Psychology of Sport & Exercise 64 (2023) 102305

Contents lists available at ScienceDirect

Psychology of Sport & Exercise

journal homepage: www.elsevier.com/locate/psychsport

Don't look back in anger: A cross-sectional and dyadic examination of the Dark Triad, anger, and aggression in athletes

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ARTICLE INFO

Keywords:
Narcissism
Machiavellianism
Psychopathy
Anger
Aggression
Actor partner independence model

ABSTRACT

Objectives: The Dark Triad (psychopathy, Machiavellianism, and narcissism) has been linked to anti-social behaviour in sport, and while anti-social behaviour often involves aggression and violence, no research to date has examined the relationship between the Dark Triad and anger and aggression in athletes. The current two-sample study sought to address this gap.
Design: Multi-sample cross-sectional design.
Method: Sample 1 included 224 athletes (M_{AGE} = 23.85) and Sample 2 included 98 coach-athlete dyads (196 total; athlete M_{AGE} = 18.15, coaches M_{AGE} = 34.84). In both samples, facets of the Dark Triad were related to anger and aggression.
Results: In Sample 1, regression analyses indicated that psychopathy positively predicted both anger and aggression and Machiavellianism positively predicted aggression. In Sample 2, actor-partner interdependence models indicated a combination of dyadic relationships (i.e., both *actor* [coach and athlete personality predicted their own anger and aggression] and *partner* effects [coach and athlete personality predicted the other's anger and aggression]). In this regard, *actor effects* were found between psychopathy and both anger and aggression and narcissism and aggression. Coach to athlete *partner effects* were found for narcissism and anger and Machiavellianism and aggression.
Conclusions: Overall, the findings provide evidence for personal and interpersonal relationships between the Dark Triad and anger and aggression and highlight the potential for the darker side of both athlete and coach personality to influence athlete emotions.

1. Introduction

Emotions play an important role in the experience of sport because of their influence on performance, motivation, and wellbeing (e.g., McCarthy, 2011). Personality traits influence the likelihood that athletes will experience a range of positive (e.g., happiness) and negative (e.g., anger) emotions in their sport (e.g., Laborde, Allen, Katschak, Mattonet, & Lachner, 2020). Anger is a common emotion experienced by athletes and has been associated with aggressive sport behaviour (e.g., Isberg, 2000). Consequently, the experience of anger and aggression in sport is likely to have important implications for athletes and their coaches (Maxwell, 2004). In the present study, our aim is to examine the role of a particular suite of personality traits that are relevant to athletes – the Dark Triad (DT; narcissism, Machiavellianism, and psychopathy) – in the experience of anger and aggression in sport. To do so, we recruited two samples and examined the personal consequences for athletes (Sample 1) and the interpersonal consequences for coach-athlete dyads (Sample 2).

1.1. The Dark Triad in sport

The DT (Paulhus & Williams, 2002) is a constellation of three related, yet distinct, personality traits: narcissism, Machiavellianism, and psychopathy, which share an inclination towards self-serving and interpersonally cold, calculating behaviour (Furnham, Richards, & Paulhus, 2013). Narcissism is characterised by grandiosity, entitlement, dominance, and a sense of superiority and uniqueness of oneself. Machiavellianism is characterised by the tendency to act and think in an overly manipulative and calculating way. Finally, psychopathy is characterised by the tendency to exhibit impulsive, thrill-seeking behaviour, and

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https://doi.org/10.1016/j.psychsport.2022.102305
Received 10 March 2021; Received in revised form 30 September 2022; Accepted 30 September 2022
Available online 5 October 2022

display poor levels of empathy towards others (Paulhus & Williams, 2002). Individuals high in narcissism tend to act in a manner mainly motivated by self-interest, individuals high in Machiavellianism tend to plan carefully about their next move (Jones & Paulhus, 2011), and those high in psychopathy are likely to act largely on impulse, whether this may be effective or not (Thompson et al., 2019).

These traits share a disagreeable, selfish, callous core but differ in the behaviours they use for self-serving purposes (Furnham et al., 2013; Paulhus & Williams, 2002). Whilst somewhat overlapping and often examined in tandem we consider the traits distinctive (Muris, Merckelbach, Otgaar, & Meijer, 2017). Likewise, each trait has distinct existing literatures which may not be totally captured within the DT framework. For example, in the context of the DT, narcissism focuses on the grandiose, rather than the vulnerable aspect of this trait (Maples, Lamkin, & Miller, 2014). Moreover, research has commonly used multiple linear regression to examine the DT as predictors of outcomes such as aggression (see Kjærvik & Bushman, 2021, for a meta-analytic review). As a result, the shared overlap between the variables is partialled out, therefore the more distinctive facets of the individual DT constructs, such as the sensation-seeking, disinhibition, and impulsiveness of psychopathy, are responsible for the effects observed in the literature (Sleep, Lynam, Hyatt, & Miller, 2017).

In a sporting context, there is some evidence to suggest that levels of the DT are higher in athletes than their non-athlete counterparts (Vaughan, Madigan, Carter, & Nicholls, 2019). As such, a growing body of work has examined how these higher levels manifest for athletes. In this regard, the DT has been shown to predict more favourable attitudes towards doping and to predict an increased likelihood to engage in actual cheating behaviours (Nicholls, Madigan, Backhouse, & Levy, 2017, 2019). Other research reports that the DT interacts with mental toughness to predict physical activity levels in athletes (Vaughan, Carter, Cockroft, & Maggiorini, 2018). More recently, underscoring their relevance to sport, Vaughan and Madigan (2020) found that the DT not only predicted competitiveness but also objective sport training performance. It is apparent then that the DT may be highly relevant and have important implications for athletes (e.g., links with achievement; Vaughan et al., 2018; 2019). Research has yet however to examine how the DT affects athletes' emotions.

