Personality and Individual Differences 144 (2019) 40–55

Contents lists available at ScienceDirect

Personality and Individual Differences

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

Review

A systematic literature review of the relationship between dark personality traits and antisocial online behaviours☆

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ARTICLE INFO

Keywords:
Dark tetrad
Dark triad
Narcissism
Psychopathy
Machiavellianism
Everyday sadism
Antisocial behavior
Online behavior

ABSTRACT

The sub-clinical personality traits of narcissism, psychopathy, Machiavellianism, and everyday sadism (i.e., the dark triad/tetrad) are known to predict subversive behaviours. Given increases in the prevalence of social media and internet use, and the growing knowledge about the negative consequences of their use, it is important to understand how these traits relate to online behaviours. We conducted a systematic review of the evidence for these relationships and found 26 studies which reveal these traits are related to trolling, cyber-aggression, cyber-loafing, sending unsolicited explicit images, the non-consensual dissemination of 'sexts', cyberbullying, problematic social media usage, problematic online gaming, problematic internet use, internet-use disorder, social media addiction, intimate partner cyberstalking, technology facilitated sexual violence, and technology facilitated infidelity. The review revealed evidence that psychopathy is the trait most strongly associated with these behaviours - Machiavellianism and everyday sadism were also consistently related to these behaviours, albeit to a lesser degree. Narcissism is the trait least consistently related to antisocial online behaviours.

1. Introduction

Personality and social psychologists are accumulating an empirical knowledge-base which demonstrates that personality traits are able to accurately predict some variations in human behaviour. Personality can be predicted from environments – for example, personality traits can be predicted from how an individual keeps their bedroom; extroverts are likely to have messy bedrooms, while tidy bedrooms are likely to be inhabited by individuals high on conscientiousness (Gosling, Ko, Mannarelli, & Morris, 2002). Recently, there has been a surge in the interest of understanding the darker side of personality, and how these less understood traits relate to and predict social behaviours. These more sinister and socially undesirable traits also predict behaviours – behaviours that are typically anti-social in nature and potentially dangerous to those the behaviours are targeted at (e.g., bullying, stalking, etc.). The major aim of this paper is to conduct a systematic search of the relevant literature and to synthesise the available evidence on the relationship between these dark traits and antisocial online behaviours.

1.1. The dark triad

The most commonly adopted model of malevolent personality traits is the dark triad (e.g., Paulhus & Williams, 2002). The dark triad refers to a trinity of personality traits that are typically considered to be socially undesirable: Narcissism, psychopathy, and Machiavellianism. The dark triad (or D3) co-exists with other better-known models of personality such as the Five Factor Model of personality (FFM) and the HEXACO model, however it parses the pro/anti-social trait domain somewhat differently from these more typically understood traits (Ashton & Lee, 2007; McCrae & John, 1992; Paulhus & Williams, 2002). Although the traits are considered socially undesirable, it should be emphasised that they are still within the normal, sub-clinical[1] range and thus manifest in society on a trait-based spectrum (Vernon, Villani, Vickers, & Harris, 2008). This means that individuals who are high on the dark triad traits differ diagnostically from those in forensic and clinical populations, and typically are functioning members of society (Furnham, Richards, & Paulhus, 2013).

Conceptualisations of trait narcissism and psychopathy are drawn from the clinical nomenclature – respectively from narcissistic and

☆ This research was supported by a grant from the School of Health and Behavioural Sciences, atAustralian Catholic University.

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[1] In this context, 'sub-clinical' refers to the traits as they appear in a 'normal' population, as opposed to those which warrant a clinical diagnosis (Vernon et al., 2008). Both clinical and sub-clinical narcissism and psychopathy are assessable via measures of the triad, however, only the sub-clinical level of these traits are encapsulated by the theory of the triad and tetrad.

https://doi.org/10.1016/j.paid.2019.02.027
Received 24 August 2018; Received in revised form 18 February 2019; Accepted 19 February 2019
Available online 02 March 2019
0191-8869/

antisocial personality disorders (The Diagnostic and Statistical Manual of Mental Disorder [DSM-V]; American Psychiatric Association [APA], 2013). Narcissism is complex and multifaceted – individuals high in narcissism can be classified along multiple facets including grandiose and vulnerable (sometimes known as hypersensitive) narcissism, united by a heightened sense of entitlement, uniqueness, and self-importance while disparaging others (Rauthmann & Kolar, 2012). Grandiose narcissism manifests as aggressive and dominant, whereas vulnerable narcissism manifests as a defensive grandiosity to mask feelings of inadequacy (Carrotte & Anderson, 2018a; Miller, Gentile, Wilson, & Campbell, 2013). At the sub-clinical level, those high on trait narcissism present similar qualities such as entitlement, grandiosity, and superiority (Paulhus & Williams, 2002). These characteristics often manifest in anti-social behaviours such as bragging and game playing and selfishness in romantic relationships (Campbell, Foster, & Finkel, 2002; Vazire & Funder, 2006). Despite the attention seeking and self-indulgent displays, narcissism is often considered the 'brighter' of the dark traits, and manifests quite distinctly from the others (Rauthmann & Kolar, 2012).

Compared to narcissism, manifestations of psychopathy can be more sinister (Furnham et al., 2013). Clinically, it refers to a consistent pattern of flagrant disregard for and violation of the rights of others with a marked affinity for deceit and manipulation (APA, 2013). Although the majority of research is concentrated on forensic and criminal samples, the research has shifted focus to those with levels of psychopathy within the 'normal' range of functioning. Due to their presentation in community samples, those high in trait psychopathy have been dubbed the 'successful psychopath' (Mullins-Nelson, Salekin, & Leistico, 2006). These individuals are predatory in nature and violate social norms by using aggression and intimidation to achieve their self-centred goals (Hare, 1996). They are interpersonally cold, non-empathetic, and demonstrate little to no impulse control or remorse (Baughman, Dearing, Giammarco, & Vernon, 2012). This is observable in their predisposition towards socially aversive behaviours such as adult-bullying and mate poaching (Baughman et al., 2012; Jonason, Li, & Buss, 2010). The aggressive, violent tendencies associated with trait psychopathy align with Rauthmann and Kolar (2012) suggestion that psychopathy, along with Machiavellianism, are the 'darker' personalities.

Although symptomatically similar, those high in Machiavellianism differs from those high in trait psychopathy in their use of strategic flattery and lies. The etymology of Machiavellianism lies in literature, stemming from Renaissance philosopher Niccolò Machiavelli's advocation of the psychosocial benefits of deception and manipulation for personal gain in relationships (Geis & Moon, 1981). Machiavellians are cynical, cunning manipulators who are affectively unphased by their exploitation of others. For example, Anderson and Cheers (2017) found that high Machiavellianism scores were related to increases in negative classical attitudes towards asylum seekers in Australia, despite evidence that this socially vulnerable group is normatively protected in this context (see Anderson, 2017 for discussion of socially undesirable responding on this topic). They suggested that, despite the group being socially protected from negative attitudes, being prejudiced towards low-power groups facilitates their social vilification, allowing those scoring high in Machiavellianism to exploit them.

1.2. The dark tetrad

The addition of subclinical sadism (dubbed 'everyday sadism') to the triad has been proposed, as it explains antisocial behaviour independently of that accounted for by the triad. Everyday sadism is an individual differences factor that captures the predatory motivation to cause harm or distress to innocent others and taking pleasure in doing so – which conceptually differs from those high in trait psychopathy to whom this harm is purely instrumental (Baumeister & Campbell, 1999). Early evidence revealed that sadism correlated with the dark triad traits, but predicted unique additional variance in teenage delinquency (suggesting that the traits are related, but indeed are distinct dimensions; see Chabrol, Van Leeuwen, Rodgers, & Séjourné, 2009). This expansion of the triad to include everyday sadism has been labelled the dark tetrad.

