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Abstract

By using actor–partner interdependence modeling (APIM), we examined the effects of the Dark Triad traits, psychopathy, narcissism, and Machiavellianism on two mate retention (MR) domains, cost-inflicting (C-I B) and benefit-provisioning behaviors (B-P B) as well as overall mate retention (OMR) on the sample of 100 heterosexual romantic couples. These effects were examined first without and then with the control of the overlap between the traits. The results show that actor effects of the Dark Triad traits on MR were stronger in men, and regarding partner effects, the Dark Triad traits in men exerted more frequent MR in women than women's Dark Triad traits in men. In line with our prediction, psychopathy had the strongest actor and partner effects on MR behaviors, both in men and women. Considering MR domains, we found actor effects on C-I B only in men, whereas actor effects on B-P B in both men and women. The Dark Triad traits, especially in men, exerted stronger partner effects on C-I B than on B-P B domain. Almost all actor and partner effects of psychopathy and narcissism remained significant after the control for the overlap between the traits, whereas all actor effects of Machiavellianism became nonsignificant. In both sets of analyses, without and with the control for the overlap between these traits, the most frequent plausible dyadic patterns were actor-only and couple pattern.

Keywords

the Dark Triad traits, psychopathy, narcissism, Machiavellianism, mate retention behaviors, actor–partner interdependence modeling, infidelity

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In the last two decades, research has extensively studied a constellation of socially aversive personality traits known as the Dark Triad (Paulhus & Williams, 2002). This cluster includes Machiavellianism and subclinical narcissism and psychopathy. They share a malevolent core (Paulhus & Williams, 2002), and in terms of overarching personality, models are well defined by low agreeableness from the five factor model (e.g., O'Boyle, Forsyth, Banks, Story, & White, 2014) and low Honesty-Humility from the HEXACO model (e.g., Muris, Merckelbach, Otgaar, & Meijer, 2017). Although the Dark Triad traits overlap conceptually and empirically with positive intercorrelations ranging from moderate to high (Muris et al., 2017), there are results that corroborate their distinctiveness (Furnham, Richards, & Paulhus, 2013). Bearing the risk of oversimplification, characteristics such as callousness and impulsive thrill seeking are typical for psychopathy (Jones & Paulhus, 2010), sense of grandiosity and superiority for narcissism (Jones & Paulhus, 2010; Raskin & Terry, 1988), and manipulativeness and cynicism for Machiavellianism (Christie & Geis, 1970).

Despite the inclination of individuals with higher levels of the Dark Triad traits to short-term relationships (Jonason, Li, Webster, & Schmitt, 2009), they still engage in long-term romantic bonds, and those with higher scores on the Dark Triad traits have a tendency to pair with others who also score higher on these traits (Kardum, Hudek-Knezevic, Schmitt, & Covic,

