$, $p > 0.05$), and the indirect effect of narcissism on cyber aggression was insignificant (indirect effect = -0.01, SE = 0.01, 95% CI = $[-0.04, 0.02]$). Consequently, belief in virtuous humanity cannot mediate the relationship between narcissism and cyber aggression.

In sum, the results show that adolescents' belief in virtuous humanity mediate the relationship between dark personality traits (i.e., Machiavellianism and psychopathy) and cyber aggression. Therefore, Hypothesis 2 was partially supported.

3.4. Testing for moderated mediation

Given the link between narcissism and cyber aggression was not mediated by belief in virtuous humanity, this study examined whether self-control will moderate the association between dark personality traits (i.e., Machiavellianism and psychopathy) and cyber aggression and between belief in virtuous humanity and cyber aggression by using Hayes's PROCESS macro (Model 15). If the path between belief in virtuous humanity and cyber aggression was moderated by self-control, then the moderated mediation models were established (Hayes, 2013; Muller, Judd, & Yzerbyt, 2005).

First, as shown in Model 1 of Table 3, the effects of dark personality traits (i.e., Machiavellianism and psychopathy) on adolescents' belief in virtuous humanity were significant ($\beta_M = -0.30$, $p < 0.001$; $\beta_P = -0.30$, $p < 0.001$). Conversely, the interaction of dark personality traits (i.e., Machiavellianism and psychopathy) and self-control did not show significant predictive effect on belief in virtuous humanity ($\beta_M = 0.03$, $p > 0.05$; $\beta_P = 0.01$, $p > 0.05$). That is, self-control does not moderate the relationship between dark personality traits (i.e., Machiavellianism and psychopathy) and belief in virtuous humanity.

Second, Model 2 of Table 3 indicated that the effects of dark personality traits (i.e., Machiavellianism and psychopathy) on cyber aggression were moderated by self-control ($\beta_M = -0.08$, $p < 0.05$; $\beta_P = -0.12$, $p < 0.01$). To describe the moderating effect, this study presented dark personality traits (i.e., Machiavellianism and psychopathy) on cyber aggression at different levels of self-control (M – 1 SD and M + 1 SD). Simple slope tests showed that for adolescents with low self-control, dark personality traits (i.e., Machiavellianism and psychopathy) significantly predicted their cyber aggression ($b_{simple\_M} = 0.38$, $p < 0.001$, 95% CI = [0.28, 0.47]; $b_{simple\_P} = 0.42$, $p < 0.001$, 95% CI = [0.33, 0.50]). However, for adolescents with high self-control, dark personality traits (i.e., Machiavellianism and psychopathy) significantly predicted cyber aggression, although considerably weaker ($b_{simple\_M} = 0.12$, $p < 0.05$, 95% CI = [0.02, 0.23];

Table 1
Descriptive statistics and correlation matrix of all variables (N = 675).

Variables	M	SD	1	2	3	4	5	6	7
1. Dark personality	38.76	10.47	1.00						
2. Machiavellianism	10.05	5.28	0.84***	1.00					
3. Psychopathy	8.76	4.17	0.70***	0.50***	1.00				
4. Narcissism	19.95	4.90	0.65***	0.28***	0.09*	1.00			
5. Belief in virtuous humanity	25.48	4.96	−0.30***	−0.34***	−0.37***	0.04	1.00		
6. Self-control	57.33	10.09	−0.38***	−0.29***	−0.31***	−0.24***	0.22***	1.00	
7. Cyber aggression	36.73	8.14	0.36***	0.32***	0.37***	0.11**	−0.28***	−0.28***	1.00

Note. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 2
Testing the mediation effect of dark triad personality traits on cyber aggression.

Variables	Model 1 (CA)		Model 2 (BVH)		Model 3 (CA)	
	β	t	β	t	β	t
Age	0.04	1.02	−0.01	−0.41	0.04	0.96
Gender	−0.06	−1.69	0.03	0.82	−0.06	−1.56
Machiavellianism	0.32	8.56***	−0.34	−9.21***	0.25	6.52***
BVH					−0.19	−5.04***
R^2	0.11		0.12		0.14	
F	27.83***		30.02***		27.98***	
Age	0.05	1.48	−0.03	−0.83	0.05	1.36
Gender	−0.08	−2.12*	0.05	1.31	−0.07	−1.93
Psychopathy	0.36	10.14***	−0.37	−10.21***	0.30	7.97***
BVH					−0.16	−4.31***
R^2	0.14		0.14		0.17	
F	37.81***		36.56***		33.75***	
Age	0.04	1.01	−0.001	−0.03	0.04	1.05
Gender	−0.12	−3.05**	0.08	2.09*	−0.09	−2.55*
Narcissism	0.12	3.24**	0.03	0.79	0.13	3.61***
BVH					−0.28	−7.61***
R^2	0.03		0.01		0.11	
F	6.65***		1.75		19.90***	