Buckels, Jones, and Paulhus (2013, Study 1) provided additional evidence for this conceptual difference in an experiment where their participants were required to choose between four unsavoury behaviours: killing bugs in a coffee grinder; helping the experimenter kill the bugs; clean a dirty toilet, or; take an ice bath. Those high on everyday sadism demonstrated a preference for actively killing the bugs (more than assisting the experimenter, suggesting that they took pleasure in administering their fatality). In their second study, they found that those high in sadism were more likely to administer an aggressive white noise to an innocent opponent in a computer game. Moreover, once these participants recognized that their opponent would not fight back, they increased the intensity of the noise and were more willing to expend time and energy for the opportunity to attack. In both studies, the association between those high in everyday sadism and their penchant for causing harm to innocent victims was independent of the trait's overlap with the dark triad.

1.3. Antisocial online behaviours

Of recent interest for social and personality psychologists, and the focal point of this paper, is the relationship between the dark traits and subversive behaviours that occur online via social networking sites (SNS), their apps, and related websites. For the purposes of this paper, we will define antisocial online behaviours as any deviant behaviour (or the purposeful absence of any expected behaviour) that is perpetrated online that has negative online of offline consequences for the target (including self-directed behaviours). The seven most popular mobile phone apps (Facebook, Instagram, Pinterest, Snapchat, LinkedIn, Twitter, & Whatsapp; Pew Research Centre, 2018) provide instantaneous and readily available social connectivity and can result in variations to negative online behaviours such as trolling and harassment, and the sending and non-consensual re-distribution of explicit images.

Although similar, the distinction should be made between cyberbullying and trolling. Cyberbullying is a deliberate and aggressive act facilitated by a computer, mobile phone, or other electronic device against a defenceless victim (Dredge, Gleeson, & de la Piedad Garcia, 2014). Trolling is also deliberate and aggressive, as well as deceptive and purposefully inflammatory (Buckels, Trapnell, & Paulhus, 2014). Both behaviours are common in online teen populations, with one in three reporting being the victim of harassment and menacing online activities (Pew Research Centre, 2007). The negative consequences for the victims of cyberbullying mirror those of traditional bullying increasing rates of depression, anxiety, and alcohol dependence (van Geel, Goemans, Toprak, & Vedder, 2017). All members of the triad have been found to correlate with cyberbullying behaviours (Goodboy & Martin, 2015).

IPCS is stalking behaviour of a former, current, or potential intimate partner via electronic methods such as hidden webcams and GPS tracking to monitor the victim as well as contacting them anonymously via fake social media profiles (Smoker & March, 2017). IPCS negatively affects the psychological, social, and physical wellbeing of victims, similarly to victims of traditional stalking and is predicted by all the traits of the tetrad (Smoker & March, 2017).

Of recent interest is the effect of the dark traits on online dating. Since 2005, the prevalence of location based real time dating apps (LBRTDA) in initiating modern intimate relationships has increased by 23% (Pew Research Centre, 2013). LBRTDAs such as Tinder and Grindr act as the ideal platform for those inclined to send unsolicited explicit images to prospective sexual partners. While sending these images is not inherently antisocial, the behaviour becomes problematic when the images are unsolicited. Women perceive receiving the unwelcome

images as a form of sexual harassment (Waling & Pym, 2017), and all tetrad traits have been found to correlate with this behaviour (March & Wagstaff, 2017). As these behaviours demonstrate significant risk factors, an exploration of *all* negative behaviours related to the dark traits is warranted.

1.4. Aims of the review

In this paper, we present a systematic literature review which synthesizes the available evidence on the relationship between the dark personality traits and antisocial online behaviours. Given the increasing popularity of this research domain, and increases in the prevalence of time spent online, such a review is timely and warranted. By examining this link, we aim to explore whether individual differences in darker trait scores are associated with these behaviours. Specifically, this systematic literature review aims to understand how the dark triad and tetrad relates to negative online behaviours, with the intention of enhancing conceptual understanding of the personality-behaviour link and potential mechanisms.

2. Method

This systematic literature review is guided by the Cochrane method, and we have presented the search method and findings in accord with the relevant sections of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Higgins & Green, 2011; Moher, Liberati, Tetzlaff, & Altman, 2009). The protocol used to conduct this review is detailed below.

2.1. Eligibility criteria

Studies were included in the systematic literature review based on the following inclusion criteria: they must (a) contain an empirical analysis of the dark triad or tetrad; (b) report the relationship between these dark traits and at least one antisocial online behaviour,[2] and (c) be available in English. It is worth highlighting that this systematic literature review has a focus on the dark *traits* at the subclinical level rather than (a) at clinical levels (i.e., personality disorders - in order to increase generalizability of the findings) or (b) *type* manifestations of narcissism, psychopathy, and Machiavellianism (as understanding personality as traits allows for greater flexibility and a deeper understanding; Haslam, Holland, & Kuppens, 2012).

Studies were not included in the review based on the following exclusion criteria: (a) the study did not report all members of the triad (and thus, by extension, the tetrad)[3]; (b) the behaviour does not occur uniquely online; (c) the behaviour is not antisocial; (d) the paper did not present data (i.e., review papers, book chapters, etc.).

2.2. Information sources and search strategy

The databases PsycInfo, MedLine, Psychology and Behavioural Sciences Collection, and Academic Search Complete were first searched in April 2018, and again in January 2019, using a search strategy based on the combination of two concepts - *online* and *dark triad*. The terms that were searched for in the title and abstracts can be found in Table 1. A call for unpublished data was made – several relevant datasets were supplied to us, but none that met all the search criteria.

Table 1
The terms derived from the concepts used in the formal search.

Online	Dark triad
Online	Narcissis*
Web	Psychopath*
Internet	Machiavellian*
"Social media"	"Dark triad"
Facebook	"Dark tetrad"
Twitter	
Tweet	
Tinder	
Instagram	
App*	
Cyber*	
Mobile	
Phone	
Cell	
iPhone	
Device	
Troll*	
Tag*	
Comment*	

2.3. Study selection

The search strategy was applied to each database, and the identified records were downloaded and merged into a single EndNote library. Duplicate articles (i.e., those identified by the search strategy in multiple databases) were eliminated, then the titles and abstracts of the records were double screened. Those articles deemed ineligible by both reviewers (based on their title or abstracts) were excluded – any articles that were deemed as eligible, as not containing enough information for a decision to be made, or if conflicting decisions were made, were again double screened based on the full text of the article. Eligible articles were included in the final review. Ineligible articles were formally excluded (with the reasons for exclusion noted).

2.4. Data collection and quality assessment

A data extraction table was created to aid the synthesis of the eligible studies. The table included publication characteristics of the articles (author, year, country of setting), sample characteristics (age, gender), the measure of the traits, the online medium which the behaviour was observed, the main findings of the studies (univariate and multivariate statistical results), the self-identified limitations, and their quality assessment score.[4]

We used the AXIS tool to critically assess the quality (and the transparency of the reporting) of all eligible studies in this review (Downes, Brennan, Williams, & Dean, 2016). The tool comprises a twenty-point checklist that requires a *yes*, *no*, or *don't know* (for calculation purposes, *yes* = 1, *no/don't know* = 0), and has been designed for use with observational and cross-sectional studies. A quality score out of 20 is then generated based on these responses (it should be noted that the interpretation of the quality scores guided by the AXIS tool is subjective – we use the following guidelines: scores indicating low quality = 1–7; medium quality = 8–14; high quality: 15–20). The quality score of each study can be found alongside the other relevant extracted data in Table 1 (individual study scores are available in Tables S1 and S2; available on the Open Science Framework at https://osf.io/p57cz/).

