



# Overcoming agreeableness: Sociosexuality and the Dark Triad expanded and revisited

Lennart Freyth<sup>a,\*</sup>, Peter K. Jonason<sup>b,c</sup>

<sup>a</sup> Johannes Kepler University Linz, Department of Psychology, Austria

<sup>b</sup> University of Padua, Department of General Psychology, Italy

<sup>c</sup> University of Cardinal Stefan Wyszyński, Institute of Psychology, Poland

## ARTICLE INFO

### Keywords:

Sexual behaviors  
Agreeableness  
Dark Triad  
Sociosexuality  
Unprotected sex  
Dark Core

## ABSTRACT

We replicated and extended ( $N = 495$ ) what is known about the relationships between the Dark Triad traits (i.e., narcissism, Machiavellianism, psychopathy) and a wider range (than previously reported) of sociosexuality including risky sexual behaviors (e.g., lack of condom use) and sexuality in relation to dating applications like Tinder, in general, in men and women, and above agreeableness. Machiavellianism and psychopathy were linked to most sociosexual behaviors and attitudes. In men, Machiavellianism was linked to various sociosexual outcomes, in women those outcomes were associated with psychopathy instead. Agreeableness was hardly correlated with sociosexual outcomes. The Dark Triad traits were more strongly correlated with the studied outcomes even after controlling for agreeableness or for the dark core. Unexpectedly, men who were Machiavellian and agreeable reported the most sex partners in different contexts, but not psychopaths. In contrast, women who were psychopathic not only had more sex partners in general, but they also engaged in more unprotected sex, and one-night stands than men did. These findings build on prior research on the Dark Triad traits and their associations with sociosexuality and help to draw a more nuanced and modern picture of those relationships.

## 1. Introduction

During a recent podcast,<sup>1</sup> Professors Jordan Peterson and David Buss discussed aspects of evolutionary psychology, the role of the Dark Triad traits, agreeableness, and sociosexual outcomes, leaving two questions unanswered: (1) What role do the Dark Triad traits play regarding sociosexuality? (2) Do the Dark Triad traits explain sociosexuality beyond agreeableness? Peterson postulated that disagreeableness is essentially equivalent to the Dark Triad and explains most sociosexual (i.e., casual sex tendency; Penke & Asendorpf, 2008) outcomes. Based on the correlation with the shared latent variance between the traits (i.e., the “dark core”), researchers dispute two positions on whether disagreeableness sufficiently explains the antagonistic part of the dark traits and the associated outcomes (Vize et al., 2021) or not (Moshagen et al., 2020). The latter position emphasizes each trait's unique components on top of the dark core. Others argue that the core's predictive validity is limited and each trait's explanatory variance beyond the Big Five traits indicate that they may be distinct components (e.g., Machiavellianism and psychopathy; Sleep et al., 2017). Further, the Dark Triad

traits are linked to sociosexuality (Jonason et al., 2009) but the dark core does not sufficiently explain short-term mating (Horsten et al., 2022). We aim to clarify the roles of disagreeableness and the Dark Triad traits in the realm of different sexual outcomes within these postulates.

What was once defined as sociosexuality may have undergone a recent expansion given sexual liberalization, the adoption of online dating, and the hookup culture (García & Reiber, 2008) and research has not necessarily kept pace with these social changes. We seek to redress this—at least initially—by studying “traditional” and “modern” manifestations of sociosexuality. Thus, we include reports of the number of sex partners via dating application, the number of oral sex partners, experience with prostitution, and the number of unprotected sex partners (Flesia et al., 2021) as newer manifestations along with more traditional measures of the numbers of lifetime sex partners and one-night stands. Tinder users—men in particular—score higher in sociosexuality and the Dark Triad traits (Sevi, 2019). Among women, short-term mating and psychopathy are associated, which may be a manifestation of secondary (i.e., emotional dysregulation, irresponsibility) more than primary (i.e., shallow affect, callousness) psychopathy (Blanchard

\* Corresponding author at: Johannes Kepler University Linz, Altenbergerstr. 69, 4040 Linz, Austria.