Note. BVH = Belief in virtuous humanity; CA = Cyber aggression; Each variable in the model is standardized; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

$b_{\text{simple\_P}} = 0.12$, $p < 0.05$, 95% CI = [0.01, 0.23]). These results showed that as the self-control level increased, the predictive effects of dark personality traits (i.e., Machiavellianism and psychopathy) on cyber aggression in adolescents were weakened (see Figs. 2 and 3).

Third, Model 2 of Table 3 also shows that the interaction of belief in virtuous humanity and self-control had a significant predictive effect on cyber aggression ($\beta_{\text{M}} = 0.12$, $p < 0.01$; $\beta_{\text{P}} = 0.08$, $p < 0.05$). For descriptive purposes, this study plotted predicted adolescents' cyber aggression against belief in virtuous humanity for low and high levels of self-control (Fig. 4). A simple slope analysis indicated that for adolescents with low self-control, higher levels of belief in virtuous humanity were significantly associated with lower levels of cyber aggression ($b_{\text{simple}} = -0.35$, $p < 0.001$, 95% CI = [−0.44, −0.26]). However, for adolescents with high self-control level, belief in virtuous humanity was not significantly associated with cyber aggression ($b_{\text{simple}} = -0.07$, $p > 0.05$, 95% CI = [−0.17, 0.04]).

Further bias-corrected percentile bootstrap analyses revealed that the indirect relationship between adolescents' dark personality traits (i.e., Machiavellianism and psychopathy) and cyber aggression via belief in virtuous humanity was moderated by self-control. Specially, for adolescents with low self-control, the indirect relationship between dark personality traits (i.e., Machiavellianism and psychopathy) and
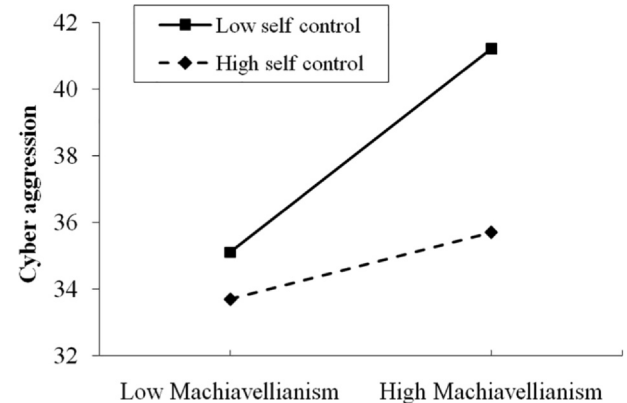

Fig. 2. Self-control moderates the relation between Machiavellianism and cyber aggression.

cyber aggression were significant ($b_{\text{M}} = 0.09$, SE = 0.02, 95% CI = [0.06 0.13]; $b_{\text{P}} = 0.08$, $SE = 0.02$, 95% CI = [0.05, 0.12]). For adolescents with high self-control, this indirect relationship became insignificant or lower ($b_{\text{M}} = 0.02$, SE = 0.01, 95% CI = [−0.01 0.04];

Table 3
Testing the moderated mediation effect of dark personality traits on cyber aggression.

Variables	Model 1 (BVH)			Model 2 (CA)		
	β	t	95% CI	β	t	95% CI
Machiavellianism	−0.30	−7.96***	[−0.39, −0.21]	0.20	5.23***	[0.12, 0.29]
Self control	0.13	3.47**	[0.05, 0.21]	−0.20	−5.44***	[−0.26, −0.14]
M × SC	0.03	0.73	[−0.06, 0.11]	−0.08	−2.03*	[−0.15, −0.001]
BVH				−0.15	−4.06***	[−0.22, −0.09]
BVH × SC				0.12	3.04**	[0.05, 0.17]
R^2	0.13			0.20		
F	34.31***			32.40***		
Psychopathy	−0.33	−8.56***	[−0.42, −0.25]	0.22	5.67***	[0.12, 0.31]
Self control	0.12	3.13**	[0.03, 0.20]	−0.19	−5.25***	[−0.25, −0.14]
P × SC	0.01	0.25	[−0.06, 0.08]	−0.12	−3.01**	[−0.18, −0.04]
BVH				−0.14	−3.70***	[−0.21, −0.08]
BVH × SC				0.08	2.06*	[0.03, 0.13]
R^2	0.15			0.22		
F	39.31***			36.72***		