[2] For the purposes of this systematic literature review, selfie-posting and editing was not included due to the subjectivity of its classification as antisocial.

[3] This search strategy was co-designed in conjunction with a senior librarian in research services who deemed no differences between search strategy including Sadis* and not, and so in the interest of parsimony we omitted this term from the search strategy.

[4] The scoring for the quality assessment of articles in this review can be found on the Open Science Framework at https://osf.io/p57cz/. This URL holds the scoring data for the AXIS tool quality assessment (Supplement Tables S1 and S2) and the full data extraction table (Microsoft excel file) used in this systematic review.

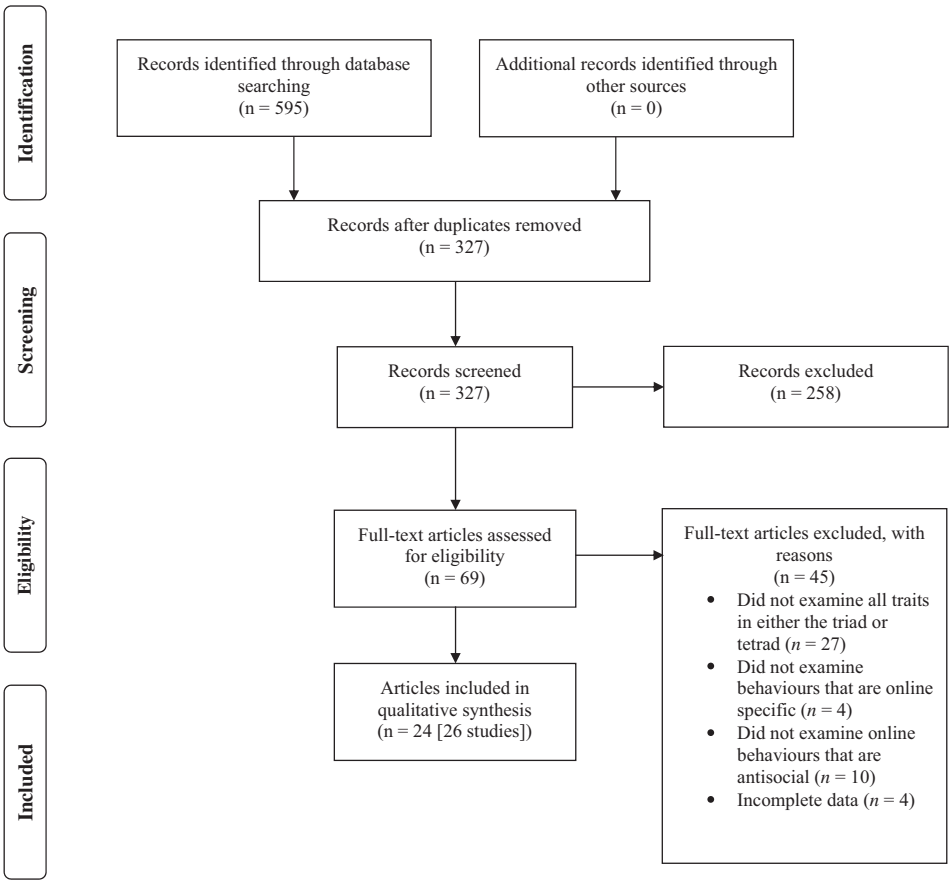

Fig. 1. PRISMA flowchart depicting the study selection process.

3. Results

3.1. Study selection

The initial search yielded a total of 327 unique articles. After the titles and abstracts were doubled screened, 69 (21%) fit the criteria. From these, 24 articles ($n_{studies}$ = 26) met the inclusion criteria (the specifics of the search selection process are detailed in Fig. 1).

3.2. Study characteristics

All 24 articles were published between 2014 and 2019, reflecting the sudden (and rapid) increase in research interest in this domain. All of the studies used a mixed-gender sample. Community samples were most commonly used (studies n = 14), 10 studies used tertiary education students, and two used samples of high school students. The triad and tetrad of dark traits were explored equally (n = 12 each). Eleven different measures were used to assess the dark traits, two were used to measure the dark triad in a single administration: The Short Dark Triad (SD3; Jones & Paulhus, 2014) was used the most (n = 14), followed by the Dark Triad Dirty Dozen, (DTDD; n = 8; Jonason & Webster, 2010). The remaining measures each captured a single trait of the triad or tetrad, and thus were used in combination with each other. Table 2 presents a synthesis of the relevant data of eligible studies.

The online behaviours occurred on various platforms. Most commonly, the research presented behaviours on a combination of social networking sites (SNS; n = 13; e.g., Facebook, Twitter, Instagram, Tumblr, and Pinterest; Buckels et al., 2014; Buckels, Trapnell, Andjelovic, & Paulhus, 2018; Clancy, Klettke, & Hallford, 2019; Demircioğlu & Göncü Köse, 2018; Gibb & Devereux, 2014; Goodboy & Martin, 2015; Lowe-Calverley & Grieve, 2017; Kircaburun, Jonason, & Griffiths, 2018a; Kircaburun et al., 2018b; Sindermann, Sariyska, Lachmann, Brand, & Montag, 2018, Smoker & March, 2017; Pina, Holland, & James, 2017; van Geel et al., 2017). Five studies explored Facebook-specific behaviours (n = 5; Bogolyubova, Panicheva, Tikhonov, Ivanov, & Ledovaya, 2018; Craker & March, 2016; Koban, Stein, Eckhardt, & Ohler, 2018; Lopes & Yu, 2017; Pabian, De Backer, & Vandebosch, 2015), three studies used location-based real time dating apps (LBRTDA; e.g., Tinder, Grindr, and Scruff; n = 3; March & Wagstaff, 2017; March, Grieve, Marrington, & Jonason, 2017; Timmermans, De Caluwé, & Alexopoulos, 2018). In addition, single studies explored the use of the messaging site 'Yik Yak' (a social networking app which allowed anonymous messaging amongst users; Seigfried-Spellar & Lankford, 2018), the Internet generally to explore behaviours specific to social media, online gaming, gambling, shopping, and sex (Kircaburun & Griffiths, 2018a), and online gaming (Kircaburun et al., 2018b).

3.3. Major findings

3.3.1. Trolling

Six studies explored the relationship between trolling behaviours and the dark tetrad, and a single study explored the dark triad. All studies found psychopathy to be related to trolling behaviours, with mixed evidence for narcissism, Machiavellianism and sadism. Craker and March (2016) found all four traits to have a moderate strength positive correlation with the Facebook trolling behaviours, except narcissism (which was weakly and non-significantly correlated). Both psychopathy and sadism were significant predictors of the behaviour. The dark traits explained 24.1% of the variance in the behaviour, R^2 = 0.25, $F(6, 332)$ = 18.89, p < .001, Cohen's f^2 = 0.33.

March et al. (2017) found the tetrad in its entirety to significantly

Table 2
Synthesis of relevant information extracted from the studies included in the review.