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2017). However, their undesirable behaviors such as lying (Baughman, Jonason, Lyons, & Vernon, 2014), sexual coercion (Figueredo, Gladden, Sisco, Patch, & Jones, 2015), and the use of antisocial tactics (Muris et al., 2017), to name a few, might exert negative effects on their partner's relationship satisfaction (Smith et al., 2014). As a result, individuals high on the Dark Triad traits could create an environment for their mates in which they are motivated to commit infidelity or end the relationship altogether. Accordingly, previous studies have reported that individuals higher on the Dark Triad traits are prone to promiscuity (Jonason et al., 2009) and infidelity (Jones & Weiser, 2014) and that secondary psychopathy in women is a unique positive predictor of perceived susceptibility to partner's infidelity (Brewer, Hunt, James, & Abell, 2015). Therefore, individuals whose partners are higher on the Dark Triad traits might benefit from an increased use of mate retention (MR) behaviors intended to prevent partner's allocation of reproductive resources to rivals. As Buss (1988) stated, "[m]ates typically must be retained to realize the promise of reproductive effort" (p. 312). The original human MR taxonomy (Buss, 1988), comprised of 104 specific acts, was hierarchically organized into 19 tactics (e.g., vigilance, jealousy induction, emotional manipulation, derogation of competitors), five categories (direct guarding, intersexual negative inducements, positive inducements, public signals of possession, and intrasexual negative inducements), two domains (intersexual manipulations, i.e., acts directed toward one's mate and intrasexual manipulations, i.e., acts directed toward same-sex potential competitors), and, finally, overall MR (overall mate retention [OMR]). Later on, Miner, Starratt, and Shackelford (2009) proposed two alternative domains, and rather than intersexual and intrasexual manipulations, they suggested cost-inflicting behaviors (C-I B) and benefit-provisioning behaviors (B-P B). Namely, the authors have recognized that one can reach the goal of retaining a mate by behaviors that lower (C-I B) or increase (B-P B) the partner's satisfaction. According to our knowledge, so far only three studies have investigated the relationship between all three Dark Triad traits and various aspects of MR behaviors included in abovementioned taxonomy. In the first study, the Dark Triad measures positively correlated with almost all MR behaviors especially those characterized by aggression toward others or the partner, appearance enhancements, and resource display, indicating that MR behaviors also reflect the essence of the Dark Triad traits (Jonason, Li, & Buss, 2010). However, the authors did not statistically control for the overlap between the Dark Triad traits, which hinders the possibility to ascribe the observed correlations to any or all specific traits. A replication study overcame this limitation by using a regression analysis (Chegeni, Pirkalani, & Dehshiri, 2018). Although all Dark Triad measures positively correlated with OMR and with both domains except psychopathy, which was unrelated to B-P B domain, regression analyses showed that only Machiavellianism was a significant positive predictor of B-P B, whereas Machiavellianism and narcissism positively predicted C-I B domain (Chegeni et al., 2018). Small effects of psychopathy may be because of its relatively unreliable measure in this research (Cronbach α was .55). However, two studies indicate that psychopathy was the best predictor of negative MR tactics in current relationships, whereas narcissism was weakly positively related to public signals of possession and positive inducements MR tactics (Jones & de Roos, 2017b). Machiavellianism interacted with relationship type, so that individuals high on this trait used negative MR behaviors more frequently when it was beneficial to do so, namely, in short-term rather than long-term relationships (Jones & de Roos, 2017b). Similar results were obtained in the studies exploring the relationships between a specific Dark Triad trait and some aspects of MR. Only psychopathy uniquely predicted intimate partner violence as a severe MR (Kiire, 2017), whereas primary and secondary psychopathy positively predicted jealousy induction (Massar, Winters, Lenz, & Jonason, 2017). Narcissistic rivalry had unique positive relations with the MR motives (Zeigler-Hill et al., 2019), whereas both grandiose and vulnerable narcissists reported enhanced strategic jealousy induction (Tortoriello, Hart, Richardson, & Tullett, 2017). Individuals with high levels of Machiavellianism were more likely to compete with same-sex rivals, directly guard a mate and employ intersexual or intrasexual negative inducements (Brewer & Abell, 2015).

Although in abovementioned studies, the majority of participants were involved in romantic relationships, so far no research regarding the effects of the Dark Triad traits on MR included both members of a romantic couple. Namely, in a dyadic relationship, individuals may be affected by their own personality and by the personality of their partner. For example, research showed that higher psychopathy in men had negative effects on their own and their partners' relationship satisfaction (Smith et al., 2014). Therefore, the inclusion of partner's perspective is important because it offers an interpersonal view on social outcomes, which adds to the perspective of one partner alone (Back & Vazire, 2015). Accordingly, further step in improving our understanding of the interpersonal consequences of the Dark Triad would be exploring their effects within a broader social context including not only the actor's but also the partner's perspective. It is especially relevant regarding evolved psychological mechanisms sensitive to contextual variations. Considering MR behaviors, three contexts have been suggested: relative mate value, couple discrepancy in relative mate value, and perceived probability of infidelity or defection (Buss & Shackelford, 1997). For example, men married to younger and more attractive women and women married to men with higher income use MR behaviors more frequently (Buss & Shackelford, 1997). Perceived sociosexuality of one's own partner, an indicator of sexual infidelity threat, has the same effect (Kardum, Hudek-Knezevic, & Gračanin, 2006). Therefore, personality traits of one's own romantic partner may be relevant at least in the context of a risk for infidelity or relationship dissolution. Research showed that all Dark Triad traits correlated positively with infidelity, although for men the only unique positive predictor was psychopathy, whereas both psychopathy and Machiavellianism positively and narcissism