Note. Each variable in the model is standardized; M = Machiavellianism; P = Psychopathy; SC = Self control; BVH = Belief in virtuous humanity; CA = Cyber aggression; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
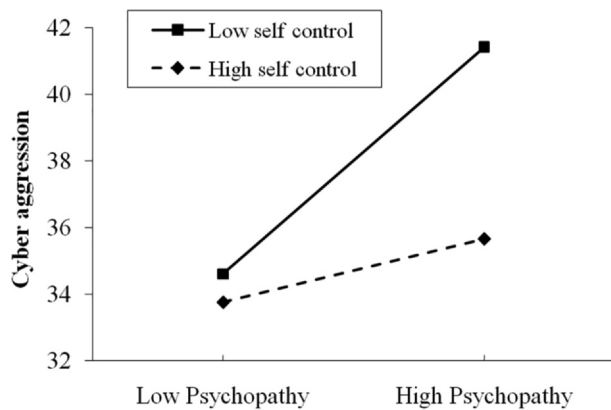
Fig. 3. Self-control moderates the relation between psychopathy and cyber aggression.
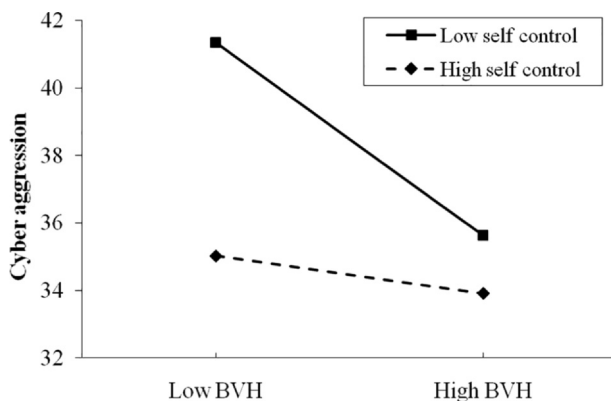

Fig. 4. Self-control moderates the relation between belief in virtuous humanity (BVH) and cyber aggression.

$b_P = 0.02$, $SE = 0.01$, 95% CI = [0.001, 0.05]). The results also indicated that the index of moderated mediation was significant (Index$_M = -0.04$, SE(Boot) = 0.01, 95% CI = [-0.06, -0.02]; Index$_P = -0.03$, SE(Boot) = 0.01, 95% CI = [-0.05, -0.01]). In sum, these results indicated that self-control moderates the indirect associations between adolescents' dark personality traits (i.e., Machiavellianism and psychopathy) and their cyber aggression via belief in virtuous humanity. Therefore, Hypothesis 3 and 4 were partially supported.

4. Discussion

This study examined how and when the dark personality traits affect cyber aggression in adolescents by constructing a moderated mediation model. The findings demonstrated the positive association between dark personality traits and cyber aggression in adolescents. Furthermore, this study found that adolescents' belief in virtuous humanity mediates the relationship between dark personality traits (i.e., Machiavellianism and psychopathy) and cyber aggression; and self-control play a moderating role in the direct effect and the second stage of the indirect effect. The results will be discussed in the succeeding sections.

4.1. Relationship between dark personality traits and cyber aggression

In recent years, an increasing number of researchers have paid attention to cyber aggression in adolescents. This study found that as one of risk factors, dark personality traits (i.e., Machiavellianism, psychopathy, and narcissism) can significantly positively be correlated with cyber aggression in adolescents. This result is consistent with previous

studies (Pabian et al., 2015; Pailing et al., 2014), and supports the Hypothesis 1. Specifically, this study observed that psychopathy can significantly predict cyber aggression, which may be due to the fact that psychopathic individuals tend to be less empathic and are more callous, and are more likely to engage in aggression (Pabian et al., 2015; Pailing et al., 2014; Paulhus & Williams, 2002). Moreover, previous conclusions about whether Machiavellianism can predict aggression are inconsistent, which may be attributed to Machiavellian individuals being good at covering their aggressive behaviors in real life (Jones & Neria, 2015). However, in the cyberspace, the anonymity of the internet will promote the cyber aggressive behaviors of Machiavellian individuals (Wright, 2014). Therefore, this study revealed that Machiavellianism is significantly positively correlated with cyber aggression in adolescents. In addition, this study found a significantly positive correlation between narcissism and cyber aggression. This result is consistent with previous studies (Ang, Tan, & Talib Mansor, 2011; Pabian et al., 2015). Narcissistic individuals tend to be self-centered and exploitative, the anonymity of the Internet could exacerbate their sense of disregard for others and their belief that aggression is acceptable and justifiable (Ang et al., 2011; Rigby & Slee, 1991). Generally, the results of this study are consistent with the view of the general aggression model (Allen et al., 2018; Cavalcanti & Pimentel, 2016). That is, dark personality traits can positively be associated with cyber aggressive behaviors in adolescents.