Author (Year)	Country	*N*	Sample characteristics Age: *M* (*SD*) Gender distribution	Measure of triad or tetrad*	Online Medium	Main Findings	Limitations	Quality Rating (/20)
Trolling								
Craker and March (2016)	Australia	396	34.41 (1.70) 75.9% female	The Short Sadistic Impulse Scale* (SSIS; O'Meara, Davies, & Hammond, 2011); The Dirty Dozen (DTDD; Jonason & Webster, 2010)	Facebook	All tetrad traits correlated with trolling behaviours on Facebook (narcissism: $r = 0.18$, $p < .001$; psychopathy: $r = 0.39$, $p < .001$; Machiavellianism: $r = 0.34$, $p < .001$; sadism: $r = 0.35$, $p < .001$). Psychopathy ($\beta = 0.19$) and sadism ($\beta = 0.16$) were unique predictors of the behaviour.	Self-report bias; Low internal consistency of the SSIS; There was an uneven distribution of gender; Poor content validity of the Global Assessment of Facebook Trolling.	18
March et al. (2017)	Australia	357	22.50 (6.55) 71% female	SSIS*; The Short Dark Triad (SD3; Jones & Paulhus, 2010)	LBRTDA	All tetrad traits correlated with trolling behaviours on Tinder (narcissism, $r = 0.11$; $p < .05$; Psychopathy, $r = 0.32$; $p < .001$; Machiavellianism, $r = 0.20$, $p < .001$; sadism, $r = 0.25$; $p < .001$). Psychopathy ($\beta = 0.17$) and sadism ($\beta = 0.16$) were unique predictors of the behaviour.	Psychopathy not treated as a unidimensional construct; Poor construct validity of the Global Assessment of Internet Trolling.	16
Seigfried-Spellar and Lankford (2018)	USA	133	19.9 (1.09) 47% female	SD3; SSIS*	Yik Yak	Correlations between the traits and trolling on Yik Yak (narcissism: $r = 0.22$, $p < .01$; psychopathy: $r = 0.42$, $p < .001$; Machiavellianism: $r = 0.21$, $p < .05$; sadism: $r = 0.41$, $p < .001$). The final regression model for trolling on Yik Yak only included psychopathy ($\beta = 0.23$; $p < .001$).	Self-report bias	15
Buckels et al. (2014) Study 1	USA	418	29.20 (11) 42.4% female	SSIS; Varieties of Sadistic Impulse Tendencies* (VAST; Paulhus & Jones, 2015); SD3	Multiple SNS	Scores on the measures of the tetrad were highest amongst participants who selected trolling as the most enjoyable online activity, as evidenced by planned orthogonal contrasts (narcissism: $t(500) = 2.64$, $p < .01$, $d = 0.24$; psychopathy: $t(500) = 3.09$, $p < .01$, $d = 0.28$; Machiavellianism: $t(500) = 2.78$, $p < .01$, $d = 0.25$; direct sadism: $t(500) = 3.03$, $p < .01$, $d = 0.27$; vicarious sadism: $t(500) = 2.91$, $p < .01$, $d = 0.26$).	The use of a categorical index of trolling limiting its scope.	11

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Table 2 (*continued*)

Author (Year)	Country	*N*	Sample characteristics Age: *M* (*SD*) Gender distribution	Measure of triad or tetrad*	Online Medium	Main Findings	Limitations	Quality Rating (/20)
Buckels et al. (2014) Study 2	USA & Canada	188 Canadian students +607 US MTurk participants = 797	Student: 21.15 (3.63) 55% female MTurk: 35.04 (12.98) 43% female	The Comprehensive Assessment of Sadistic Tendencies* (CAST; Buckels et al., 2014); SD3	Multiple SNS	All traits of the tetrad correlated positively with trolling behaviour (narcissism: $r = 0.18$, $p < .001$; psychopathy $r = 0.55$, $p < .001$; Machiavellianism $r = 0.34$, $p < .001$; sadism $r = 0.68$, $p < .001$). Sadism ($\beta = 0.61$) and psychopathy ($\beta = 0.10$) were the unique predictors of trolling behaviour. All of traits except for narcissism ($r = -0.09$, $p > .05$) were related to rated enjoyment of trolling (psychopathy $r = 0.38$, $p < .001$; Machiavellianism $r = 0.37$, $p < .001$; sadism $r = 0.52$, $p < .001$). Sadism ($\beta = 0.53$) and Machiavellianism ($\beta = 0.23$) were the unique predictors of trolling enjoyment.		10
Buckels et al. (2018) Study 1	Canada	345	34.4 (12.69) 51.8% female	SD3; CAST*	Multiple SNS	All traits of the tetrad correlated with trolling (narcissism: $r = 0.26$, $p < .001$; psychopathy: $r = 0.62$, $p < .001$; Machiavellianism: $r = 0.32$, $p < .001$; sadism: $r = 0.71$, $p < .001$). In the regression model, both psychopathy ($\beta = 0.21$; $p < .01$) and sadism ($\beta = 0.56$; $p < .001$) remained associated with trolling even after controlling for the other traits.	No specific definition of online trolling; self-report bias.	16
Lopes and Yu (2017)	UK	135	20.45 (3.55) 83.70% female	SD3	Facebook	The triad as a whole significantly correlated with the endorsement of trolling comments ($F(3, 131) = 5.67$, $p < .001$). Psychopathy was the only significant unique predictor of trolling the popular profile ($\beta = 0.55$) and the unpopular profile ($\beta = 0.29$).	The measurement of trolling behaviour a priori; Homogeneity of sample.	17
Uncivil commenting								
Koban et al. (2018)	Germany	256	24.38 (5.57) 74.21% female	The DTDD	Facebook	None of the triad traits predicted uncivil commenting on Facebook.	Use of the DTDD; homogeneity of sample age and cultural background.	16
Cyber-aggression								
Pabian et al. (2015)	Belgium	324	16.05 (1.31) 63% female	SD3	Facebook	All triad traits correlated with cyber-aggression on Facebook (narcissism: $r = 0.29$, $p < .001$; psychopathy: $r = 0.43$, $p < .001$; Machiavellianism: $r = 0.30$, $p < .001$). Psychopathy was the only unique predictor of the behaviour ($\beta = 0.60$).	Self-report bias; not a comprehensive measure of the triad; uneven distribution of gender and education status.	17

(*continued on next page*)

Table 2 (*continued*)