negatively predicted women's infidelity (Jones & Weiser, 2014). However, in a sample of women, narcissism was the only unique positive predictor of previous incidence of infidelity, whereas narcissism and secondary psychopathy positively predicted intentions to engage in infidelity (Brewer et al., 2015). Opposite-sex rivals seem to recognize the liability to infidelity in individuals higher on the Dark Triad traits, who therefore experience more frequent attempts and success in mate poaching. Specifically, narcissism, psychopathy, and the Dark Triad composite positively correlated with attempts and successful poaching by others for both short- and long-term mates, as well as for a long-term sexual affair, whereas Machiavellianism positively correlated only with being poached for short-term relationship (Jonason et al., 2010). Additionally, psychopathy positively predicted being the target of poaching and being successfully poached in men, whereas all three Dark Triad traits predicted being the target of poaching in women (Kardum, Hudek-Knezevic, Schmitt, & Grundler, 2015). In short, there are reasons to assume that both one's own and partner's characteristics are important for the prediction of MR behaviors. People higher on the Dark Triad traits tend to use MR behaviors more frequently, but they may also provoke their partners to use these behaviors more frequently. Namely, partner's Dark Triad traits might signal to his or her partner an increased need for mate guarding. Accordingly, including both members of a romantic couple is a necessary step to the better understanding of the relationship between these personality traits and MR behaviors.

The aim of this study was to examine actor and partner effects of the Dark Triad traits on C-I B and B-P B domains and OMR. Because couple data are often interdependent, that is, their scores are either more similar or more different than the scores of two unpaired individuals, we used Actor–Partner Interdependence Model (APIM) to statistically control for nonindependence in couple data (Kenny, Kashy, & Cook, 2006). This analytical approach allowed separate but simultaneous testing for actor and partner effects of both couple members' Dark Triad traits on their MR behaviors, as well as detecting different dyadic patterns (Kenny & Ledermann, 2010).

Based on the results of the previous studies, we hypothesized that all Dark Triad traits will exert positive actor effects on MR behaviors. As already mentioned, a great number of MR behaviors are at the core of the Dark Triad traits, reflecting disagreeableness as their common feature (Jonason et al., 2010; Paulhus & Williams, 2002). Using only self-reports, we may also expect positive actor effects because of shared method variance, and therefore, they will be higher than partner effects, which are obtained from different data sources (Orth, 2013). As psychopathy is considered the most malevolent of the Dark Triad traits (Muris et al., 2017), we hypothesized that it would exert the strongest actor effects on both MR domains, especially C-I B, and OMR. Because men tend to score higher on all Dark Triad traits than women and their Dark Triad traits have more deleterious effects on various relationship outcomes (Jonason et al., 2009), we expected that the Dark Triad traits in men would exert stronger actor effects than in women. Additionally, because these personality traits facilitate short-term mating in both men and women (Kardum et al., 2015), it is highly probable that both members of a couple would be interested to prevent possible infidelity of their partners. Therefore, we expected to obtain positive partner effects of men as well as women's Dark Triad traits on MR behaviors. It seems that from all Dark Triad traits, psychopathy has evolved as a male-typical life history strategy, in which mating rather than parental effort is preferentially pursued (Wiebe, 2004). Accordingly, we could expect that especially partners of men high on psychopathy will tend to use more frequent MR behaviors to prevent them from infidelity. This tendency might be stronger for C-I B domain because it better corresponds to the harsh and aggressive nature of persons higher in psychopathy. Although men are inclined to short-term sexual relationships more than women (Buss & Schmitt, 1993), women are also to some extent prone to casual sexual relationships, which lead to the problem of paternal uncertainty in men (Goetz & Shackelford, 2006). Therefore, it is plausible that men will also use more MR behaviors when their partners score higher on the Dark Triad traits and, especially, on psychopathy. Taking into account the abovementioned hypotheses, we could expect that actor-only and couple dyadic patterns will be the most frequent.

Many studies dealing with the effects of the Dark Triad traits have not statistically controlled for the overlap between them. Because of their mutual moderate positive correlations, these three traits usually show similar effects on other variables. However, when the unique effects of the each Dark Triad trait had been taken into account by controlling for the overlap with the other two traits, the differences of their effects on various outcomes became more obvious (see Furnham et al., 2013). For example, without controlling for the other two, each of the Dark Triad traits facilitated an exploitative, short-term mating strategy, especially in men (Jonason et al., 2009). However, when examining the unique paths between the Dark Triad traits and sociosexuality, Machiavellianism negatively correlated with short-term mating behaviors (Jones & de Roos, 2017a). In the present study, we examined the effects of the Dark Triad traits on MR behaviors first without and then with the control of this overlap by defining the other two Dark Triad traits as within-dyad covariates. We expected the most pronounced differences for Machiavellianism, particularly its reduced effects on MR behaviors when controlling for the overlap with the other two Dark Triad traits. Namely, individuals high in Machiavellianism are described as cautious in their nature (Jones & de Roos, 2017b), showing strategic cognitive capabilities (Bereczkei, 2015), and impulse control (Jones & Figueredo, 2013), characteristics that correspond to C-I B in long-term relationships to a lesser degree. Additionally, its unique negative relations with short-term mating behaviors may imply that their long-term partners could use MR behaviors less frequently. On the other hand, in the context of interpersonal relationships, psychopathy is considered as the most toxic Dark Triad trait (Kardum, Hudek-Knezevic, Mehić, & Pilek, 2018), and therefore, its unique effects on MR behaviors will be similar to those without controlling for narcissism and