1.2. Anger and aggression in sport

Emotions are important in sport. Of these, anger is particularly important due to its ability to both facilitate and harm performance. Anger is characterised by a strong feeling of annoyance, displeasure, or hostility and is evoked by perceived threat to an individual's ego-identity and self-esteem (e.g., Lazarus, 2000). Anger is the most difficult emotion to control (Goleman, 1998) and although it has potential to mobilize energy, anger has been associated with a number of negative performance outcomes such as misuse of energy, narrow focus of attention leading to poorer decision-making and skill execution, and the possibility of violent behaviour (e.g., Campo et al., 2016). The experience of uncontrolled anger or rumination about past experiences that have caused anger can increase the likelihood of aggressive or violent behaviour (e.g., Maxwell, 2004). As such, aggressive behaviour is one of the most important consequences of anger in sport (e.g., Maxwell, Visek, & Moores, 2009).

Aggression in sport is any intentional behaviour beyond the official rules of conduct of the sport, and may be directed towards an opponent, official, team-mate, or spectator motivated to avoid this behaviour (Maxwell, 2004). This definition does not specify the motivation for the behaviour, however, which may be reactive or inherent. This distinction was later described by Maxwell and Moores (2007); hostility (or reactional aggression) is the physical arousal resulting from a threat to one's physical or psychological health whereas instrumental aggression (or innate aggression) is possessing a disposition towards being accepting of and using aggression. These sub-types of aggressive behaviour were renamed trait anger and trait aggression respectively (Maxwell & Moores, 2007). Research supports that males who participate in competitive sport report higher levels of trait aggression and this aggression may be functional (e.g., goal achievement; Forbes, Adams-Curtis, Pakalka, & White, 2006).

The higher levels of trait aggression in male athletes suggests that either sport selects aggressive males or aggressive males are more inclined towards playing sport (Forbes et al., 2006). Some sports are associated with aggressive tribal behaviours (e.g., football hooliganism; Dionísio et al., 2008) while the competitive nature of sport may require higher levels of aggression (e.g., Wann, Weaver, Belva, Ladd, & Armstrong, 2015). As such, certain sports are associated with higher levels of aggression. For example, Boostani (2012) found that kickboxers reported higher levels of aggression compared to low contact sports. Some sports may allow participants to acquire, unintentionally, the skills required for success in intrasexual selection (Lombardo, 2012). If so, at least some sports, in play, may foster or encourage aggression (Tenenbaum, Stewart, Singer, & Duda, 1997). Therefore, higher aggression, whether legal or illegal within the constructs of the sport, may lead to competitive advantage, by enabling an athlete to command a physical and thus, tactical advantage over an opponent (Tenenbaum et al., 1997).

1.3. The Dark Triad and anger and aggression

The relationships between the DT and anger and aggression are well documented (Anderson & Kiehl, 2013; Erzi, 2020; Jones & Neria, 2015; Knight et al., 2018). The positive relationship between the DT, anger, and aggression which may be due to overlapping conceptual cores, similarity in outcomes, and functionality in achieving goals (Furnham et al., 2013; Jones & Neria, 2015; Vaughan et al., 2019). That is, both the DT and aggression share a common potentiality to be advantageous in a sport setting due to lending a predisposition towards using tactics beyond the rules of the game, or at the fringes of the rules, in order to gain any possible advantage. For example, Nicholls et al. (2017; 2019) found that the DT predicted a willingness to attempt to gain advantage unlawfully which was a tendency observed in athletes playing under coaches higher in aggression (Malete, Chow, & Feltz, 2013). This effect may be explained by a conceptual overlap, whereby hostile aggression forms part of a dark core of selfishness and callousness (Jones & Neria, 2015).

Outside of sport, the relationship between the DT and aggression has been established. Jones and Neria (2015) examined multivariate effects of the DT across different aspects of aggression (e.g., physical, verbal, anger, and hostility) and found that Machiavellianism was positively related to hostility (trait anger) and psychopathy was positively related to physical aggression (trait aggression). Individuals higher in Machiavellianism may resort to aggressive intimidation to gain a mental advantage via manipulation (Jonason & Webster, 2010) and internally justify aggressive behaviours via the tendency to objectify others (Figuerdo, Gladden, Sisco, Patch, & Jones, 2015), whereas individuals higher in psychopathy would act on their disposition towards uninhibited and aggressive behaviour (Figuerdo et al., 2015). That is, although all facets of the DT were positively correlated with physically aggressive bullying behaviours in adults, psychopathy showed the strongest relationship (Baughman, Dearing, Giammarco, & Vernon, 2012). Also, narcissism was found to be related to sexual aggression; males higher in narcissism displayed greater enjoyment when watching films depicting rape (Bushmen et al., 2003). Likewise, research attests that narcissism is not a unitary construct but consists of two independent components of grandiose and vulnerable narcissism (Kjærvik & Bushman, 2021). Meta-analytic evidence suggests that both grandiose and vulnerable narcissism are significantly related to aggression and its subcomponents (e.g., i.e., indirect, direct, displaced, physical, and verbal). Moreover, those high in narcissism are prone to aggression particularly when provoked (Kjærvik & Bushman, 2021). This distinction is important given that narcissism in the context of the DT focuses on grandiose

narcissism (Maples et al., 2014).