Author (Year)	Country	*N*	Sample characteristics Age: *M* (*SD*) Gender distribution	Measure of triad or tetrad*	Online Medium	Main Findings	Limitations	Quality Rating (/20)
Bogolyubova et al. (2018)	Russia	6724	44.96 (11.58) 77.9% female	SD3	Facebook	Psychopathy was the only significant predictor of cyber-aggression (β = 1.00).	Self-report bias; Self-selection bias; Exclusive use of public wall posts; Facebook is not the most popular SNS in Russia, thus offering poor generalisability.	13
Cyberloafing								
Lowe-Calverley and Grieve (2017)	Australia	273	28.12 (10.65) 80% female	The Primary Psychopathy Scale (Levenson, Kiehl, & Fitzpatrick, 1995); Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988); MACH-IV (Christie & Geis, 1970)	Multiple SNS	All triad traits correlated with cyberloafing (grandiose narcissism: $r = 0.13$, $p < .05$; primary psychopathy: $r = 0.19$, $p \leq .01$; Machiavellianism: $r = 0.15$, $p \leq .05$). Direct relationship between psychopathy and cyberloafing ($r = 0.13$; $p < .05$), all other relationships moderated by the perceived ability to deceive.	Self-report bias	14
Sending unsolicited explicit images								
March and Wagstaff (2017)	Australia	240	25.96 (9.79) 72% female	The Narcissism Personality Inventory (NPI-16; Ames, Rose, & Anderson, 2016); Levenson's Psychopathy Scale (Levenson et al., 1995); Mach-IV; SSIS*	LBRTDA	The Explicit Image Scale (EIS) and the tetrad were significantly correlated (narcissism: $r = 0.23$, $p < .001$; psychopathy: $r = 0.19$, $p < .001$; Machiavellianism: $r = 0.26$, $p < .001$; sadism: $r = 0.22$, $p < .001$). Machiavellianism the only significant predictor (β = 0.19). It also mediated the relationships between the other variables.	Self-report bias	17
Non-consensual dissemination of 'sexts'								
Clancy et al. (2019)	Australia	505	M = 20.60; SD = 3.1 66.9% female	The DTDD	Multiple SNS	All traits of the triad had a significant main effect of dissemination of sexts (narcissism: $F = 4.3$, $p = .038$, $\eta_p^2 = 0.01$; psychopathy: $F = 4.1$, $p = .044$, $\eta_p^2 = 0.01$; Machiavellianism: $F = 13.9$, $p < .001$, $\eta_p^2 = 0.03$). The dark triad traits did not independently predict dissemination after controlling for motivations for dissemination.	Self-report bias	17
Cyberbullying								
Goodboy and Martin (2015)	USA	227	20.9 (2.32) 49% female	DTDD	Multiple SNS	All traits had significant relationships with visual (narcissism: $r = 0.19$; psychopathy: $r = 0.34$; Machiavellianism: $r = 0.25$) and text based cyberbullying behaviours (narcissism: $r = 0.27$; psychopathy: $r = 0.38$; Machiavellianism: $r = 0.30$). Psychopathy was the only significant predictor of both cyberbullying behaviours (text based: β = 0.30; visual: β = 0.27).	Motivations behind cyberbullying behaviours were not measured; Mobile phone use and internet aggression were the only methods of cyberbullying behaviours examined.	12

(*continued on next page*)

Table 2 (*continued*)

Author (Year)	Country	*N*	Sample characteristics Age: *M* (*SD*) Gender distribution	Measure of triad or tetrad*	Online Medium	Main Findings	Limitations	Quality Rating (/20)
Gibb and Devereux (2014)	USA	297	22.70 (7.02) 61% female	SD3	Multiple SNS	Psychopathy was the only significant predictor of cyberbullying behaviours ($\beta = 0.37$).	The SD3 perhaps not broad enough to measure the relationship between the traits and cyberbullying behaviour	16
van Geel et al. (2017)	The Netherlands	1568	17.58 (1.39) 69.1% female	SD3; VAST*	Multiple SNS	All of the traits of the tetrad correlated with cyberbullying (narcissism: $r = 0.18$; $p < .001$; psychopathy: $r = 0.28$; $p < .001$; Machiavellianism: $r = 0.17$, $p \leq .001$; sadism: $r = 0.31$; $p < .001$). Narcissism ($\beta = 0.07$; $p \leq .05$) and psychopathy ($\beta = 0.16$; $p \leq .001$) predicted cyberbullying when controlling for gender, age, the Big Five, and the D3 ($\Delta R^2 = 0.032$, $F(3, 1537) = 18.450$, $p < .001$). Sadism ($\beta = 0.23$; $p < .001$) was the only predictor when controlling for gender, age, and the Big Five, and the D4 ($\Delta R^2 = 0.024$, $F(1, 1536) = 42.427$, $p < .001$).	Self-report bias	17
Problematic social media usage (*PMSU*)								
Kircaburun, Demetrovics, and Tosuntaş (2018)	Turkey	827	20.36 (1.47) 60% female	DTDD	Multiple SNS	The correlations between the traits and PSMU were weak and significant (narcissism: $r = 0.28$, $p < 001$; psychopathy: $r = 0.10$, $p < .01$; Machiavellianism: $r = 0.19$, $p \leq .001$). Only narcissism ($\beta_S = 0.30$) and Machiavellianism ($\beta_S = 0.23$) presented significant direct effects.	Self-report bias; the Dirty Dozen not a comprehensive measure of the traits	17

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Table 2 (*continued*)

Author (Year)	Country	*N*	Sample characteristics Age: *M* (*SD*) Gender distribution	Measure of triad or tetrad*	Online Medium	Main Findings	Limitations	Quality Rating (/20)
Kircaburun, Jonason, and Griffiths (2018a, b)	Turkey	761	20.70 (2.28) 64% female	DTDD Turkish Form (Özsoy, Rauthmann, Jonason, & Ardıç, 2017; Jonason & Webster, 2010); SSIS Turkish Form* (Kircaburun, Jonason, and Griffiths, 2018a, b; O'Meara et al., 2011)	Multiple SNS	Correlations between traits and cyberstalking: narcissism ($r = 0.37$; $p < .01$); psychopathy ($r = 0.25$; $p < .01$), Machiavellianism ($r = 0.37$, $p \leq .01$); sadism ($r = 0.34$; $p < .01$). Traits and cyberbullying: narcissism ($r = 0.30$, $p < .01$), psychopathy ($r = 0.41$; $p < .01$); Machiavellianism ($r = 0.46$; $p < .01$); sadism ($r = 0.47$; $p < .01$). Traits and cybertrolling: narcissism ($r = 0.28$, $p < .01$), psychopathy ($r = 0.41$; $p < .01$); Machiavellianism ($r = 0.42$; $p < .01$); sadism ($r = 0.34$; $p < .01$). Narcissism was indirectly associated with PSMU via cyberstalking ($r^2 = 0.05$, $p < .001$). Psychopathy was directly associated with cyberbullying ($r^2 = 14$, $p < .001$) and cybertrolling ($r^2 = 0.17$, $p < .01$). Machiavellianism was directly associated with cyberbullying ($r^2 = 0.21$, $p < .001$), cybertrolling ($r^2 = 0.20$, $p < .001$), and cyberstalking ($r^2 = 0.17$, $p < .001$), and indirectly with PMSU via cyberbullying ($r^2 = 0.03$, $p < .01$) and cyberstalking ($r^2 = 04$, $p < .001$). Sadism was directly associated with cyberbullying ($r^2 = 0.23$, $p < .001$), cybertrolling ($r^2 = 0.15$, $p < .01$), and cyberstalking ($r^2 = 0.16$, $p < .001$), and indirectly with PSMU via cyberbullying ($r^2 = 0.03$, $p < .01$) and cyberstalking ($r^2 = 0.04$, $p < .001$).	Self-report bias; the Dirty Dozen not a comprehensive measure of the traits	17
Problematic online gaming (*POG*)								
Kircaburun, Demetrovics, and Tosuntaş (2018)	Turkey	421	20.82 (4.70)	DTDD Turkish Form; SSIS Turkish Form*	Online Games	Only narcissism (r = 0.21; $p < .01$) and sadism (r = 0.15; $p < .01$) correlated with problematic online gaming.	Self-report bias; exclusively male participants	19
Problematic internet use (*PIU*)								

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Table 2 (*continued*)