E-mail address: [freyth.research@outlook.com](mailto:freyth.research@outlook.com) (L. Freyth).

<sup>1</sup> [www.youtube.com/watch?v=n9wzSpz7gKE](https://www.youtube.com/watch?v=n9wzSpz7gKE), March 2022.

et al., 2021). In men and women promiscuity and infidelity are associated with disagreeableness (men only), Machiavellianism, and psychopathy (Jones & Weiser, 2014). Hence, people characterized by “dark” personality traits might consider infidelity acceptable because they are likely cheaters themselves.

Beyond Dark Triad traits' effects, we expect to replicate sex differences in sociosexuality (Penke & Asendorpf, 2008; Schmitt, 2005) which may be the result of different developments of ancestral men and women over time based on asymmetrical investment in offspring (Buss & Schmitt, 1993) or modern norms surrounding sexual behavior (e.g., sexual double standard). Nonetheless, most casual sex involves both sexes, so the number of sex partners should not be particularly discrepant, instead it is attitudes around sex that may differ more (Jonason, 2007). Yet, which men and women (in particular) engage in different casual sex practices is rarely investigated. Frequently, casual sex is either regarded as an exploitative mating strategy (Black et al., 2014; Jonason et al., 2009) or as a psychopathological manifestation (Gutiérrez, 2013) – some even doubt sex differences in these strategies (Carter et al., 2014). These views leave out that charm (Black et al., 2014) and flexible mating strategies (e.g., bet-hedging, environment-dependent tactics) may attract mates, which are not necessarily exploitative behavior.

For researchers interested in the Dark Triad (or Tetrad) of personality, there is a potential thorn in our side. Possibly, sociosexual outcomes (among others) can be reduced to spurious effects of disagreeableness. We test this assertion by replicating and extending the known associations between the Dark Triad traits, agreeableness as per the Big Five traits, and various sociosexual outcomes, covering behaviors, attitudes, and desires, overall and in men and women, and we control the associations between the Dark Triad traits and sociosexual outcomes for agreeableness and vice-versa. Additionally, we include the dark core in our analysis to provide a more detailed comparison between the three constructs (disagreeableness, dark core, Dark Triad traits). We then test for differences for the partialled coefficients and for the incremental validity provided by agreeableness in predicting a wide range of sociosexual outcomes.

## 2. Methods

### 2.1. Participants and procedure

We used an online-panel for German-Speaking countries to collect data of finally 495 (288 Men, 207 Women) paid (2.50€) respondents, aged 42.18 (*SD* = 14.49), who completed the survey as part of a larger study (Freyth & Batinic, 2021). Fifty-seven participants were removed after manual data cleaning (i.e., more than two missing items, response time below 1 s per question, odd response patterns) to ensure data quality for the used short scales. Power analyses indicated a sample size of 479 to identify small contributions in the hierarchical regressions ( $\Delta R^2 = 0.03$ ,  $\alpha = 0.05$ , power = 0.95). Ethical clearance was obtained by Johannes Kepler University Linz, Austria. Participants consented before starting and upon completion of a series of online questionnaires, they were debriefed, and thanked for their participation.

### 2.2. Measures

We used the 15-item Big Five Inventory (3 items per trait; Schupp & Gerlitz, 2008). Participants reported their agreement with different statements (1 = *I totally disagree*, 7 = *totally agree*; e.g., “I am someone, who....”), capturing neuroticism (e.g., “...gets nervous easily”; McDonald's  $\omega = 0.73$ ), extraversion (e.g., “...is talkative”;  $\omega = 0.76$ ), openness (e.g., “...has an active imagination”;  $\omega = 0.67$ ), agreeableness (e.g., “...has a forgiving nature”;  $\omega = 0.58$ ), and conscientiousness (e.g., “...does thing efficiently”;  $\omega = 0.61$ ). Items were averaged to build trait scores.