Other work supports the association between the DT and various conceptualisations of aggression. For example, Knight et al. (2018) reported that psychopathy, Machiavellianism, and vulnerable narcissism was significantly positively related to proactive aggression (i.e., spreading rumours portraying the self in a popular light) and psychopathy, Machiavellianism, and vulnerable and grandiose narcissism was significantly positively related to reactive aggression (i.e., ignoring someone after they insult you). Ezri (2020) reported significant positive correlations between psychopathy, Machiavellianism, narcissism, and a composite DT score with relational or indirect aggression. In both Knight et al. (2018) and Ezri (2020) the largest association was found between psychopathy and aggression. It is likely that the distinctive features of psychopathy such as sensation-seeking, disinhibition and impulsiveness drive this relationship.

Despite the literature supporting positive relationships between the DT and aggression outside of sport (e.g., Webster, Gesselman, Crysel, Brunell, & Jonason, 2014), very little research has focused exclusively on whether these relationships play a predictive role in a sample of athletes. Given the potential consequences of aggressiveness to the experience of sport, understanding the personality characteristics that may predispose an individual to experience anger and aggression is important. As no research to date has examined the relationship between the DT and aggression in athletes, aim (1) of the current study will address this gap by examining the relationship between the DT, anger, and aggression and whether the DT dimensions (psychopathy, Machiavellianism, and narcissism) predict anger and aggression in athletes.

1.4. Dyadic relationships

The coach-athlete relationship is likely to be important to the sport experience for athletes. Actor-partner interdependence models (APIMs) are a conceptual way of viewing how certain characteristics of individuals influence their own, alternative characteristics and/or those of another individual, within the interpersonal framework of a dyadic (two-person) relationship (Cook and Kenny, 2005). One such dyadic relationship in sport is between an athlete and their coach – the efficiency, strength, and success of which is crucial in ensuring good athlete attrition at youth/grassroots level (Barnett, Smoll, & Smith, 1992) and creating optimal conditions for high performance at elite level (Trzaskoma-Bicsérdy, Bognár, Révész, & Géczi, 2007). Whilst research examining personality and individual differences in sport is increasing, research into APIMs involving the DT is relatively sparse (Webster et al., 2016), and work with APIMs involving the DT and aggression in a sport setting non-existent. However, research has examined the occurrence of other APIMs between coaches and athletes.

Actor-partner effects between coaches and athletes have been examined in relation to the big five personality traits (Jackson, Dimmock, Gucciardi, & Grove, 2011; Yang, Jowett, & Chan, 2014). Yang et al. (2014) found actor-partner effects of conscientiousness, extroversion, and neuroticism on both coaches' and athletes' perceptions of relationship quality, while Jackson et al. (2011) found an actor effect of higher athlete neuroticism being positively related to lower athlete commitment to the coach-athlete relationship (Jackson et al., 2011). Further, a partner effect was found whereby high coach extraversion (and/or conscientiousness) was positively related to favourable athlete outcomes (e.g., high relationship commitment in their athletes; Jackson et al., 2011). These findings can be linked with the DT as psychopathy displayed a negative relationship with neuroticism while narcissism displayed a positive relationship with extraversion (Paulhus & Williams, 2002). In addition, self-reported agreeableness and/or conscientiousness in athletes and coaches has been reported to form a complete APIM with relationship commitment (Jackson et al., 2011). Significantly, all three facets of the DT were negatively related to agreeableness and Machiavellianism and psychopathy were negatively related to conscientiousness (Paulhus & Williams, 2002). Therefore, the DT may be potentially detrimental to coach-athlete commitment, and thus, athlete performance, or the DT may somewhat buffer itself from negative implications within the coach-athlete dyad.

Outside of sport, evidence supports the dyadic relationship between the DT and aggression. For example, Webster et al. (2014) reported that men's Machiavellianism predicted female's aggression and men's psychopathy predicted females' hostility and physical aggression. Furthermore, partner effects were found between female's psychopathy and men's anger rumination. Also, Webster et al. (2016) found actor effects between female partners' psychopathy and displaced aggression (trait anger) within romantic relationships in the general population. Moreover, a partner effect was found between male psychopathy and female trait aggression. These trends were exacerbated by relationship length in males, with the inverse true of females (Webster et al., 2016). These findings suggest that further research into the DT and aggression in dyads is worthwhile. Specifically, personality-based actor-partner interdependences in coach-athlete dyads will help establish whether the trends found in the more malevolent side of personalities of partners might be observed in a sport setting.

In sport, the coach–athlete relationship is particularly crucial (Jowett & Cockerill, 2002). Although research suggests that aggression can seep into coach-athlete relationships, we have limited understanding about the role of darker personality traits. As research examining the way the DT and aggression interact in dyads is in its infancy (Webster et al., 2016). Despite research outside of sport drawing upon dyadic examinations of the DT, and of aggression, in relationships, the research examining DT and aggression in sport, and dyadic relationships, is sparse. Previous research suggests the presence of personality-based actor-partner effects in spousal relationships (e.g., Webster et al., 2014; Webster et al., 2016) and in coach-athlete relationships (e.g., Jackson et al., 2011; Yang et al., 2014), and therefore, provide foundation for aim (2) of the current study.