Author (Year)	Country	*N*	Sample characteristics Age: *M* (*SD*) Gender distribution	Measure of triad or tetrad*	Online Medium	Main Findings	Limitations	Quality Rating (/20)
Kircaburun and Griffiths (2018)	Turkey	772	20.72 (2.30) 64% female	DTDD Turkish Form; SSIS Turkish Form*	The internet	All traits of the tetrad were significantly related to PIU (narcissism: $r = 0.20$, $p < .001$; psychopathy: $r = 0.15$, $p < .001$; Machiavellianism: $r = 0.24$, $p < .001$; sadism: $r = 0.20$, $p < .001$). In the regression model narcissism was associated with social media use ($\beta = 0.18$; $p < .001$) and online gambling ($\beta = -0.08$; $p < .05$), Machiavellianism was associated with online gaming ($\beta = 0.11$; $p < .05$), online sex ($\beta = 0.09$; $p < .05$), and online gambling ($\beta = 0.14$; $p < .001$), and sadism was related online to online sex ($\beta = 0.12$; $p < .01$). Narcissism was indirectly associated with PIU through social media use ($\beta = 0.09$, $p < .05$; 95% CI [0.00, 0.18]) and Machiavellianism was directly and indirectly associated with PIU through online gambling and online gaming ($\beta = 0.12$, $p < .05$; 95% CI [0.02, 0.21]).	Self-report bias	17
Internet use disorder (*IUD*)								
Sindermann et al. (2018) Study 1	Germany	468	29.64 (14.15) 69% female Study 2:	SD3	Multiple SNS	Only psychopathy ($r_s = 0.32$; $p < .001$) and Machiavellianism ($r_s = 0.24$; $p < .001$)correlated with IUD.	Self-report bias	15
Sindermann et al. (2018) Study 2	Germany	362	Participants age undisclosed 69.61% female	SD3	Multiple SNS	Only psychopathy ($r_s = 0.29$; $p < .001$) and Machiavellianism ($r_s = 0.30$; $p < .001$) correlated with IUD. Narcissism related to internet gambling disorder and internet pornography use disorder (all r_s's > 0.19, p's $< .001$). Psychopathy correlated with internet gaming disorder, internet gambling disorder, internet-shopping disorder and internet pornography disorder (all r_s's > 0.32, p's $> .05$) Machiavellianism correlated with internet gaming disorder, internet pornography disorder and internet communication disorder (all r_s's > 0.26, p's $> .05$).	Self-report bias	12
Social media addiction (*SMA*)								
Demircioğlu and Göncü Köse (2018)	Turkey	229	21.51 (1.80) 67.7% female	The Short Dark Triad – Turkish (SD3-T; adapted from Jones & Paulhus, 2010 by Özsoy et al., 2017)	Multiple SNS	Only psychopathy ($r = 0.25$; $p < .01$) and Machiavellianism ($r = 0.24$; $p < .01$) significantly correlated with SMA. Psychopathy was the only trait to have a significant path to social media addiction in the structural equation model ($\beta = 0.17$, $p < .05$).	Self-report bias	17

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Table 2 (*continued*)

Author (Year)	Country	*N*	Sample characteristics Age: *M* (*SD*) Gender distribution	Measure of triad or tetrad*	Online Medium	Main Findings	Limitations	Quality Rating (/20)
Intimate partner cyber stalking (*IPCS*)								
Smoker and March (2017)	Australia	689	26 (10.21) 70% female	SD3; SSIS*	Multiple SNS	All of the traits were positively correlated with ICPS (narcissism: $r = 0.23$, $p < .001$; psychopathy $r = 0.37$, $p < .001$; Machiavellianism: $r = 0.37$, $p < .001$; sadism: $r = 0.39$, $p < .001$).	Self-report bias	15
Technology facilitated sexual violence (*TFSV*) – *revenge porn proclivity*								
Pina et al. (2017)	UK	100	25.81 (7.11) 82% female	SD3; CAST*	Multiple SNS	The traits of the triad were significantly correlated with the proclivity towards the behaviour (narcissism: $r = 0.29$, $p < .05$; psychopathy: $r = 0.36$, $p < .001$; Machiavellianism: $r = 0.32$, $p < .01$) and sadism did not. Psychopathy was the only significant predictor ($\beta = 0.23$).	Social desirability bias	17
Technology facilitated infidelity (*TFI*)								
Timmermans et al. (2018)	The Netherlands	471	22.89 (4.57) 72.8% female	SD3	Tinder	Non-single Tinder users scored significantly higher on psychopathy ($M = 2.34$, $SD = 0.61$) compared to non-single non-users ($M = 1.96$, $SD = 0.49$; $p < .01$). Motives for non-single user's Tinder use: Narcissism was associated with social approval ($r = 0.30$; $p < .01$), to pass time/entertainment ($r = 0.22$; $p < .05$), and distraction ($r = 0.26$; $p < .05$). Psychopathy was associated with sexual experience alone ($r = 0.31$; $p < .01$) and one-night stands ($r = 0.29$; $p < .05$). Machiavellianism was associated with sexual experience ($r = 0.27$; $p < .05$) and social approval ($r = 0.28$; $p < .05$).	Self-report bias	19

* Denotes a measure of the dark tetrad.

predict trolling on Tinder. When analysing the predictive capabilities individually, psychopathy and sadism uniquely and significantly predicted online trolling behaviours. Another study explored the tetrad's relationship with Yik Yak (Seigfried-Spellar & Lankford, 2018). All traits were significantly related to the app-specific behaviour. Psychopathy and sadism were the strongest correlates, however psychopathy was the only significant predictor in the regression model.

Buckels et al. (2014; Study 1) found scores on measures of the tetrad were highest amongst participants who selected trolling as the most enjoyable online activity, compared to other cyber behaviours such as chatting and debating. In a second study, these authors reported that all of the traits positively correlated with engaging in the trolling, however psychopathy and sadism were the only unique predictors in a regression model. They also reported all of the traits to correlate with enjoyment of trolling, except for narcissism. Machiavellianism and sadism alone predicted trolling enjoyment. In a more recent study by Buckels et al. (2018), all traits of the tetrad were found to relate to trolling, with sadism and psychopathy correlating most strongly. Both traits were predictive of the behaviour in the regression model, even after controlling for the remaining members of the tetrad.

Lopes and Yu's (2017) study aimed to understand who is at risk of being trolled by those high on dark triad traits in terms of 'popular' and 'unpopular' Facebook profiles. The triad significantly predicted the endorsement of posting trolling comments on the status' of popular and unpopular profiles, however psychopathy was the only trait to contribute significant unique variance to the model predicting this behaviour.

3.3.2. Uncivil commenting

Koban et al. (2018) found none of the dark triad traits significantly predicted uncivil commenting on Facebook.

3.3.3. Cyber-aggression

Two studies examined the relationship between the dark triad and cyber-aggression. Pabian et al. (2015) used an adolescent sample to predict cyber-aggression with the dark traits, and found all the traits to be significantly related to the behaviour, however psychopathy was the only unique predictor the behaviour in a regression analysis. Bogolyubova et al. (2018) found psychopathy to be the only unique predictor of cyber-aggressive linguistics.

3.3.4. Cyber-loafing

One study analysed the relationship between the tetrad and cyber-loafing. Lowe-Calverley and Grieve (2017) chose to analyse primary psychopathy and grandiose narcissism rather than general trait psychopathy and narcissism (the only study in this review to make such a unique choice). Their results identified weak, but significant correlations between each of the traits and cyber-loafing. Upon further analyses, primary psychopathy was directly related to cyber-loafing, whereas the relationships with the remaining traits were moderated by the participant's perceived ability to deceive.

3.3.5. Sending unsolicited explicit images

March and Wagstaff (2017) used the Explicit Image Scale (EIS) to assess the existing relationship between the tetrad and the sending unsolicited explicit images to other users as well as its ability to predict it. All four traits were correlated with increases in EIS scores. However, Machiavellianism was the only unique predictor in multiple regression analyses. Further analysis identified Machiavellianism as fully mediating the relationships between psychopathy and the EIS and sadism and the EIS and partially mediating the relationship between narcissism and the EIS.

3.3.6. Non-consensual dissemination of 'sexts'

One study analysed the triad's relationship with the non-consensual dissemination (i.e., sending, receiving, or forwarding) of sexually explicit messages, images, or photos, colloquially known as 'sexts' (Clancy et al., 2019). All traits of the triad were significantly associated with sext dissemination, with the strongest relationship for Machiavellianism. However, the dark triad traits did not independently predict dissemination after controlling for motivations for dissemination.