Table 1. Sociodemographic Characteristics of the Participants.

Sociodemographic Variables	Men	Women
Level of education		
High school	37%	20%
Undergraduate study	8%	13%
Graduate study	55%	67%
Age (years)		
M	24.57	23.20
SD	3.16	2.57
Years of education		
M	14.90	15.74
SD	2.36	1.99
Employed	13%	11%
Relationship length (years)		
M	3.5	
SD	3.76	
Living together	23%	

Note. *M* = mean; *SD* = standard deviation.

Machiavellianism. Furthermore, we also controlled for the other variables such as men and women's age and education and relationship length, which may be important for the links between the Dark Triad traits and MR behaviors.

Method

Participants and Procedure

We recruited a sample of 100 young urban heterosexual romantic couples by using a snowball method (Biernacki & Waldorf, 1981). Research assistants (psychology students) distributed the research announcement to their friends, colleagues, and other students. The inclusion criterion was that they had been in a relationship for at least 6 months. Participants' age ranged from 18 to 31 years and all couples were without children. Men were significantly older ($t = 3.36$, $p < .001$, $d = .47$) and had fewer years of education ($t = 2.43$, $p < .05$, $d = .34$). We presented other sociodemographic characteristics of the participants in Table 1. They first provided verbal informed consent and then completed the questionnaires. Two psychology students examined each member of a couple alone at the same time at the faculty premises or in their homes. To ensure independent responding, partners sat apart from each other.

Measures

The 31-item Self-Report Psychopathy Scale-III (Paulhus, Hemphill, & Hare, 2012; Williams, Paulhus, & Hare, 2007) was used to assess psychopathy. Participants rated how much they agreed (1 = *strongly disagree*, 5 = *strongly agree*) with each statement (e.g., "I almost never feel guilty over something I've done."). Cronbach's α reliability coefficients for psychopathy in men and women were .87 and .82, respectively.

Narcissism was measured with the 40-item Narcissistic Personality Inventory (Raskin & Terry, 1988). For each item, participants chose one of two statements they felt applied to them more (e.g., (A) "I insist upon getting the respect that is due to me" or (B) "I usually get the respect that I deserve."). Cronbach's α reliability coefficients for narcissism in men and women were .88 and .73, respectively.

Machiavellianism was assessed with the 20-item MACH-IV (Christie & Geis, 1970). Participants indicated how much they agreed with each statement (−3 = *strongly disagree*, +3 = *completely agree*; e.g., "The best way to handle people is to tell them what they want to hear."). Cronbach's α reliability coefficients for Machiavellianism in men and women were .79 and .77, respectively. We treated all measures as unidimensional, and for each of them, we computed total score by summing up ratings for all scale items.

We used Mate Retention Inventory (MRI; Buss, 1988) consisting of 104 descriptions of behaviors aiming to retain one's romantic partner. On a scale from 0 (*never*) to 3 (*often*), participants indicated how frequently they performed each act within the past year. Buss (1988) categorized MR acts into 19 tactics, further grouping these tactics into five categories and these categories into two general domains of MR, intersexual and intrasexual manipulations. In the present study, we used the alternative structure of MR domains named as cost-inflicting (direct guarding, intersexual negative inducements and intrasexual negative inducements; e.g., "Threatened to break-up if my partner ever cheated on me") and benefit-provisioning MR (positive inducements and public signals of possession; e.g., "Displayed greater affection for my partner"; Miner, Starratt, & Shackelford, 2009). Along with the two MR domains, we also used overall MR score. Cronbach's α reliability coefficients for men's cost-inflicting MR was .95, for benefit-provisioning .90, and for OMR .96. Cronbach's αs for women's cost-inflicting MR were .92, for benefit-provisioning .89, and for OMR .94.