1.5. Aims

Much literature has supported a positive relationship between the DT and aggression (Erzi, 2020; Jones & Neria, 2015; Knight et al., 2018; Webster et al., 2014), but very little has focused exclusively on whether these relationships play a predictive role in a sample of athletes. The present study had two aims; (1) we aimed to examine the cross-sectional relationships between the DT and aggression and whether the DT components (psychopathy, Machiavellianism, and narcissism) predict anger and aggression in a sample of athletes; and (2) we aimed to examine the dyadic relationships between the DT, anger, and aggression in athletes and coaches. Based on previous research, we hypothesised that–across the two samples–all DT components would positively predict anger and aggression. Specifically, it was predicted that (i) DT components would positively predict anger and aggression in athletes; (ii) Athlete and coach DT scores will display actor effects on their own anger and aggression scores; (iii) Coach DT scores will display partner effects on the athletes' anger and aggression scores; and (iv) Athlete DT scores will display partner effects on the coaches' anger and aggression scores.

2. Methods

2.1. Participants

We used Sample 1 to test relationships between the DT and anger and aggression and Sample 2 to test the relationships dyadically in athletes and coaches.

2.1.1. Sample 1

Participants were 224 athletes (n = 130 males; 58.42%) recruited from a range of team and individual sports clubs in the UK. Participants' mean age was 23.85 years (SD = 8.87). Participants were involved in

football, rugby, weightlifting, athletics, golf, tennis, and rowing and performed at a range of levels varying from club and university to senior international. Athletes had participated in their sport for an average of 11.12 years (SD = 7.41). A power analysis using the G*Power programme suggested a sample size of 127 participants would be required for multiple linear regression with a medium effect size (0.14) to achieve 0.95 power at.05 alpha level (Faul, Erdfelder, Buchner, & Lang, 2009).

2.1.2. Sample 2

Participants were 98 athlete (M_{AGE} = 18.15; SD = 2.66) and coach (M_{AGE} = 34.84; SD = 11.29) dyads (196 participants in total) recruited from team (n = 35 dyads; basketball, football, hockey, and tennis) and individual sports (n = 63 dyads; athletics, boxing, swimming, and tennis). Athletes competed regularly in a range of novice (n = 26 dyads), amateur (n = 39 dyads), elite (n = 18 dyads), and super-elite (n = 15 dyads; Swann, Moran, & Piggott, 2015) level competition. The dyads comprised 67 same gender pairs (44 male & 23 female) and 31 mixed gender dyads (12 male athlete & female coach; 19 female athlete & male coach). The mean relationship duration was 3.89 years (SD = 1.44) and athletes and coaches spent on average 6.97 h (SD = 4.31) together a week (training and competition). Athletes reported 8.63 years (SD = 4.33) and coaches 17.21 (SD = 7.84) years' experience in their sport. Power analysis suggested a sample size of 98 participants would be required to detect medium actor and partner effects (0.14) to achieve 0.82 power at .05 alpha level (Ackerman & Kenny, 2016).

2.2. Procedure

Following institutional ethical approval at a UK university (MPY104_169050988), informed consent was obtained from all participants after reading information sheets detailing the objectives of the study to determine the relationship between personality and aggression in sport. Both samples completed the same measures. Participants from Sample 2 were recruited via coaches who were provided information sheets with the opportunity to invite an athlete. The athlete was then contacted independently and assigned a unique ID for pairing after questionnaires were completed. Participants were ensured that their data would remain confidential from their partner.

2.3. Measures

2.3.1. The short Dark Triad (SD3; Jones & Paulhus, 2013)

The SD3 is a 27-item measure of narcissism, Machiavellianism, and psychopathy. Participants respond to 9 items for each component on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Items assess narcissism (e.g., "I know that I am special because everyone keeps telling me so."), Machiavellianism (e.g., "most people can be manipulated."), and psychopathy (e.g., "people who mess with me always regret it"). Vaughan et al. (2019) supported the scale's reliability and validity with athlete samples.

2.3.2. The competitive aggressiveness and anger scale (CAAS; Maxwell & Moores, 2007)

The CAAS is a 12-item measure of anger and aggression. Participants respond to 6 items for each component on a 5-point Likert scale ranging from 1 (*not at all severe*) to 5 (*extremely severe*). Items assess trait anger (e.g., "official's mistakes make me angry.") and trait aggression (e.g., "I use excessive force to gain an advantage."). Maxwell and Moores (2007) supported the scales' reliability and validity with athlete samples.

2.4. Analytical strategy

Before hypotheses testing we inspected data for missingness and normality, internal consistency via Omega (Dunn, Baguley & Brunsden, 2014) using the Hayes and Coutts (2020) extension macro for SPSSv26, and the factor structure via Confirmatory Factor Analysis using AMOS (Byrne, 2016). To examine the cross-sectional relationships between the DT and aggression and whether the DT components (psychopathy, Machiavellianism, and narcissism) predict anger and aggression in athletes in a sample of athletes, two multiple linear regressions via SPSSv26 were carried out to assess whether the unique combination of narcissism, Machiavellianism, and psychopathy predicted anger and aggression in Sample 1.