We used the 9-item Naughty Nine Scale (3 items per trait; Küfner et al., 2015). Participants reported how much they agree with different

statements (1 = *I totally disagree*, 5 = *totally agree*; “I tend to....”;  $\omega = 0.83$ ), capturing narcissism (e.g., “...seek prestige or status”;  $\omega = 0.80$ ), Machiavellianism (e.g., “...manipulate others to get my way”), and psychopathy (e.g., “...be callous or insensitive”;  $\omega = 0.62$ ). Items were averaged to build trait scores.

Sociosexuality was measured in several ways. We used the 9-item Sociosexuality Inventory-Revised (Penke & Asendorpf, 2008) captured participants' sociosexual attitudes (e.g., “Sex without love is OK”;  $\omega = 0.85$ ), sociosexual desires (e.g., “In everyday life, how often do you have spontaneous fantasies about having sex with someone you have just met?”;  $\omega = 0.88$ ), and sociosexual behaviors (e.g., “With how many different partners have you had sex within the past 12 months?”;  $\omega = 0.74$ ). We further asked participants about their numbers of lifetime sex partners, dating application sex partners (both total and unprotected), oral-sex partners, and one-night stands. We also asked if they would forgive their partners infidelity (yes/no) and if they have had experience with prostitution as a sex worker, for women, and a client, for men.

### 2.3. Analysis

First, we test for replication of sex differences in traits and sexual outcomes (Table 1). Then we run zero-order correlation for agreeableness, narcissism, Machiavellianism, and psychopathy towards all sociosexuality measures for the overall sample, and for men and women

**Table 1**

Descriptive statistics and sex differences for personality traits and sexuality (*N* = 495; 288 men; 207 women).

	<i>M</i> ( <i>SD</i> )			<i>t</i>	<i>d</i>
	Overall	Men	Women		
Agreeableness	4.09 (0.65)	4.04 (0.60)	4.16 (0.72)	-2.10*	-0.19
Narcissism	3.52 (1.49)	3.49 (1.46)	3.56 (1.53)	-0.46	-0.04
Machiavellianism	2.90 (1.40)	2.97 (1.40)	2.80 (1.40)	1.35	0.12
Psychopathy	2.73 (1.24)	2.92 (1.22)	2.48 (1.22)	3.95**	0.36
Number of sex partners	23.11 (69.25)	24.63 (53.29)	21.32 (87.31)	0.47	0.04
Number of unprotected sex partners	9.57 (28.60)	11.66 (31.94)	6.48 (22.50)	1.92	0.18
Number of sex partners via dating applications	8.01 (27.60)	10.63 (34.15)	3.54 (6.64)	1.82	0.26
Unprotected partners via dating applications	1.58 (7.02)	2.08 (8.65)	0.69 (1.54)	1.37	0.20
Number of one-night stand partners	9.36 (37.53)	11.58 (38.61)	6.24 (35.81)	1.54	0.14
Number of oral sex partners	14.14 (60.30)	18.46 (74.50)	7.66 (26.62)	1.89	0.18
Sociosexual attitudes	3.06 (1.26)	3.30 (1.18)	2.73 (1.29)	5.09**	0.46
Sociosexual desires	2.63 (1.12)	2.95 (1.14)	2.18 (0.91)	8.04**	0.73
Sociosexual behavior	2.58 (1.07)	2.71 (1.12)	2.36 (0.91)	2.99**	0.33

Dichotomous variables	Agreement in %			$\chi^2$	$\Phi$
	Overall	Men	Women		
Prostitution experience (yes/no)	0.18 (0.38)	0.27 (0.45)	0.04 (0.20)	44.32**	0.30
Acceptance of infidelity (yes/no)	0.46 (0.50)	0.55 (0.50)	0.33 (0.47)	23.64**	0.22

Note. Reports were lower for sex partners via dating apps total (*n* = 214) and unprotected (*n* = 207).