Statistical Procedure

As a framework for analyzing dyadic data, we used APIM (Kenny et al., 2006), which is useful because it provides separate but simultaneous estimates of actor and partner effects. The relation between individuals' trait and their own outcome is named actor effect, and the relation between individuals' trait and their partners' outcome is named partner effect. Additionally, APIM controls for correlations between the independent variables and correlations between residual variables (Cook & Kenny, 2005). Thus, actor effects are estimated controlling for partner effects, and partner effects are estimated controlling for actor effects. Therefore, actor effects for women estimate whether their Dark Triad traits predict their own MR behaviors, whereas men's actor effects estimate whether their Dark Triad traits predict their own MR behaviors. Women's partner effects estimate whether their Dark Triad traits predict their partner's MR behaviors, whereas men's partner effects estimate whether their Dark Triad traits predict their partner's MR behaviors.

Table 2. Descriptive Statistics for All Measures Used and Correlations Between All Variables.

	Women						Men					
Variable	1	2	3	4	5	6	7	8	9	10	11	12
Women												
1. P												
2. N	.42***											
3. M	.42***	.20*										
4. C-I B	.23*	−.06	.29**									
5. B-P B	.30**	.10	.23*	.57***								
6. OMR	.31**	.03	.29**	.85***	.91***							
Men												
7. P	.26**	.12	.25*	.38***	.26**	.36***						
8. N	.19	.21*	.01	.18	.19	.22*	.48***					
9. M	.14	.00	.40***	.31**	.08	.21*	.48***	.36***				
10. C-I B	.32***	.01	.10	.38***	.33***	.40***	.42***	.18	.29**			
11. B-P B	.22*	.07	.19	.26**	.54***	.47***	.21*	.28**	.23*	.57***		
12. OMR	.31**	.05	.16	.35***	.48***	.48***	.37***	.27**	.29**	.89***	.87***	
M	66.07	12.57	62.81	0.36	1.30	0.77	75.53	14.91	67.16	0.40	1.34	0.80
SD	10.96	5.10	12.36	0.25	0.37	0.28	14.28	7.76	12.58	0.33	0.40	0.33

Note. P = psychopathy; N = narcissism; M = Machiavellianism; C-I B = cost-inflicting behaviors; B-P B = benefit-provisioning behaviors; OMR = overall mate retention; *M* = mean; *SD* = standard deviation.
*$p < .05$. **$p < .01$. ***$p < .001$.

As recommended by Kenny and Ledermann (2010), to determine the most likely dyadic patterns that describe dyadic relationships, we also computed the parameter k, which equals the partner effect divided by the actor effect. We interpreted those k parameters with absolute standardized values of the actor effects greater than .10. We performed these analyses by free web application APIM_SEM (Stas, Kenny, Mayer, & Loeys, 2018), an online software that automatically performs APIMs by using lavaan (Rosseel, 2012), an R-package for Structural Equation Modeling. On the sample size used in the present study, given that a correlation between partners is $r = .20$, and a correlation between errors is $r = .40$, the power of detecting actor effects of .30 is .89, and the power of detecting partner effects of .25 is .75 (Ackerman & Kenny, 2016). Because the Dark Triad traits were mutually significantly correlated, we also examined their unique actor and partner effects on MR in men and women. To disentangle the unique effects of each trait, we controlled for the other four measures (two men's and two women's Dark Triad traits) by including them as two within-dyad covariates.

Results

Firstly, we computed descriptive statistics for all measures used and correlations between all variables within the samples of men and women as well as between them (Table 2). As expected, men scored higher on psychopathy ($t = 5.26$, $p < .001$, $d = .74$), narcissism ($t = 2.52$, $p < .05$, $d = .36$), and Machiavellianism ($t = 2.47$, $p < .05$, $d = .35$). No gender differences were found for C-I B ($t = 0.80$, $p > .05$, $d = .14$), B-P B ($t = 0.72$, $p > .05$, $d = .10$), and OMR ($t = 1.01$, $p > .05$, $d = .09$). Previous study on Croatian sample with similar characteristics also found no significant sex difference in the overall frequency of MR behaviors (Kardum et al., 2006).