3.3.7. Cyberbullying

Three studies explored the relationship between the triad and cyberbullying behaviours (Gibb & Devereux, 2014; Goodboy & Martin, 2015; van Geel et al., 2017). At the univariate level, Goodboy and Martin (2015) provided evidence that all of the traits correlated with both text-based and visual cyberbullying. At the multivariate level, a multiple regression revealed that psychopathy was the only unique predictor of text based and visual cyberbullying. Gibb and Devereux (2014) reported that psychopathy was also the only significant predictor of college-age cyberbullying. A single study analysed the relationship between the tetrad and cyberbullying in senior high school students (van Geel et al., 2017). At the bivariate level all of the traits correlated with cyberbullying. In a multiple hierarchical regression exploring the predictive role of the dark triad, after controlling for demographic factors, narcissism ($\beta = 0.07$) and psychopathy ($\beta = 0.16$) were significant predictors of cyberbullying ($F(3, 1537) = 18.450$, $p < .001$). However, with the addition of sadism in the following step of the regression, it became the only significant predictor of the behaviour ($\beta = 0.23$; $F(1, 1536) = 42.427$, $p < .001$).

3.3.8. Problematic social media use (PSMU)

Two studies examined the relationship between the dark traits and PSMU (i.e., excessive and compulsive use). In the first article by Kircaburun, Demetrovics, and Tosuntaş (2018), all correlations between the triad members and PSMU were significant, albeit weak in strength. In the second article, Kircaburun, Jonason, and Griffiths (2018a), explored whether the dark tetrad traits would be directly or indirectly related associated with PMSU via cyberbullying, cybertrolling, and cyberstalking. Narcissism was indirectly associated with PSMU via cyberstalking (for the full sample, and women but not men). Psychopathy was directly associated with cyberbullying and cybertrolling, however this did not lead to PSMU. Machiavellianism was directly associated with cyberbullying, cybertrolling, and cyberstalking, and indirectly with PMSU via cyberbullying and cyberstalking (for the full sample, and men but not women). Sadism was directly associated with cyberbullying, cybertrolling, and cyberstalking, and indirectly with PSMU via cyberbullying and cyberstalking.

3.3.9. Problematic online gaming (POG)

A single study analysed the relationship with the tetrad and POG (i.e., excessive and compulsive use; Kircaburun, Demetrovics, & Tosuntaş, 2018). Only narcissism and sadism significantly related positively with POG, with narcissism being the strongest correlate.

3.3.10. Problematic internet use (PIU)

A single study aimed to investigate the relationships of the dark tetrad with specific online activities (i.e., social media, gaming, gambling, shopping, and sex) and problematic internet use (Kircaburun & Griffiths, 2018). All traits of the tetrad were significantly related to PIU. Machiavellianism was the strongest correlate and psychopathy was the weakest. When analysing the anti-social online behaviours that may constitute PIU in a hierarchical regression model, narcissism was associated with social media use and online gambling, Machiavellianism was associated with online gaming, online sex, and online gambling, and sadism was related online to online sex. In the saturated mediation model run to examine the direct and indirect effects of online activities between personality traits and PIU, narcissism was indirectly associated with PIU through social media use and Machiavellianism was directly and indirectly associated with PIU through online gambling and online gaming.

3.3.11. Internet use disorder (IUD)

One article containing two studies explored the relationship between the triad and IUD (i.e., over usage; Sindermann et al., 2018). Study 1 explored the relationships between the traits and unspecified forms of IUD. Only psychopathy and Machiavellianism significantly correlated with IUD as measured by the Short Internet Addiction Test (s-IAT; Pawlikowski, Altstötter-Gleich, & Brand, 2013). Both traits correlated more strongly with the craving/social problems subscale of the s-IAT (Pawlikowski et al., 2013) compared to the loss of control/time management subscale. Study 2 was conducted to analyse the relationships between specific forms of IUD. Narcissism related to the loss of control/time management subscale of the s-IAT when amended to measure internet gambling disorder, as well as both subscales of the amended s-IAT when amended for internet pornography use disorder. Psychopathy correlated with the full scales and subscales of the s-IAT when amended for internet gaming disorder, internet gambling disorder, and internet pornography disorder, and the craving/social problems subscale of the s-IAT when amended for internet shopping disorder. Machiavellianism correlated with the full scales and subscales of the s-IAT when amended for internet gaming disorder, internet pornography disorder and internet communication disorder.

3.3.12. Non-clinical social media addiction (SMA)

One study examined the relationship between SMA and the triad, defined by the authors as an inability to control social media use with frequency to significantly impair an individual's academic and social life (Demircioğlu & Göncü Köse, 2018). Only psychopathy and Machiavellianism significantly correlated with social media addiction and psychopathy was the only trait to have a direct, significant path to SMA in the structural equation model.

3.3.13. Cyberstalking

A single study examined the influence of the dark tetrad on Intimate Partner Cyber Stalking (IPCS; Smoker & March, 2017). Psychopathy, Machiavellianism, and sadism were all moderately correlated with IPCS, while narcissism was weakly correlated.

3.3.14. Technology facilitated sexual violence (TFSV)

A single study analysed the relationship between TFSV (specifically revenge porn behaviours) and the dark tetrad (Pina et al., 2017). The correlations revealed that all of the traits were significantly correlated with the proclivity towards the behaviour. Psychopathy was the only significant predictor.

3.3.15. Technology facilitated infidelity (TFI)

A single study explored how non-single Tinder users differ from single users and non-users in a committed relationship on the traits of the triad (Timmermans et al., 2018). Psychopathy was the only trait to reveal significant differences between the groups of single Tinder users, non-single users, and non-single non-users, albeit a small effect size. A post-hoc pairwise comparison revealed that non-single Tinder users scored significantly higher on trait psychopathy than non-single non-users. The correlations exploring the motives for non-single's use of Tinder revealed narcissism was associated with social approval, to pass time/entertainment, and distraction. Psychopathy was associated with sexual experiences and was the only trait to significantly correlate with the offline outcome of one-night stands. Machiavellianism was associated with sexual experience and social approval. The relevant information for each study can be found in Table 2.

4. Discussion

This paper aimed to systematically review the existing evidence that has explored the relationship between the darker traits (i.e., members of the dark triad or the dark tetrad) and the antisocial behaviours that occur specifically online. The majority of studies found the traits to yield significant correlations with (and prediction of) the investigated behaviours (n = 26). The triad alone was related to uncivil commenting, cyber-aggression, cyberbullying PSMU, IUD, SMA, and TFI, and the tetrad alone was related to cyber-loafing, sending unsolicited explicit images, the non-consensual dissemination of sexts, POG, PIU, IPCS, and TFSV. Both the triad and tetrad were related to trolling and PSMU. These findings occurred across nine countries and various SNS' with the mean ages of participants ranging from 16.05 to 44.96.

4.1. Synthesis of major findings

The synthesised evidence suggests that psychopathy was the trait most strongly and consistently correlated with the majority of the explored antisocial online behaviours, followed by Machiavellianism and everyday sadism. Narcissism was trait least strongly and least consistently correlated with these behaviours (only weakly correlated with trolling, cyber-aggression, cyber-loafing, sending unsolicited explicit images, the non-consensual dissemination of 'sexts', cyberbullying, PSMU, POG, PIU, and IPCS). With the exception of IPCS, sending unsolicited explicit images, and 'sext' dissemination, these behaviours may be considered less threatening than behaviours such as TFSV.