To examine the dyadic relationships between the DT, anger, and aggression in athletes and coaches, the APIM (Kenny, Kashy, & Cook, 2006) was used as a framework for analysing dyadic data (coach & athletes in Sample 2). The APIM framework provides separate and concurrent estimates of *actor* and *partner effects* with associated errors. In the context of the athlete-coach relationship, the relation between an individual's trait and own outcome is the *actor effect*, and the relation between an individual's trait and partners outcome is the *partner* effect. Actor Partner Independence Models provide benefits such as they control for the overlap between independent and residual variables; actor effects are estimated controlling for partner effects and partner effects are estimated controlling for actor effects over existing multi-level modelling techniques (Kenny et al., 2006). In the current setting, *actor effects* for athletes and coaches determine whether their DT predict their own aggression. Athlete's *partner effects* determine whether their DT predict coach's aggression, whereas coaches *partner effects* determine whether their DT predict athlete's aggression. A *complete APIM* indicates *actor effects* for both athletes and coaches plus *partner effects* between athlete and coaches.

To ease interpretation and based on recommendations in the literature, the k parameter (the partner effect divided by the actor effects) were calculated to estimate the most accurate dyadic pattern in dyadic relationships (Kenny & Ledermann, 2010). Standardised values of the k parameter greater than .10 were considered meaningful. All APIM analyses were conducted using the APIM_SEM application (Stas, Kenny, Mayer, & Loeys, 2018), which uses the lavaan package for structural equation modelling on the R statistical programming software (Rosseel, 2012).

3. Results

3.1. Preliminary analyses

We first inspected for missing values. Given that only a small number of cases (Sample 1: 1.1%; Sample 2: <1%) contained missing data, missing responses were replaced with the mean (ipsatised item replacement; Graham et al., 2003). In both samples, no cases displayed Mahalanobis distance larger than the critical value (Sample 1: $\chi^2(3) = 6.22, p < .01$; Sample 2: $\chi^2(3) = 6.71, p < .001$); therefore all cases were retained for analysis. The data were screened for normality and homogeneity and found to be parametric (skewness and kurtosis within±2). In both samples, Box's M test examined the variance–covariance matrices between male and female participants and was non-significant. Thus, subsequent analyses were collapsed across gender (Tabachnick & Fidell, 2007). Also, age did not correlate significantly with DT or aggression variables ($p > .05$) and therefore, was not entered as a covariate.

The internal consistency of the measures was assessed through Omega with a 0.70 cut-off required for stability (Dunn, Baguley &

Table 1
Descriptive statistics, internal consistency, and bivariate correlations.

Scale	M (*SD*)	ω	1	2	3	4
1.Machiavellianism	3.10 (0.56)	.71				
2.Narcissism	2.68 (0.58)	.72	.36**			
3.Psychopathy	2.27 (0.54)	.71	.41**	.47**		
4.Anger	2.76 (0.85)	.83	.23**	.23**	.37**	
5.Aggression	2.25 (1.04)	.89	.37**	.30**	.36**	.50**

Note. ω = Omega. N = 224. *$p < .05$; **$p < .01$.

Brunsden, 2014). Omega values ranged from 0.71 to 0.89 in Sample 1 and 75 to 0.87 in Sample 2 (see Table 1 and 3) demonstrating satisfactory levels of internal consistency (Tabachnick & Fidell, 2007). Next, we assessed the factor structure of the three-factor SD3 and two-factor CAAS in sample 1 and 2 using confirmatory factor analysis. Models were assessed using conventional cut-offs (i.e., Root Mean Square Error of Approximation [RMSEA] and Standardised Root Mean Residual [SRMR] is 0.06 or less, and each of the Comparative Fit Index [CFI] and Tucker Lewis Index [TLI] are 0.90 or greater; Hu & Bentler, 1999). The fit of the three-factor SD3 model in sample 1 (RMSEA = 0.045, SRMR = 0.038, CFI = 0.914, TLI = 0.921) and 2 (RMSEA = 0.058, SRMR = 0.051, CFI = 0.904, TLI = 0.912) was acceptable and indicated acceptable factor loadings for all items (i.e., 0.368 - 0.627; Byrne, 2016). The fit of the two-factor CAAS model in sample 1 (RMSEA = 0.034, SRMR = 0.029, CFI = 0.924, TLI = 0.933) and 2 (RMSEA = 0.044, SRMR = 0.049, CFI = 0.921, TLI = 0.929) was also acceptable and indicated acceptable factor loadings for all items (i.e., 0.347 - 0.694; Byrne, 2016).

Means, standard deviations, and bivariate correlations for athletes' in Sample 1 are reported in Table 1 and for athletes and coaches in Sample 2 are reported in Table 3. Bivariate correlations indicated linearity between variables. In both samples, all DT subscales displayed significant, moderate, positive relationships with one another, and likewise, trait anger displayed significant, large, positive relationships with trait aggression. All DT subscales (Narcissism, Machiavellianism, and psychopathy) displayed significant, small-to-moderate, positive relationships with aggression and anger. Further, in Sample 2, DT displayed significant, moderate, and positive relationships with aggression and anger for both athletes and coaches, and between athletes and coaches (e.g., coach narcissism correlated with athlete aggression).

3.2. Multiple regression analyses

Results of the multiple regression analyses testing cross-sectional relationships in Sample 1 are presented in Table 2. Two multiple linear regression models were constructed to ascertain whether higher scores in narcissism, Machiavellianism, or psychopathy were able to predict higher anger and higher aggression. The results showed that the DT predicted 20% of the aggression variance ($F(3,220) = 18.28$, $p = .001$) and 14% of the variance in anger variance ($F(3,220) = 12.25$, $p = .002$). Machiavellianism was a significant positive predictor of aggression, while psychopathy was a significant positive predictor of both aggression and anger. In contrast, narcissism showed no predictive relationships (Table 2).