We found modest to moderate correlations between the Dark Triad traits within the samples of men and women, as well as assortative correlations between men and women. MR domains correlated relatively high within the samples of men and women, and the assortative correlations between the same MR domains were moderate. Psychopathy and Machiavellianism moderately positively correlated with all MR measures in both men and women, whereas narcissism positively correlated with B-P B and OMR only in men. Regarding women's Dark Triad traits, only psychopathy positively correlated with all measures of men's MR. Regarding men's Dark Triad traits, psychopathy also positively correlated with all measures of women's MR, whereas narcissism positively correlated to OMR and Machiavellianism to C-I B and OMR.

Next, we examined whether men and women's Dark Triad traits predicted both MR domains and OMR in men and women (Table 3). Psychopathy and Machiavellianism in men exerted significant positive actor effects on C-I B, whereas none of the Dark Triad traits in women exerted significant actor effects on this MR domain (Table 3). After controlling for the other two Dark Triad traits (Table 4), the actor effect of psychopathy in men remained significant, whereas the actor effect of Machiavellianism became nonsignificant. All Dark Triad traits in men and only psychopathy in women exerted significant positive partner effects on C-I B, regardless of whether or not we controlled for the other Dark Triad traits. Therefore, women whose partners had higher scores on each of the Dark Triad traits as well as men whose partners had higher scores on psychopathy used C-I B more frequently. Psychopathy in men and women

Table 3. APIMs for DT Traits Predicting MR Domains and OMR Without the Control for Other Two DT Traits.

Pred.	Crit.	r_p	r_{ce}	Dist. Test (χ^2)[a]	Actor Effect (β) W → W M → M	Partner Effect (β) M → W W → M	R^2	k	95% CI LL	95% CI UL	Dyadic Pattern
P	C-I B	.26*	.24*	49.27***	.15	.34***	.16	1.78	−0.90	4.45	Actor-only and couple
					.37***	.22*	.23	0.78	−0.03	1.60	Actor-only and couple
N		.20*	.36***	38.90***	−.10	.20*	.04	−1.38	−4.21	1.45	CBD
					.19	−.03	.03	−0.25	−1.82	1.32	CBD
M		.40***	.33**	22.45***	.19	.24*	.13	1.20	−0.71	3.12	Actor-only and couple
					.30**	−.02	.09	−0.07	−0.74	0.61	Actor-only
P	B-P B	.26*	.49***	41.69***	.25*	.20*	.12	0.61	−0.20	1.46	Actor-only and couple
					.16	.18	.07	1.41	−1.20	3.98	CBD
N		.20*	.51***	27.43***	.06	.18	.04	1.86	−4.75	8.48	CBD
					.28**	.02	.08	0.09	−0.97	1.15	Actor-only and couple
M		.36***	.52***	11.73	.22**	.05	.06	0.22	−0.43	0.75	Actor-only
P	OMR	.26*	.36***	45.92***	.23*	.30**	.18	0.99	−0.10	2.11	Actor-only and couple
					.31***	.23*	.19	0.98	−0.10	2.06	Actor-only and couple
N		.20*	.45***	34.84***	−.02	.22*	.05	−7.37	−80.08	65.34	CBD
					.27**	−.03	.07	−0.01	−1.11	1.08	CBD
M		.40***	.45***	16.73*	.24*	.11	.10	0.46	−0.57	1.49	Actor-only and couple
					.27**	.05	.09	0.18	−0.65	1.00	Actor-only and couple

Note. Pred. = predictor; Crit. = criterion; P = psychopathy; N = narcissism; M = Machiavellianism; C-I B = cost-inflicting behaviors domain; B-P B = Benefit-provisioning behaviors domain; OMR = overall mate retention; r_p = correlation between women's and men's predictor variables; r_{ce} = correlation between errors of women's and men's criterion variables; Dist. test = distinguishability test; χ^2 = chi square test; W = women; M = men; β = standardized beta coefficient; R^2 = coefficient of determination; k = ratio of the partner effect to the actor effect; 95%CI = confidence interval for k calculated by Monte Carlo sampling; LL = lower limit of 95% CI; UL = upper limit of 95% CI; CBD = cannot be determined.
[a]Degrees of freedom for all tests are 6.
*p < .05. **p < .01. ***p < .001.

Table 4. APIMS for DT Traits Predicting MR Domains and OMR With the Control for Other Two DT Traits.