4.2. Mediating role of belief in virtuous humanity

To the best of our knowledge, this study is the first to test the mechanism of the relationship between dark personality traits and cyber aggression in adolescents. Basically, consistent with our hypothesis, this study found that belief in virtuous humanity mediates the relationship between dark personality traits in adolescents (including Machiavellianism and psychopathy, but excluding narcissism) and their cyber aggression. That is, adolescents with high level of dark personality traits (i.e., Machiavellianism and psychopathy) are more likely to have lower levels of belief in virtuous humanity, which in turn leads to an increase in cyber aggression. Previous studies have shown that psychopathy is considered the "darkest" construct, followed by Machiavellianism, whereas narcissism is considered the lightest component of dark personality traits (Brankley & Rule, 2014; Paulhus & Williams, 2002). Machiavellianism and psychopathy are considered to be highly related to being antisocial, whereas narcissism is not necessarily related to being antisocial (Brankley & Rule, 2014; Furnham, Richards, & Paulhus, 2013). Psychopathic individuals are often hostile to others and tend to see them as inferior and undeserving of compassion. Machiavellian individuals have a hostile worldview and tend to see others as aggressive and ruthless (Brankley & Rule, 2014). Narcissists tend to focus on themselves, such as showing themselves superficially and ostentatiously while paying little attention to others (Paulhus & Williams, 2002). Thus, in this study, Machiavellianism and psychopathy are negatively associated with belief in virtuous humanity, whereas narcissism is not. Belief in virtuous humanity is a cognitive factor formed in the long-term interaction between individuals and the environment (Yao & Enright, 2020; Zhang et al., 2016). In the present study, adolescents' belief in virtuous humanity is negatively associated with their cyber aggression. The internal working model can explain this result (Lopez et al., 1998). According to this theory, individuals with high level of belief in virtuous humanity tend to engage in more prosocial behaviors and adopt less aggressive strategies compared with their counterpart (Lopez et al., 1998; Yao & Enright, 2020). In sum, the results revealed the role of belief in virtuous humanity in linking dark personality traits (i.e., Machiavellianism and psychopathy) with cyber aggression in adolescents.

4.3. Moderating role of self-control

Consistent with our hypothesis, self-control moderates the

association between dark personality traits (i.e., Machiavellianism and psychopathy) and cyber aggression in adolescents and between belief in virtuous humanity and adolescents' cyber aggression. Specifically, this study found that self-control can play a buffering role in the effects of dark personality traits in adolescents on their cyber aggression. In comparison with adolescents with low self-control, a high self-control level helps adolescents buffer the effects of dark personality traits (i.e., Machiavellianism and psychopathy) on their cyber aggression. This result is consistent with the interpretation of the risk-protective factor model (Hollisterwagner et al., 2001). Self-control is an important protective resource for individuals (Baumeister & Exline, 1999; Baumeister et al., 2007), it can restrain their instinctive impulses and make behaviors in line with social norms. The anonymity of the internet may increase the risk of adolescents' dark personality traits (i.e., Machiavellianism and psychopathy) and promote their cyber aggression, at the same time, adolescents' self-control can play a buffer role in their relationships. These results suggest that training and improving self-control ability can help prevent and intervene cyber aggressive behaviors in adolescents.

Furthermore, under the theoretical framework of the protective-protective model (Hollisterwagner et al., 2001), this study found that the interaction of adolescents' belief in virtuous humanity and self-control can significantly predict their cyber aggression. Previous studies have shown that there may be two hypotheses (protective-enhancing vs. protective-attenuating) that can be used to explain the nature of this interaction (Li et al., 2013). The protective-enhancing hypothesis suggests that one protective factor can enhance beneficial effect of another protective factor (Li et al., 2013; Yang et al., 2020). Conversely, the protective-attenuating hypothesis holds that one protective factor usually confers advantages, and this beneficial effect is especially potent when individuals possess low levels of another protective factor (Li et al., 2013; Yang et al., 2020). In this study, belief in virtuous humanity significantly negatively predicted cyber aggression for adolescents with low self-control, whereas this association became insignificant for adolescents with high self-control. This result is consistent with the protective-attenuating model. That is, the beneficial effect of adolescents' belief in virtuous humanity is stronger for adolescents with low rather than high levels of self-control levels. This model suggests that to reduce adolescents' cyber aggression, we should mainly seek to promote belief in virtuous humanity of adolescents with low self-control level.