Psychopathy predicted trolling, cyberaggression, cyberbullying, and TFSV in 12 cases and correlated with all antisocial online behaviours in studies reporting significant relationships. Both cyberaggression and trolling are behaviours that are often retaliatory in nature. Their relationship with psychopathy may reflect trait psychopathy as a manifestation of high impulsivity and unempathetic characteristics. Psychopathy was also related to revenge porn proclivity (TFSV) as well as the non-consensual dissemination of 'sexts'. Both behaviours are contingent on a non-consenting dissemination of private, sensitive material and the perpetrators of such behaviours can cause serious and damaging consequences to their victims (who are most commonly women; Pina et al., 2017). This behaviour captures the unempathetic callousness exercised by the trait psychopath in their affinity for short-term action for instant gratification and cruel relationship abandonment (Pina et al., 2017).

Machiavellianism predicted trolling, sending unsolicited explicit images, and PSMU. The predictive capacity of Machiavellianism for such images was speculated by March and Wagstaff (2017) to be related to the affinity of Machiavellians for behavioural strategy in the charming manipulation and exploitation of others. It is considered an aggressive mating strategy to manipulate others into a short-term sexual exchange, and for Machiavellians, this unfeeling, self-satiating tactic may be particularly useful.

Everyday sadism was predictive of trolling in four studies. Both Craker and March (2016) and March et al. (2017) speculated that the predictive power of the sadism suggests that Facebook and Tinder trolls are likely to derive pleasure from the suffering they cause their victims. Sadism was related to all of the behaviours that were explored with this trait (i.e., trolling, cyber-loafing, sending unsolicited explicit images, cyberbullying, PSMU, POG, PIU, IPCS, and TFSV) – albeit this was less than the number of behaviours assessed by the triad alone. These behaviours can be considered more perverse than others such as SMA and uncivil commenting. Sending unsolicited explicit images and IPCS are often dominance orientated, cruel, and (in the case of the latter), degrading and dehumanising. Both behaviours are considered harassment and can have serious consequences for their victims who are also often women (Smoker & March, 2017). Everyday sadism alone was also predictive of cyberbullying in a study of high school students (van Geel et al., 2017). This may suggest that the driving force behind the behaviour is the pleasure gained from the suffering of their victims, at least in the observed population.

The results of this systematic review have produced a relatively small number of studies that have explored the dark traits online. Too few studies have explored the same online behaviours to be able to draw firm conclusions on these relationships, however some tentative

patterns have begun to emerge. Taken together, the evidence suggests that psychopathy and sadism are the strongest correlates of online behaviours that are (a) the most interpersonally belligerent and (b) are the easiest for the perpetrator to remain anonymous. For example, the online behaviours of trolling, cyberaggression, cyberbullying, and technology facilitate sexual violence are all uniquely predicted by psychopathy (in studies exploring the D3), or by both psychopathy and sadism (in studies exploring the D4). Behaviours that are not as interpersonally antagonistic are not driven by these traits (or at least not as consistently or to the same degree) – for example, problematic social media usage is more strongly related to narcissism than other traits, and sending unsolicited explicit images is more strongly related to Machiavellianism (although we note that these relationships are each based on single studies).

4.2. Limitations and future directions

A limitation of the literature pertains to the measurement of the dark traits. The majority of the studies utilised the SD3 (Jones & Paulhus, 2014), which captures the three theoretically distinct traits with nine items per trait. The measure has been criticized by some for not comprehensively assessing the complex, multidimensional nature of the traits of the triad (Carrotte & Anderson, 2018b; Pabian et al., 2015). This critique (plus claims of poor psychometric properties) has also been applied to the use of the DTDD which reduces the number of items even further, aiming to encapsulate the traits in a total of just 12 (Miller et al., 2012; see also Furnham, Richards, Rangel, & Jones, 2014). Three of the seven studies which used the DTDD stated that their choice of this measure might be a limitation of their research (Kircaburun, Demetrovics, & Tosuntaş, 2018; Koban et al., 2018). Koban et al. (2018) suggested their non-significant correlations with uncivil commenting were a result of the DTDD's incapability to capture the multidimensional nature of narcissism and psychopathy.

Both the SD3 and the DTDD are self-report measures which is a consistent limitation of the literature contained within this review. Seventeen studies noted self-report bias as a limitation of their review (Bogolyubova et al., 2018; Buckels et al., 2018; Lowe-Calverley & Grieve, 2018; Clancy et al., 2019; Craker & March, 2016; Demircioğlu & Göncü Köse, 2018; Kircaburun & Griffiths, 2018; Kircaburun et al., 2018a, 2018b; March & Wagstaff, 2017; Pabian et al., 2015; Seigfried-Spellar & Lankford, 2018; Sindermann et al., 2018; Smoker & March, 2017; Timmermans et al., 2018; van Geel et al., 2017). As the behaviours analysed in these studies have socially negative connotations (e.g., trolling, non-consensual dissemination of 'sexts', etc.), it would be naïve to assume that those high in exploitative trait psychopathy, cunningly manipulative Machiavellianism, and people-pleasing trait narcissism would not try to deceive researchers conducting research on these topics. As such, future research should continue to refine the assessment of the dark traits, and should consider the role of socially desirable responding.

Another limitation of the literature is the sampling. No research was conducted with participants outside of Australia, Europe, North America, or Turkey. Thus, the results and conclusions drawn about the relationships between the dark traits and antisocial online behaviours cannot be widely generalised beyond those geo-locations. Indeed, the small number of studies might limit any generalisations of these findings at all, particularly in light of the fact that all the studies have been conducted in the last ten years and typically with young samples. The issue of cross-cultural validity can be seen in other personality models such as the Five Factor Model (FFM; McCrae & John, 1992). The FFM was originally thought to encapsulate the five universal personality traits, however more recent research has demonstrated different underlying factor structures of personality in some non-Western samples (Gurven, Von Rueden, Massenkoff, Kaplan, & Lero Vie, 2013; McCrae & John, 1992). Thus, future research should acknowledge that personality is culturally specific, and the trait-structure of the triad and tetrad need to be validated cross-culturally.

Future research should also consider analysing this relationship behaviour in light of the person-situation interaction. The interaction posits the importance of understanding both individual differences and the environment in determining behavioural choices (Joyce, Slocum, & Von Glinow, 1982). This may allow conclusions to be drawn regarding the situations that interact with the traits to elicit the antisocial online behaviours.

4.3. Conclusions

This is the first systematic literature review to analyse the relationship between the personality traits of the dark triad/tetrad and antisocial online behaviours. The evidence suggests that all of the traits correlate with (and predict) at least one antisocial online behaviour. Taken together, the findings of this systematic review suggest that psychopathy is the darkest of the traits, based on their ability to uniquely predict 'high severity' behaviours (i.e., cyberaggression and TFSV). Our findings also ratify Rauthmann and Kolar (2012)'s speculation that narcissism may be the 'brightest' trait (or the least dark). Given the capacity of everyday sadism's to uniquely relate to (or predict) antisocial online behaviours, this review suggests that the dark tetrad is the most encapsulating model of dark personality traits (more than the dark triad, thus contributing to the ongoing debate disputing the number of dark traits). Despite commonly covarying with their fellow triad or tetrad members, all four of the traits were able to uniquely predict an antisocial behaviour. That is, we present evidence that the dark tetrad of traits is related to, but distinct from one another - thus cementing their individuality. However, given the uncertainty surrounding the psychometric properties of some of the measures used in this review, this interpretation should be considered with caution.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.paid.2019.02.027.

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