3.3. Actor Partner Independence Models

Psychopathy formed *complete APIMs* with both anger and aggression (see Table 4). Narcissism also formed a *complete APIM* with aggression. Machiavellianism formed a *complete APIM* with aggression. Replicating findings from Sample 1, significant positive *actor effects* were found across all models; anger and aggression in athletes were predicted by the regression coefficient of the athletes' DT dimension. Also, coach DT scores displayed *actor effects* on their own anger and aggression scores (see Table 4). Coach-athlete *partner effects* were found for Machiavellianism with aggression. In addition, coach-athlete *partner effects* were found for narcissism and anger (see Table 4). Similarly, for narcissism, the athlete-coach *partner effect* became non-significant for anger, whilst the coach-athlete *partner effect* remained for aggression. All significant effects were positive.

Table 2
Multiple linear regression analyses summary.

Model	Anger		Aggression	
R^2	.14**		.20**	
	β	Partial	β	Partial
Machiavellianism	.09	.08	.25**	.22
Narcissism	.05	.04	.11	.10
Psychopathy	.31**	.26	.21*	.17

Note. $N = 224$, β = standardised beta coefficient, Partial = partial correlations. *$p < .05$; **$p < .01$.

4. Discussion

The aim of the current study was to assess the cross-sectional and dyadic relationships between the DT and aggression and anger. Based on previous research, we hypothesised that–across the two samples–all DT components would positively predict anger and aggression both cross-sectionally and dyadically. Although results supported the prediction that all DT dimensions were positively related to anger and aggression in both samples, psychopathy was the only significant predictor of anger while both psychopathy and Machiavellianism were significant positive predictors of aggression in athletes. Narcissism showed no predictive relationships. Replicating the positive relationships between DT and anger and aggression in athletes, actor effects (athletes' DT scores predicted their own anger and aggression) were found in Sample 2. These actor effects were also evident for coaches. Also, actor-partner interdependence models indicated complete dyadic relationships for psychopathy with anger and aggression, and for narcissism with aggression. Further, coach-athlete partner effects were found for Machiavellianism and narcissism with aggression and anger respectively. Findings therefore suggest that particular personality traits (e.g., psychopathy) may lend a proclivity towards unprovoked violence during participation in sport, or a proclivity towards reactional violence, directed at the opposition.

Psychopathy was a significant positive predictor of anger and aggression in the athlete sample. The predictive relationships are well supported by previous studies; men who display traits synonymous with psychopathy (e.g., antagonistic interpersonal style, impulsive behaviour) are more hostile (retaliatory), thus display higher trait anger characteristics (Reidy, Zeichner, Miller, & Martinez, 2007). Moreover, impulsive aggression and violence is seen as a litmus behaviour, indicative of those with higher psychopathy levels (Anderson & Kiehl, 2013). However, though the findings are well established, their meanings in relation to actual actions during sports are less well understood, due to the cross-sectional nature of the way these traits are often examined. Cause and effect can be difficult to establish, and the true mechanism of the relationship even more obscure. For instance, higher psychopathy scores have been associated with reduced reactivity to unpleasant/immoral sports-related pictures (Stanger, Kavussanu, Willoughby, & Ring, 2012), but this finding does not infer that those with higher psychopathy scores would perpetrate similar actions themselves.

Machiavellianism predicted trait aggression in athletes, mirroring findings in ice hockey players (Russell, 1974) which also supported the beneficial nature of higher Machiavellianism and aggression for performance. That is, the number of assists and goals scored by each player was positively correlated with all measures of aggression, and the players with higher aggression scores had higher Machiavellianism scores. However, as Machiavellianism in an athletic sample increases, the likelihood of cheating follows (Nicholls et al., 2019). Whether this cheating would manifest as aggression, as this sample would suggest, or via the use of doping (Nicholls et al., 2017; Nicholls et al., 2019), this trend could help explain the benefits of the DT to athletic performance. An athlete higher in Machiavellianism is more likely to gain a sporting advantage through unlawful channels. Furthermore, Vaughan et al. (2018) reported that the DT could be used interactively with mental toughness, to predict athletic success, so the advantages of psychopathy, narcissism, and Machiavellianism to an athlete may be lawful as well as unlawful.

Narcissism did not predict anger or aggression in the athlete sample which differs from meta-analytic evidence found in the general

Table 3
Descriptive statistics, internal consistency, and bivariate correlations.

	Athlete					Coach				
Variable	1	2	3	4	5	6	7	8	9	10
Athlete										
1. Machiavellianism										
2. Narcissism	.43**									
3. Psychopathy	.49**	.45**								
4. Anger	.31**	.29**	.38**							
5. Aggression	.41**	.35**	.42**	.51**						
Coach										
6. Machiavellianism	.19**	.21**	.22**	.23**	.26**					
7. Narcissism	.13*	.35**	.16**	.18**	.21**	.45**				
8. Psychopathy	.18**	.22**	.38**	.26**	.31**	.51**	.48**			
9. Anger	.17**	.19**	.25**	.41**	.43**	.32**	.31**	.41**		
10. Aggression	.19**	.22**	.24**	.37**	.44**	.39**	.36**	.43**	.53**	
M (SD)	2.88 (.51)	2.79 (.59)	2.57 (.52)	2.84 (.82)	2.46 (.92)	2.96 (.53)	2.88 (.62)	2.87 (.57)	2.99 (.89)	2.73 (.98)
ω	.78	.75	.78	.81	.84	.79	.76	.80	.83	.87

Note. Ω = Omega. $N = 196$ (98 dyads). *$p < .05$; **$p < .01$.