Pred.	Crit.	r_p	r_{ce}	Dist. Test (χ^2)[a]	Actor Effect (β) W → W M → M	Partner Effect (β) M → W W → M	R^2	k	95% CI LL	95% CI UL	Dyadic Pattern
P	C-I B	.26*	.24*	167.27***	.13	.31***	.22	1.83	−1.46	5.12	CBD
					.35**	.23*	.24	0.83	−0.06	1.72	Actor-only and Couple
N		.20*	.25*	153.56***	−.19	.20*	.15	−0.69	−1.58	0.20	Actor-only and Contrast
					−.01	−.03	.16	4.94	−115.00	124.88	CBD
M		.40***	.23*	141.90***	.17	.23*	.15	1.34	−1.07	3.75	CBD
					.18	−.05	.17	−0.30	−1.36	0.76	Actor-only and Contrast
P	B-P B	.26*	.50***	157.43***	.23*	.19	.13	0.63	−0.32	1.58	Actor-only and Couple
					.01	.16	.12	24.45	−606.29	655.20	CBD
N		.20*	.50***	135.32***	−.02	.17	.09	−5.12	−53.65	43.41	CBD
					.24*	.03	.11	0.20	−1.08	1.48	CBD
M		.40***	.50***	123.08***	.17	−.01	.08	−0.06	−1.23	1.11	CBD
					.13	.16	.09	1.22	−1.88	4.32	CBD
P	OMR	.26*	.37***	159.56***	.20	.27**	.21	1.03	−0.32	2.39	Actor-only and Couple
					.22*	.23*	.21	1.34	−0.48	3.17	Actor-only and Couple
N		.20*	.38***	146.20***	−.12	.22*	.14	−1.16	−3.20	0.87	Actor-only and Contrast
					.14	.01	.13	0.06	−2.08	2.20	CBD
M		.40***	.38***	134.04***	.20	.11	.12	0.57	−0.82	1.96	Actor-only and Couple
					.18	.05	.12	0.30	−1.08	1.67	CBD

Note. Pred. = predictor; Crit. = criterion; P = psychopathy; N = narcissism; M = Machiavellianism; C-I B = cost-inflicting behaviors domain; B-P B = benefit-provisioning behaviors domain; OMR = overall mate retention; r_p = correlation between women's and men's predictor variables; r_{ce} = correlation between errors of women's and men's criterion variables; Dist. test = distinguishability test; χ^2 = chi square test; W = women; M = men; β = standardized beta coefficient; R^2 = coefficient of determination; k = ratio of the partner effect to the actor effect; 95%CI = confidence interval for k calculated by Monte Carlo sampling; LL = lower limit of 95%CI; UL = upper limit of 95%CI; CBD = cannot be determined.
[a]Degrees of freedom for all tests are 23.
*p < .05. **p < .01. ***p < .001.

and Machiavellianism in men exerted similar effects on one's own as well as on one's own partners' C-I B (Table 3).

The most frequent dyadic patterns obtained for all Dark Triad traits on C-I B were the actor-only and the couple pattern. Namely, the majority of 95% confidence intervals (CIs) fell between actor-only and couple pattern (i.e., a CI value of *k* including 0 suggests actor-only and a CI value of *k* including 1 suggests a couple pattern), which did not indicate a clear dyadic pattern. The most plausible dyadic pattern for the effects of Machiavellianism on C-I B in men was actor-only, whereas for the effects of narcissism on C-I B in men and women dyadic patterns could not have been determined (Table 3). Regarding the unique effects of the Dark Triad traits (Table 4), the actor-only and the couple pattern remained the most plausible dyadic patterns for the effects of psychopathy on C-I B in men. Along with the actor-only, the most plausible dyadic pattern for the effects of narcissism on C-I B in women and Machiavellianism on C-I B in men was the contrast pattern that appears if actor and partner effects are equal in size but have opposite signs.

Psychopathy in women and narcissism in men had significant positive actor effects on B-P B (Table 3), and these effects remained significant after controlling for the other two DT traits (Table 4). Only psychopathy in men exerted significant positive partner effect on B-P B (Table 3), which remained marginally significant after controlling for the other two Dark Triad traits (Table 4). Therefore, women whose partners had higher scores on psychopathy used B-P B more frequently. Because the test of distinguishability for Machiavellianism was not significant, we performed additional analysis treating dyad members as indistinguishable. Without the control for the other two DT traits, we obtained significant positive actor effect (Table 3), although Machiavellianism did not exert any unique actor effects on B-P B (Table 4). Psychopathy in women and narcissism in men exerted similar effects on one's own and on one's own partner's B-P B (Table 3).