4.4. Implications

This study has several important theoretical and practical implications. On the theoretical level, this study explores and reveals the risk factors (e.g. dark personality traits) and protective factors (e.g. belief in virtuous humanity and self-control) that affect adolescents' cyber aggression, verifies and supports the risk-protective model and the protective-protective model. In addition, this study also explores and reveals the psychological mechanism of the effects of dark personality traits on the cyber aggressive behaviors in adolescents, enriches and develops the general aggression model, and transfers its applicability to the internet environment.

On the practical level, the enlightenment of this study can be elaborated from at least three aspects. First, this study suggests that dark personality is a significant risk factor for cyber aggressive behavior in adolescents. Thus, we should pay more attention to the personality traits of adolescents in the prevention of cyber aggression. Second, this study demonstrates that belief in virtuous humanity is a mechanism that links dark personality traits to cyber aggression in adolescents. In other words, belief in virtuous humanity can serve as a coping mechanism. Previous studies have indicated that belief in virtuous humanity is a cognitive factor formed in the long-term interaction between individuals and the environment (Yao & Enright, 2020; Zhang et al., 2016). Therefore, a harmonious interpersonal communication

mode and a good social atmosphere should be established in real life to promote adolescents' belief in virtuous humanity. Third, this study reveals that self-control plays a buffering role in the association between dark personality traits and cyber aggressive behaviors in adolescents. Previous studies have shown that self-control can be improved through training (Baumeister & Exline, 1999; Denson et al., 2011). Therefore, to reduce adolescents' cyber aggression, some measures should be considered to improve adolescents' self-control in real life.

4.5. Limitations and future directions

Despite some interesting results obtained from this study, it still has several limitations. First, this work is a cross-sectional design study, which cannot draw any causal inferences. Longitudinal and experimental research should be considered in the future to further validate the moderated mediation model in this study. Second, this study mainly takes college students as the research object in exploring and revealing the risk and protective factors that affect the cyber aggressive behaviors in adolescents. Future studies should consider expanding the sampling range to include middle-school students and primary-school students to reveal the characteristics of cyber aggression more comprehensively. Finally, this study measured the cyber aggressive behavior of adolescents through their subjective self-reported data. Future research should consider other objective indicators (e.g., indicators evaluated by others or those objectively recorded by apps) to examine the robustness of the present study.

5. Conclusion

In conclusion, this study examined the influencing factors and psychological mechanism of cyber aggression in adolescents. This theoretically enhances our understanding relationship between dark personality traits and cyber aggression in Chinese adolescents. It shows that belief in virtuous humanity mediates the relationship between dark personality traits (i.e., Machiavellianism and psychopathy) and adolescents' cyber aggression. Moreover, the relationship between adolescents' dark personality traits (i.e., Machiavellianism and psychopathy) and cyber aggression as well as belief in virtuous humanity and cyber aggression in adolescents is moderated by self-control. These findings suggest that a variety of interventions should be required to reduce cyber aggressive behaviors in adolescents.

6. Compliance with Ethical Standards

Ethical compliance: This study was reviewed and approved by local Ethics Committee, and all methods were performed in accordance with government regulations and laboratory's policies and with the 1964 Helsinki Declaration.

Informed consent: Informed consent was obtained from all participants included in the study.

Author contributions

To conception and design: Heyun Zhang, Huanhuan Zhao
Collection, analysis and interpretation of data: Heyun Zhang, Huanhuan Zhao
Drafting the article: Heyun Zhang
Revising the article critically: Heyun Zhang, Huanhuan Zhao

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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.

References

Allen, J. J., Anderson, C. A., & Bushman, B. J. (2018). The general aggression model. *Current Opinion in Psychology, 19*, 75–80. https://doi.org/10.1016/j.copsyc.2017.03.034.

Anderson, C. A., & Carnagey, N. L. (2004). Violent evil and the General Aggression Model. In A. G. Miller (Ed.). *The social psychology of good and evil* (pp. 168–192). New York: The Guilford Press.