Table 4
Actor Partner Independence Models for Dark Triad predicting Aggression and Anger *without* Dyadic Covariates.

					Actor Effect (β)	Partner Effect (β)					
					A → A	C → A			95% CI		
Predictor	Criterion	r_p	r_{ce}	Dist. Test (χ^2)[a]	C → C	A → C	R^2	k	LL	UL	Dyadic Pattern
Machiavellianism	Anger	.18*	.22**	38.21**	.16*	.19**	.12	1.42	.04	1.68	Complete
					.18*	.13					Actor only and couple
Narcissism		.21**	.19**	42.36**	.17*	.21**	.14	1.75	.08	1.93	Complete
					.20**	.12					Actor only and couple
Psychopathy		.25**	.21*	48.15**	.23**	.27**	.19	1.98	.14	2.26	Complete
					.25**	.25**					Complete
Machiavellianism	Aggression	.22**	.18*	45.63**	.19**	.21**	.15	1.61	.07	1.84	Complete
					.20**	.16**					Complete
Narcissism		.23**	.19*	45.97**	.21**	.24**	.18	1.88	.10	2.08	Complete
					.24**	.19**					Complete
Psychopathy		.29**	.17*	52.68**	.26**	.31**	.22	2.41	.36	3.23	Complete
					.29**	.28**					Complete

Note. r_p = correlation between athlete's and coach's predictor variables; r_{ce} = correlation between errors of athlete's and coach's criterion variables; Dist. test = distinguishability test; χ^2 = chi square test; A = athlete; C = coach; β = standardised beta coefficient; R^2 = coefficient of determination; k = ratio of the partner effect to the actor effect; 95% CI = confidence interval for k calculated by Monte Carlo sampling; LL = lower limit of 95% CI; UL = upper limit of 95% CI. N = 196 (98 dyads). *$p < .05$; **$p < .01$.

population (Kjærvik & Bushman, 2021). This result could be due to the inconsistencies in the relationship between narcissism and aggression (Sohrabi, Atashak, & Aliloo, 2011), the lack of conceptual clarity regarding vulnerable and grandiose narcissism in the context of the DT (Kjærvik & Bushman, 2021), or may be due to the effect of ego threats which is a dimension absent from the current design (Lambe, Hamilton-Giachritsis, Garner, & Walker, 2016). A review by Roberts et al. (2018) suggests a positive relationship exists between narcissism and performance in the presence of perceived opportunity for glory, however, the relationship is null or negative when self-enhancement is absent (Roberts et al., 2019). Furthermore, Vaughan and Madigan (2020) found that competitive orientations (hypercompetitive and self-developmental competitive) explained the relationship between narcissism and sport task performance. It is therefore possible that narcissism on its own is not a predictor of aggression or anger in sport, but that those higher in narcissism act aggressively only when the opportunity to experience glory, develop their selves, and dominate others is presented. Future research should explore this idea.

Significant associations between the DT and aggression are not surprising given the conceptual overlap between the DT core of antagonism and aggression (Jones & Neria, 2015). Moreover, interpretation of our multiple regressions warrants caution considering the impact of partialing. The partialing of predictor variables, a common statistical technique in research examining the DT, involves examining the unique variance of one predictor from a set of independent variables that blur the conceptual uniqueness associated with each predictor resulting in increased measurement error (Sleep et al., 2017). We note that the DT in itself provides theoretical foundation for the current investigation, the use of multiple regression enables comparison with previous similar work, our internal consistency, multicollinearity, and power are satisfactory therefore have retained these analyses. Nonetheless, as recommended by Lab, Lynam, Miller, and Pek (2022) we encourage readers to focus on the zero-order correlations when considering the relation between the DT and aggression and anger. Note that correlations are consistent with effects reported outside of sport (Erzi, 2020; Jones & Neria, 2015; Knight et al., 2018; Webster et al., 2016).

Replicating findings from the athlete sample, psychopathy formed full APIMs with aggression and anger suggesting that a consistent relationship between psychopathy and aggressive tendencies. The DT makes athletes more likely to use performance enhancing drugs (Nicholls et al., 2019), and less likely to be agreeable (as shown in the general population; Paulhus & Williams, 2002), which makes them more liable to both aggressive behaviour (e.g., Webster et al., 2016), and lower levels of commitment (Chantal et al., 2008). Perhaps more puzzling, given the parameters of coaching, is the effect shown by athlete's psychopathy on the aggression and anger of their coaches. It is likely that the individual facets such as sensation-seeking, disinhibition and impulsiveness are somewhat masked in the context of the DT and impact significant others inconsistently (Furnham et al., 2013). This relationship could be due to the cross-sectional nature of the study; although APIMs can predict the

unique relationships shared by members of a dyad, the full workings, direction, and cause of the relationship cannot be ascertained. Significantly, in non-competitive relationships, such as romantic partnerships (Webster et al., 2016), partner effects have been observed between psychopathy and aggression, as they were in the current study. Therefore, this particular result could be best explained by the inherence or breadth of the effect it has, regardless of the nature, or setting of the relationship.