\* *p* < .05.

\*\* *p* < .01.

separately (Table 2). We also tested for the partialized coefficients, as all traits were intercorrelated towards agreeableness ( $r_{\text{narcissism}} = 0.17, p < .01$ ;  $r_{\text{Machiavellianism}} = 0.22, p < .01$ ;  $r_{\text{psychopathy}} = 0.17, p < .01$ ). Additionally, we report correlations with the dark core as well as coefficients after partialing out the dark core for reasons of comparison.

### 3. Results

Machiavellianism was correlated in 14 of 22 tests (64 %) on sexual behaviors and attitudes, the dark core in 12 tests (55 %), and psychopathy in 10 tests (45 %) whereas narcissism (4; 18 %) and agreeableness (3; 14 %) were only rarely linked. In men Machiavellianism was more frequently related to sociosexual outcomes than in women (13 v. 6; 59 % vs. 27 %), while psychopathy was more often associated with sexual behaviors in women (16 times; 73 %) compared to men (1; 5 %). The dark core was not associated with six outcomes with which Machiavellianism or psychopathy were associated, but with more than agreeableness (e.g., number of one-night stand partners). The dark core missed associations with unprotected sex partners in general and via dating applications, and the acceptance of infidelity, and especially when in men and women different traits were linked to the outcomes (i.e., number of unprotected partners).

Next, we tested the correlations for moderation by sex using Fisher's  $z$ -test. When comparing the correlations in men and women we found seven out of the 11 instances for at least one Dark Triad trait. In men, narcissism and Machiavellianism were more strongly correlated with sociosexual desires, narcissism with more partners via dating applications, and Machiavellianism with more sociosexual behaviors than women. Psychopathy showed stronger relationships to the number of sex partners, the number of unprotected sex partners, and the number of one-night stand partners in women than men.

Given the correlations between agreeableness and the Dark Triad traits, we used Steiger's  $z$ -test to test for a change in the correlations between the Dark Triad traits and sociosexuality after removing agreeableness or the dark core and vice-a-versa. The partial correlations involving sociosexual attitudes, desires, behaviors, and the acceptance of infidelity were larger for all Dark Triad traits than for agreeableness. In men, the magnitude of the partial correlations on sociosexual desires, attitudes, and the acceptance of infidelity with the Dark Triad traits were larger. Also, the magnitudes of partial correlations on narcissism with the number of unprotected partners and partners via dating applications in men were larger than for agreeableness, but negative.

Partial correlations of psychopathy with the numbers of lifetime sex partners, and sex partners via dating apps, both also unprotected, in men were negative but larger than correlations of agreeableness. Residualized correlations including psychopathy compared with agreeableness were larger for the number of sex partners, partners unprotected, and one-night stands in women. Also, after partialing out the dark core, the Dark Triad traits still provided an individual contribution in most of the cases. Removing the dark core mainly reduced correlations with the attitudes and desire-dimension of the Sociosexual Orientation Inventory-Revised, and associations between narcissism and sexual outcomes (supplements: partialized dark core for both sexes). Summarizing, almost all investigated correlations with sociosexual outcomes differed for at least one of the Dark Triad traits after partialization.