Ang, R. P., Tan, K.-A., & Talib Mansor, A. (2011). Normative beliefs about aggression as a mediator of narcissistic exploitativeness and cyberbullying. *Journal of Interpersonal Violence, 26*(13), 2619–2634. https://doi.org/10.1177/0886260510388286.

Baumeister, R. F., & Exline, J. J. (1999). Virtue, personality, and social relations: Self-control as the moral muscle. *Journal of Personality, 67*(6), 1165–1194. https://doi.org/10.1111/1467-6494.00086.

Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current Directions in Psychological Science, 16*(6), 351–355. https://doi.org/10.1111/j.1467-8721.2007.00534.x.

Beran, T. N., & Li, Q. (2005). Cyber-harassment: A study of a new method for an old behavior. *Journal of Educational Computing Research, 32*(3), 265–277. https://doi.org/10.2190/8YQM-B04H-PG4D-BLLH.

Brankley, A. E., & Rule, N. O. (2014). Threat perception: How psychopathy and Machiavellianism relate to social perceptions during competition. *Personality and Individual Differences, 71*, 103–107. https://doi.org/10.1016/j.paid.2014.07.015.

Cavalcanti, J. G., & Pimentel, C. E. (2016). Personality and aggression: A contribution of the General Aggression Model. *Estudos De Psicologia, 33*(3), 443–451. https://doi.org/10.1590/1982-02752016000300008.

Chapin, J. (2016). Adolescents and cyber bullying: The precaution adoption process model. *Education and Information Technologies, 21*(4), 719–728. https://doi.org/10.1007/s10639-014-9349-1.

Denson, T. F., Capper, M. M., Oaten, M. J., Friese, M., & Schofield, T. P. (2011). Self-control training decreases aggression in response to provocation in aggressive individuals. *Journal of Research in Personality, 45*(2), 252–256. https://doi.org/10.1016/j.jrp.2011.02.001.

Denson, T. F., Dewall, C. N., & Finkel, E. J. (2012). Self-control and aggression. *Current Directions in Psychological Science, 21*(1), 20–25. https://doi.org/10.1177/0963721411429451.

Dewall, C. N., Finkel, E. J., & Denson, T. F. (2011). Self-control inhibits aggression. *Social and Personality Psychology Compass, 5*(7), 458–472. https://doi.org/10.1111/j.1751-9004.2011.00363.x.

Fergus, S., & Zimmerman, M. A. (2005). Adolescent resilience: A framework for understanding healthy development in the face of risk. *Annual Review of Public Health, 26*(1), 399–419. https://doi.org/10.1146/annurev.publhealth.26.021304.144357.

Festl, R., & Quandt, T. (2013). Social relations and cyberbullying: The influence of individual and structural attributes on victimization and perpetration via the internet. *Human Communication Research, 39*(1), 101–126. https://doi.org/10.1111/j.1468-2958.2012.01442.x.

Flexon, J. L., Meldrum, R. C., Young, J. T. N., & Lehmann, P. S. (2016). Low self-control and the Dark Triad: Disentangling the predictive power of personality traits on young adult substance use, offending and victimization. *Journal of Criminal Justice, 46*, 159–169. https://doi.org/10.1016/j.jcrimjus.2016.05.006.

Fosse, G. K., & Holen, A. (2006). Childhood maltreatment in adult female psychiatric outpatients with eating disorders. *Eating Behaviors, 7*(4), 404–409. https://doi.org/10.1016/j.eatbeh.2005.12.006.

Furnham, A., Richards, S., & Paulhus, D. L. (2013). The Dark Triad of personality: A 10 year review. *Social and Personality Psychology Compass, 7*(3), 199–216. https://doi.org/10.1111/spc3.12018.

Gilbert, F., & Daffern, M. (2011). Illuminating the relationship between personality disorder and violence: Contributions of the General Aggression Model. *Psychology of Violence, 1*(3), 230–244. https://doi.org/10.1037/a0024089.

Grigg, D. W. (2010). Cyber-aggression: Definition and concept of cyberbullying. *Australian Journal of Guidance and Counselling, 20*(2), 143–156. https://doi.org/10.1375/ajgc.20.2.143.

Han, L., Sun, R., Gao, F. Q., Zhou, Y. C., & Jou, M. (2019). The effect of negative energy news on social trust and helping behavior. *Computers in Human Behavior, 92*, 128–138. https://doi.org/10.1016/j.chb.2018.11.012.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* New York: Guilford Press.