The link between Machiavellianism and aggression indicated by Sample 1 was replicated by actor effects in Sample 2, further cohering with existing literature (e.g., Nicholls et al., 2019). Machiavellianism showed a full APIM with aggression and displayed actor effects with anger within the coach-athlete dyads. This finding is somewhat puzzling given Paulhus and Williams (2002) definition of Machiavellianism within the DT regarding 'manipulation of others' where one would expect partner effects (i.e., the relation between an individual's Machiavellianism score and partners anger score). It is possible that in the sporting context, the manipulation facet of Machiavellianism is not universal. Cruickshank and Collins (2015) suggested that Machiavellianism is more important for elite sport team leaders whereas this may be less relevant for athletes. Our data supports this assumption. Previous research also claims of potentially confounding similarity between the DT, particularly between Machiavellianism and psychopathy (Rogoza & Cieciuch, 2018). However, unlike psychopathy, Machiavellianism's partner effect with anger was non-significant, undermining this standpoint. This finding suggests that whilst psychopathy and Machiavellianism may appear similar in their descriptions and are related, there are distinct in their functions.

Despite not showing any significant predictions in Sample 1, narcissism showed a full APIM with aggression, and displayed actor effects with anger within the coach-athlete dyads in Sample 2. This finding could be due to the aforementioned inconsistencies in the relationship between narcissism and aggression (Sohrabi et al., 2011) or could be explained by the influence coaches have over their athletes. For example, it has been found that coaches who prioritize winning over good sportsmanship tended to positively influence their male athletes' gamesmanship, including behaviours equivalent to trait aggression and/or psychopathy (e.g., anti-social behaviours towards opposition; Bolter & Weiss, 2013). Furthermore, another study found that when coaches communicated with athletes in an aggressive way, athletes displayed less sportsmanship whilst competing (Kassing and Infante, 1999). Also, narcissism in athletes has been linked to a greater self-held importance towards winning (Caliskan and Özer, 2019), which could contribute to the actor effects shown, in that it creates more motivation towards winning at all costs, leading to higher levels of aggression.

5. Applied implications

The consequences of ill-discipline in sport range from the concession penalties, to much more seriously, the risk of detriment to the emotional wellbeing of those participating. Therefore, findings have implications for those working with athletes with a history of disciplinary issues. Dark personality traits and aggressive tendencies should be screened for, and addressed where necessary, as athletes who use performance enhancing drugs and display a willingness to cheat, sometimes entailing excessive physical force, pose a risk to the wellbeing of themselves and others (Nicholls et al., 2017; Nicholls et al., 2019). Furthermore, as narcissistic coaches have been found to foster athletes with more positive attitudes towards doping (Matosic, Boardley, Stenling, & Sedikides, 2016), further increasing the likelihood of an athlete gaining an unfair, and unsafe advantage, sport psychology practitioners should consider dark personality traits of both coaches and athletes in targeting anger and aggression in a sport context.

6. Limitations and directions for future research

The present study has a number of limitations. First, the present studies are not indicators of a cause-and-effect relationship between DT and aggression in athletes, owing to their cross-sectional designs. It is also unclear how the length of time spent with a coach influences dyadic relationships. An athlete who has been with a coach for longer may have more opportunity for actor-partner effects to develop, as the same is true of male argumentativeness in romantic relationships (Webster et al., 2016). Thus, a longitudinal study of this particular dyad and its intricacies may be enlightening. Second, collecting data via self-report methods, such as the questionnaires used, renders the responses vulnerable to social-desirability bias. For this reason, it may be prudent to employ observational measures of aggression, such as using footage and/or to count the number of pre-operationalised aggressive episodes exhibited. Disciplinary data could also be accessed, such as the number of penalties/fouls/cards awarded against each player and/or the number of physical and verbal confrontations entered (Loughead & Leith, 2001). This aggression data could then be analysed, alongside the CAAS, against the athletes' self-reported SD3 scores and their coaches. Third, the sample included athletes from a range of sports with varying levels of baseline physical contact. Linearities may exist between personality and the contact level of the sport selected by the person (Boostani, 2012), and as the contact level of the sport was not controlled for, this could have contributed to the trends noted in aggression. However, Boostani (2012) had a low sample size, and only examined three sports, reducing the generalisability of the findings. Until a similar study, of greater sample size and variety of sports involved is comprised, the importance of this avenue may not be understood. Future work may also wish to include non-athlete controls so that effects can be compared across domains.

7. Conclusion

The current work provides the first examination of the relationship between the DT and aggression in athletes. These findings extend our understanding of the DT showing that aggression and anger are central tenants of the theory and conceptually linked in athlete samples (Anderson & Kiehl, 2013; Furnham et al., 2013; Jones & Neria, 2015). Akin to the general population, a positive relationship between the constructs were found, with psychopathy the main driver of this relationship. Moreover, effects were replicated and extended by examining the relationship dyadically demonstrating the influence of coach and athlete DT levels on their own and partners' anger and aggression. Finally, these findings indicate the importance of a dyadic couples' personality in determining each other's outcomes in sport and future work should continue this line of enquiry with other related personality frameworks (e.g., HEXACO; Lee and Ashton, 2014). In sum, although the DT has the potential to be conducive to athlete success (Vaughan et al., 2018, 2019), those same successful traits are likely to be linked with anger and aggression which may result in both the athlete and the coach using violence or retaliation to be victorious. Thus, the DT may be a risk factor for aggression in sport.

Funding information

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Declaration of competing interest

The authors report no conflict of interest.

Data availability

Data will be made available on request.

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