Last, we ran a series of hierarchical regressions where Step 1 contained the Dark Triad traits and Step 2 contained agreeableness, allowing us to test for the incremental validity provided by the latter over the former.<sup>2</sup> Agreeableness added between 2 % in one overall case (acceptance of infidelity; Step 1:  $R_{\text{Nagelkerke}}^2 = 0.02, p = .05$ ;  $\Delta R_{\text{Nagelkerke}}^2 = 0.02, p < .01$ ) once in women (acceptance of infidelity; Step 1:  $R^2 = 0.07, p$

$< .01$ ;  $\Delta R^2 = 0.02, p = .03$ ), and once in men—which was also the only behavioral case—for the number of unprotected sex partners (Step 1:  $R^2 = 0.05, p < .01$ ;  $\Delta R^2 = 0.02, p = .02$ ). In total, agreeableness failed to add more variance in 30 of 33 tests (91 %). When we flipped this regression around, the Dark Triad traits provided incremental validity in 17 of 33 cases (52 %; 8 out of 11, or 73 %, for the overall sample) with a range from 2 (total sex partners,  $p = .04$ ) to 20 % (i.e., sociosexual desire in men).

### 4. Discussion

We replicated and extended what is known about the Dark Triad traits regarding sociosexuality. We did this by investigating a wider, modern range of sociosexual outcomes than previous, traditional research which was limited to either sociosexuality or specific types of relationships (Adams et al., 2014; Jonason et al., 2009). In our study, the Dark Triad traits were related to almost all sociosexual outcomes independently of agreeableness and offer contributions beyond the dark core. Differences were indicated in 36 % overall correlations, in 55 % among men, and 39 % of tests among women; and in 24 % of tests sex moderations were found. The Dark Triad traits' correlations towards sociosexual outcomes showed differences for sociosexual desires and the acceptance of infidelity in eight tests, and in five out of eleven tests for sociosexual attitudes. This indicates substantial differences in the correlations and supports the claim, that the Dark Triad traits are more than just disagreeableness or the Dark Triad's core (Sleep et al., 2017). We summarize our findings in three domains. First, replicating Dark Triad traits' correlates with sociosexuality and expanding the outcomes by updating aspects of modern sex research. Second, we demonstrated sex differences covering various aspects at once providing a multi-faceted picture of men's and women's sexual behavior and attitudes in a diverse range of sociosexual phenomena. Third, we tested whether the Dark Triad traits' correlations were independent of agreeableness and of a dark core, and if agreeableness could provide incremental variance for sociosexual outcomes on top of the Dark Triad traits.

First, we replicated links between the Dark Triad traits and agreeableness with sociosexual outcomes and expanded these finding by including less investigated manifestations like the number of oral sex partners, of the number of sex partners via dating apps partners in total and unprotected, the total number of one-night stands, the active experience of prostitution, and the acceptance of infidelity (Flesia et al., 2021). Especially Machiavellianism and psychopathy were linked to almost all sociosexual phenomena, while agreeableness was of minor importance as was narcissism, which was linked to attitudinal outcomes only. Interestingly, Machiavellianism correlated positively with the acceptance of infidelity, matching previous findings that Machiavellian cheaters do not report relationship dissolution, while psychopathic cheaters did (Jones & Weiser, 2014). Agreeable individuals reported more one-night stands and less acceptance of infidelity. In general, linking the Dark Triad traits with sociosexuality (i.e., short-term mating) is in line studies spanning at least two decades (Horsten et al., 2022; Jonason et al., 2009) and investigating different behaviors of modern sex life instead of just relying on unidimensional sociosexuality provided a more nuanced picture.

Second, examining the associations between personality traits and sociosexuality in both sexes showed that agreeableness was associated with more sex partners among several conditions in men but not in women, and more strongly with sex partners via dating applications in men than in women. Among men, Machiavellianism was related to most sexual outcomes, and more strongly associated with sociosexual desires and behaviors compared to women. Observing no psychopathy-sociosexuality link among men, challenges the view of exploitative men (e.g., Jonason et al., 2009) along with adaptationist accounts (Jonason et al., 2017). Surprisingly, psychopathic men even reported fewer sexual partners, general and unprotected, than women. As undesirable personality traits are a “dealbreaker” for women, callous-

<sup>2</sup> Regression is the more common method for testing incremental validity, but the Steiger's  $z$ -test provides an alternative approach. We present both to provide an honest and informative test of the hypothesis.