Hertz, M. F., & David-Ferdon, C. (2011). Online aggression: A reflection of in-person victimization or a unique phenomenon? *Journal of Adolescent Health, 48*(2), 119–120. https://doi.org/10.1016/j.jadohealth.2010.11.255.

Hinduja, S., & Patchin, J. W. (2010). Bullying, cyberbullying, and suicide. *Archives of Suicide Research, 14*(3), 206–221. https://doi.org/10.1080/13811118.2010.494133.

Hollisterwagner, G. H., Foshee, V. A., & Jackson, C. (2001). Adolescent aggression:

Models of resiliency. *Journal of Applied Social Psychology, 31*(3), 445–466. https://doi.org/10.1111/j.1559-1816.2001.tb02050.x.

Jin, T. L., Lu, G. Z., Zhang, L., Wu, Y. T. N., & Jin, X. Z. (2018). The effect of violent exposure on online aggressive behavior of college students: The role of ruminative responses and internet moral. *Acta Psychologica Sinica, 50*(9), 1051–1060. https://doi.org/10.3724/SP.J.1041.2018.01051.

Jonason, P. K., & Webster, G. D. (2010). The Dirty Dozen: A concise measure of the Dark Triad. *Psychological Assessment, 22*(2), 420–432. https://doi.org/10.1037/a0019265.

Jones, D. N., & Neria, A. L. (2015). The Dark Triad and dispositional aggression. *Personality and Individual Differences, 86*, 360–364. https://doi.org/10.1016/j.paid.2015.06.021.

Juvonen, J., & Gross, E. F. (2008). Extending the school grounds?—Bullying experiences in cyberspace. *Journal of School Health, 78*(9), 496–505. https://doi.org/10.1111/j.1746-1561.2008.00335.x.

Law, D. M., Shapka, J. D., Domene, J. F., & Gagne, M. (2012). Are Cyberbullies really bullies? An investigation of reactive and proactive online aggression. *Computers in Human Behavior, 28*(2), 664–672. https://doi.org/10.1016/j.chb.2011.11.013.

Li, D. P., Li, X., Wang, Y. H., Zhao, L. Y., Bao, Z. Z., & Wen, F. F. (2013). School connectedness and problematic internet use in adolescents: A moderated mediation model of deviant peer affiliation and self-control. *Journal of Abnormal Child Psychology, 41*(8), 1231–1242. https://doi.org/10.1007/s10802-013-9761-9.

Lopez, F. G., Melendez, M. C., Sauer, E. M., Berger, E., & Wyssmann, J. (1998). Internal working models, self-reported problems, and help-seeking attitudes among college students. *Journal of Counseling Psychology, 45*(1), 79–83. https://doi.org/10.1037/0022-0167.45.1.79.

Mallinckrodt, B., Abraham, W. T., Wei, M., & Russell, D. W. (2006). Advances in testing the statistical significance of mediation effects. *Journal of Counseling Psychology, 53*(3), 372–378. https://doi.org/10.1037/0022-0167.53.3.372.

Mishna, F., Khourykassabri, M., Gadalla, T. M., & Daciuk, J. (2012). Risk factors for involvement in cyber bullying: Victims, bullies and bully–victims. *Children and Youth Services Review, 34*(1), 63–70. https://doi.org/10.1016/j.childyouth.2011.08.032.

Muller, D., Judd, C. M., & Yzerbyt, V. Y. (2005). When moderation is mediated and mediation is moderated. *Journal of Personality and Social Psychology, 89*(6), 852–863. https://doi.org/10.1037/0022-3514.89.6.852.

Oboyle, E. H., Forsyth, D. R., Banks, G. C., & Mcdaniel, M. A. (2012). A meta-analysis of the Dark Triad and work behavior: A social exchange perspective. *Journal of Applied Psychology, 97*(3), 557–579. https://doi.org/10.1037/a0025679.

Pabian, S., De Backer, C. J. S., & Vandebosch, H. (2015). Dark Triad personality traits and adolescent cyber-aggression. *Personality and Individual Differences, 75*, 41–46. https://doi.org/10.1016/j.paid.2014.11.015.

Pailing, A., Boon, J., & Egan, V. (2014). Personality, the Dark Triad and violence. *Personality and Individual Differences, 67*, 81–86. https://doi.org/10.1016/j.paid.2013.11.018.

Paulhus, D. L., & Williams, K. M. (2002). The Dark Triad of personality: Narcissism, Machiavellianism, and psychopathy. *Journal of Research in Personality, 36*(6), 556–563. https://doi.org/10.1016/S0092-6566(02)00505-6.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879.