**Table 2**  
Zero-order correlations between the Dark Triad traits and agreeableness and sociosexuality overall and in both sexes (M/W).

	Agreeableness		Narcissism		Machiavellianism		Psychopathy		Dark core	
	Overall	M/W	Overall	M/W	Overall	M/W	Overall	M/W	Overall	M/W
Number of sex partners	0.05	0.13*/ <0.01	0.04	0.05/0.04	0.13**	0.16***/ 0.11	0.08	-0.01/	0.11*	0.11/0.11
-Partialed	0.02/0.03	0.11*/ -0.04	0.03/	0.03/0.04	0.09*/ 0.08	0.14*/ 0.12 <sub>a</sub>	0.08/0.02	-0.04 <sub>a</sub> /	0.10*/ -0.06	0.08/0.11
Number of unprotected sex partners	0.09	0.14*/ 0.03	0.01	0.02/	0.12*	0.15***/ 0.03	0.04	-0.05/	0.08	0.09/0.05
-Partialed	0.07/0.07	0.14*/ <0.01	<0.01/	<0.01 <sub>a</sub> /	0.11*/ 0.11*	0.13*/0.02	0.02/	-0.08 <sub>a</sub> /	0.06/0.01	0.06/0.04
Number of sex partners via dating appl.	0.09	0.16*/ -0.13	<0.01	<0.01	0.10	0.11/0.09 <sub>a</sub>	0.01	<0.01/	0.05	0.06/<0.01
-Partialed	0.08/0.09	0.14/	<0.01/	-0.02 <sub>a</sub> /	0.11/	0.07/0.09 <sub>a</sub>	0.02/	<0.01/	0.05/	0.03/<0.01
Number of unprotected partners via dating appl.	0.08	0.13/	0.01	0.02/0.01	0.14*	0.14/	<0.01	-0.04/	0.08	0.08/0.16
-Partialed	0.06/0.07	-0.04	<0.01/	<0.01/	0.15*/	0.25**	<0.01/	-0.05/	0.07/	0.05/0.17
Number of one-night stand partners	0.13*	0.16***/ 0.07	0.07	<0.01/	0.17**	0.15*/0.10	0.14**	0.01/	0.13**	0.14*/0.11
-Partialed	0.07/0.07	0.10/0.04	0.03/	0.05/	0.08/	0.14*/0.08	0.13**/	0.02/	0.11*/	0.11/0.09
Number of oral sex partners	0.06	0.08/0.04	0.02	0.01/0.05	0.07	0.08/0.05	0.13**	0.11/	0.07	0.07/0.08
-Partialed	0.04/0.04	0.06/0.02	<0.01/	<0.01/	0.02/	0.06/0.04	0.12*/	0.10/	0.06/0.07	0.06/0.08
Sociosexual attitudes	0.09	0.03/	0.15**	0.18***/	0.26**	0.26***/	0.15**	0.10/	0.26**	0.25**/
-Partialed	0.03/0.03	0.19**	0.14*	0.14*	0.11*	0.22**	<0.01	0.15*	0.11*	0.25**
Sociosexual desires	<0.01	0.09/	0.28**	0.41***/	0.30**	0.39***/	0.18**	0.13*/	0.35**	0.44**/
-Partialed	-0.08/	<0.01/	0.29** <sub>a</sub> /	0.40** <sub>a</sub> /	0.31 <sub>a</sub> /	0.38** <sub>a</sub> /	0.18** <sub>a</sub> /	0.11/	0.36** <sub>a</sub> /	0.43** <sub>a</sub> /
Sociosexual behaviors	0.02	-0.09	0.01	0.16** <sub>a</sub>	0.05	0.17** <sub>a</sub>	-0.03	0.15** <sub>a</sub>	0.10*	0.22** <sub>a</sub>
-Partialed	<0.01/	0.04/0.02	0.09/	0.10/0.10	0.18**	0.26***/	0.03	0.02/	0.12*	0.21*/0.06
Prostitution experience	<0.01	0.04/0.01	0.02	0.02/0.04	0.07	0.07/0.02	0.11*	0.04/	0.07	0.05/0.06
-Partialed	-0.02/	0.02/	0.02/	0.01/0.04	0.02/	0.06/0.01	0.11** <sub>a</sub> /	0.04/	0.07/0.03	0.04/0.06
Acceptance of infidelity	-0.02	<0.01	-0.07	0.11/	<0.01	0.13/0.08	0.08	0.14*	0.11*	0.11/0.11
-Partialed	-0.12**	-0.06/	0.04	-0.03	0.13**	0.13/0.08	0.08	0.03/0.05	0.11*	0.11/0.11
		-0.15**/	0.03/	0.12** <sub>a</sub> /	0.09** <sub>a</sub> /	0.15** <sub>a</sub> /	0.08 <sub>a</sub> /	0.05/	0.10** <sub>a</sub> /	0.08/0.11
		-0.15**	-0.09	<0.01 <sub>a</sub>	0.08 <sub>a</sub>	0.08 <sub>a</sub>	0.02 <sub>a</sub>	0.08 <sub>a</sub>	-0.06	

Note: Bolded pairs indicate moderation by sex ( $p < .05$ ) with Fisher's  $z$ ; Partialed = Agreeableness was partialed for the Dark Triad traits and vice-a-versa/Partialed for the dark core (the dark core was partialed for agreeableness/and the Dark Triad traits); <sub>a</sub> on partial correlations indicates differences ( $p < .05$ ) partial and zero-order correlations using Steiger's  $z$ .

\*  $p < .05$ .  
\*\*  $p < .01$ .

psychopathic men might be undesirable mates even in short-term mating contexts (Blanchard et al., 2021). Alternatively, younger and charming men might be able to compensate for this, but our sample was too old on average to test such things. In women, psychopathy was associated with most sexuality measures and in three behavioral cases even more strongly than in men. Psychopathy manifests itself rather violently in men, while the borderline-like manifestations (i.e., emotional dysregulation, impersonal sexual attitudes) in women are favored for long- and short-term mating by men (Blanchard et al., 2021). Conceivably, impulsive, sexually motivated, psychopathic women play an active role in sex, supported by our findings. These behavioral sex-specific associations might be specific “flavored” manifestations of the individual trait on top of the underlying disposition of the dark core (Bader et al., 2022). Evidently, the Dark Triad traits are different mating strategies with different mechanism in men and women, which lead to short-term sex and are not limited to young samples (Carter et al., 2014). The outcomes of the Dark Triad traits show variation by sex (Jonason et al., 2017), particularly impulsivity (i.e., psychopathy) and outcomes

such as sociosexual desire, which leads us to the assumption that contradicting studies (Carter et al., 2014) may be based on statistical and/or observed artifacts. Taken together, the Dark Triad traits are associated with different sexual outcomes in men and women, and additionally the strength of the correlations depends on the sexual variable considered.

Third, agreeableness was not only associated with few sexual outcomes but based on Steiger's  $z$ -tests and regressions, we showed just how unimportant it is. For instance, the models where the Dark Triad traits were in Step 1 of hierarchical regressions could not be improved by adding agreeableness in Step 2 overall and in both sexes which may mean that the Dark Triad traits account for variance above agreeableness and their supposed dark core (Sleep et al., 2017). Furthermore, the associations with different outcomes (Jones & Weiser, 2014) of Machiavellianism (e.g., total number of sexual partners) and psychopathy (e.g., number of one-night stand partners) assessed in this study, or regarding different outcomes associated with both traits in terms of behaviors and preferences compared to other studies (Adams et al., 2014), support the distinctiveness of the two characteristics (e.g.,

impulse control, sensitivity to punishment; Jones & Mueller, 2022), which some researchers doubt (Miller et al., 2017). This difference is particularly visible when men and women are compared.