Rigby, K., & Slee, P. T. (1991). Bullying among Australian school children: Reported behavior and attitudes toward victims. *Journal of Social Psychology, 131*(5), 615–627. https://doi.org/10.1080/00224545.1991.9924646.

Schenk, A. M., & Fremouw, W. J. (2012). Prevalence, psychological impact, and coping of cyberbully victims among college students. *Journal of School Violence, 11*(1), 21–37. https://doi.org/10.1080/15388220.2011.630310.

Sontag, L. M., Clemans, K. H., Graber, J. A., & Lyndon, S. T. (2011). Traditional and cyber aggressors and victims: A comparison of psychosocial characteristics. *Journal of Youth and Adolescence, 40*(4), 392–404. https://doi.org/10.1007/s10964-010-9575-9.

Sourander, A., Brunstein Klomek, A., Ikonen, M., Lindroos, J., Luntamo, T., Koskelainen, M., ... Helenius, H. (2010). Psychosocial risk factors associated with cyberbullying among adolescents: A population-based study. *Archives of General Psychiatry, 67*(7), 720–728. https://doi.org/10.1001/archgenpsychiatry.2010.79.

Spears, B., Slee, P. T., Owens, L., & Johnson, B. D. (2009). Behind the scenes and screens: Insights into the human dimension of covert and cyberbullying. *Journal of Psychology, 217*(4), 189–196. https://doi.org/10.1027/0044-3409.217.4.189.

Tan, S. H., & Guo, Y. Y. (2008). Revision of self-control scale for Chinese college students. *Chinese Journal of Clinical Psychology, 16*(5), 468–470.

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72*(2), 271–324. https://doi.org/10.1111/j.0022-3506.2004.00263.x.

Van Geel, M., Goemans, A., Toprak, F., & Vedder, P. (2017). Which personality traits are related to traditional bullying and cyberbullying? A study with the Big Five, Dark Triad and sadism. *Personality and Individual Differences, 106*, 231–235. https://doi.org/10.1016/j.paid.2016.10.063.

Vandebosch, H., & Cleemput, K. V. (2009). Cyberbullying among youngsters: Profiles of bullies and victims. *New Media and Society, 11*(8), 1349–1371. https://doi.org/10.1177/1461444809341263.

Wang, J., Iannotti, R. J., & Nansel, T. R. (2009). School bullying among adolescents in the United States: Physical, verbal, relational, and cyber. *Journal of Adolescent Health, 45*(4), 368–375. https://doi.org/10.1016/j.jadohealth.2009.03.021.

Wang, J., Nansel, T. R., & Iannotti, R. J. (2011). Cyber and traditional bullying: Differential association with depression. *Journal of Adolescent Health, 48*(4), 415–417. https://doi.org/10.1016/j.jadohealth.2010.07.012.

Wright, J. P., Morgan, M. A., Almeida, P. R., Almosaed, N. F., Moghrabi, S. S., & Bashatah, F. S. (2017). Malevolent forces: Self-control, the Dark Triad, and crime. *Youth*

Violence and Juvenile Justice, 15(2), 191–215. https://doi.org/10.1177/1541204016667995.

Wright, M. F. (2014). Predictors of anonymous cyber aggression: The role of adolescents' beliefs about anonymity, aggression, and the permanency of digital content. *Cyberpsychology, Behavior, and Social Networking, 17*(7), 431–438. https://doi.org/10.1089/cyber.2013.0457.

Yang, J. P., Wang, X. C., & Lei, L. (2020). Perceived school climate and adolescents' bullying perpetration: A moderated mediation model of moral disengagement and peers' defending. *Children and Youth Services Review, 109*, 1–8. https://doi.org/10.1016/j.childyouth.2019.104716.

Yao, Z. J., & Enright, R. D. (2020). Belief in altruistic human nature and prosocial behavior: A serial mediation analysis. *Ethics and Behavior, 30*(2), 97–111. https://doi.org/10.1080/10508422.2019.1591963.

Zhang, H. Y., Zhao, H. H., & Xu, Y. (2016). Adolescents' perception of virtuous humanity, influencing factors and after-effect. *Youth Studies, 34*(2), 21–29 doi:jtp.cnki.net/bilingual/detail/html/qnyj201602003.

Zhao, F., & Gao, W. B. (2012). Reliability and validity of the adolescent online aggressive behavior scale. *Chinese Mental Health Journal, 26*(6), 439–444. https://doi.org/10.3969/j.issn.1000-6729.2012.06.009.