Taken together, men's sexual behaviors appear agreeable and tactical (i.e., Machiavellian), their cognitions self-centered. Women's sexual behaviors seem more psychopathic and partly tactical. The Dark Triad traits were correlated with almost all investigated outcomes and remained so after controlling for either agreeableness or the dark core (mostly). The dark core outperforming disagreeableness supports voices (Moshagen et al., 2020), which contradict the claim that both are the same (Vize et al., 2021). Whether Machiavellianism should be interpreted as agentic tactics or deceitfulness, and how agreeableness is best operationalized be answered by subsequent, facet-level research.

#### 4.1. Limitations and conclusions

Despite the methodological strength and a large adult sample who reported a wide range of rarely investigated sociosexual behaviors, our study is not free of limitations: the cross-sectional design, a small subsample for sex partners via dating applications (Flesia et al., 2021), and relying on reported behaviors and not on reported preferences (Adams et al., 2014). However, we want to focus on two concerns future researchers should address. Shorter scales may measure the trait's main components but not all potential characteristics, as is true for agreeableness, which we captured with a scale (BFI-S) based on the Big Five Inventory instead of the NEO-PI or Five-Factor-Model (Vize et al., 2021). The BFI-S is repeatedly used in German samples after being improved for a German population (Schupp & Gerlitz, 2008), was repeatedly validated (also for the NEO-PI-R; Hahn et al., 2012), and built with the intention to measure the trait and not its facets (John et al., 2008). Therefore, we consider the BFI-S a useful measure for our study, particularly regarding the partialization of agreeableness. Therefore, we suggest working on a unidimensional construct of disagreeableness to differentiate it from low agreeableness, an approach used in the Big Five tradition (John et al., 2008). As sociosexuality correlated with psychopathy in women but not in men, interpretations could be tempered because we used a different measure of the Dark Triad traits than previous studies (Jonason et al., 2009) and we sampled Germans, as opposed to North Americans who are common in this area of research given the three most cited researchers in the field are American and Canadian (i.e., Jonason, Jones, & Paulhus). In addition, sex differences in sociosexuality are smaller in Germany compared to America (Schmitt, 2005); German men might be less assertive "hunters" or German women are more agentically promiscuous than North American women. Moreover, more equality among men and women in more sociosexually unrestricted societies (Lippa, 2009), might lead to more active sexual strategies in women. Future research should investigate further sociosexual outcomes, particularly on the different patterns of dating app-related outcomes between the sexes. Especially women's strategies must be studied and compared in younger and older women with long- and short-term dating orientations. Research should also examine whether the use of dating apps, as an expanded "hunting ground", or as a necessary alternative for nice guys, also results in mating success.

We replicated and expanded the relationships between the Dark Triad traits and agreeableness with sociosexuality. We drew a more nuanced picture of particularly Machiavellian men and psychopathic women engaging in more casual sex, while agreeableness was weakly and only occasionally and minimally correlated to sociosexual outcomes and not associated with any sexual behaviors in women. The Dark Triad traits account for sociosexual outcomes beyond agreeableness and the dark core, so we reject the hypotheses offered in the podcast. By replicating some, but not all, previous links between the Dark Triad traits and sociosexuality while revealing new ones, more work is clearly needed on this topic.

## Funding

The second author was partially funded by a grant from the National Science Centre of Poland (2019/35/B/HS6/00682).

## CRediT authorship contribution statement

**Lennart Freyth:** Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration, Funding acquisition. **Peter K. Jonason:** Conceptualization, Methodology, Data curation, Writing – review & editing, Visualization, Supervision, Funding acquisition.

## Declaration of competing interest

The authors report there are no competing interests to declare.

## Data availability statement

Data is still used for an ongoing longitudinal study and will be made public after publication. Until then, data can be requested from the corresponding author.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2022.112009>.

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