The most frequent dyadic patterns obtained for all Dark Triad traits on B-P B were also the actor-only and the couple. The effects of Machiavellianism on B-P B showed the actor-only dyadic pattern, whereas regarding the effects of psychopathy on B-P B in men, and narcissism on B-P B in women, plausible dyadic patterns could not have been determined (Table 3). Regarding the unique effects of the Dark Triad traits (Table 4), only actor-only and couple patterns for the effects of psychopathy on B-P B in women remained plausible, whereas the effects of other two traits could not have been determined.

All Dark Triad traits in men and women except narcissism in women had significant positive actor effects on OMR (Table 3), but only psychopathy in men showed the unique contribution (Table 4). Psychopathy in women and psychopathy and narcissism in men exerted significant positive partner effects on OMR without the control of the other two Dark Triad traits (Table 3), and the same traits also showed significant unique contributions (Table 4). Therefore, women whose partners had higher scores on psychopathy and narcissism as well as men whose partners had higher scores on psychopathy used OMR more frequently.

The most frequent dyadic patterns obtained for all Dark Triad traits on OMR were also the actor-only and the couple, whereas for the effects of narcissism on OMR in both men and women plausible dyadic patterns could not have been determined (Table 3). Considering unique effects of the Dark Triad traits (Table 4), the actor-only and the couple dyadic patterns mainly remained the most plausible. Regarding the effects of narcissism on OMR in women, actor-only and contrast dyadic patterns were the most plausible, whereas regarding the effects of narcissism and Machiavellianism on OMR in men plausible dyadic patterns could not have been determined.[1]

Discussion

The aim of this study was to explore the effects of the Dark Triad traits on C-I B and B-P B domains as well as overall MR behaviors by using APIM. We hypothesized that all Dark Triad traits, and especially psychopathy, would exert positive actor effects on MR, particularly on C-I B, and that these effects would be stronger in men. Our results partly confirm these hypotheses showing that only psychopathy in men consistently, with and without controlling for the other two Dark Triad traits, exerted significant positive actor effects on C-I B, whereas Machiavellianism in men exerted significant positive actor effect only without controlling for the other two Dark Triad traits. Regarding actor effects of the Dark Triad traits on B-P B domain, our study shows that psychopathy in women and narcissism in men consistently exerted positive actor effects on this MR domain.

We can compare our results to the previous studies only regarding actor effects of the Dark Triad traits on MR because, to the best of our knowledge, no study has ever explored partner effects. The results of our study are similar to those obtained by Jones and de Roos (2017b), who also found that psychopathy was the strongest positive predictor of C-I B, whereas narcissism weakly positively predicted B-P B domain. Their finding that Machiavellianism had no relation with C-I B when they controlled for psychopathy is similar to our results obtained for men. In the study of Jonason, Li, and Buss (2010), C-I B tactics more strongly correlated with psychopathy, whereas B-P B tactics positively correlated with all Dark Triad traits. On the other hand, the results of our study differ from those obtained by Chegeni, Pirkalani, and Dehshiri (2018) which showed that Machiavellianism was the best predictor of both MR domains. However, Chegeni et al.'s study differs from ours regarding research design, statistical analyses, and assessment of the Dark Triad, and therefore, they are hardly comparable. For example, they used Dirty Dozen (Jonason & Webster, 2010), which has been considered too brief to capture critical construct variance (Maples, Lamkin, & Miller, 2014). Consequently, studies suggest that it is better conceptualized as a combined Machiavellianism-psychopathy factor than three-factor scale (e.g., Kajonius, Persson, Rosenberg, & Garcia, 2016).

Because people higher on the Dark Triad traits are frequent targets of mate poaching (Kardum et al., 2015) and exhibit

more promiscuity (Jonason et al., 2009) as well as infidelity in romantic relationships (Jones & Weiser, 2014), we hypothesized that all Dark Triad traits would exert significant positive partner effects on MR behaviors. These effects would be the strongest for psychopathy, and particularly on C-I B. We partly confirmed these hypotheses. Namely, psychopathy in men and women as well as narcissism and Machiavellianism in men consistently exerted significant positive partner effects on C-I B. Considering B-P B, only psychopathy in men exerted significant positive partner effect. These results are congruent with the findings that men are more promiscuous and prone to infidelity than women and that all Dark Triad traits, and especially psychopathy, strengthen these tendencies (Visser, Pozzebon, Bogaert, & Ashton, 2010). Consequently, women whose partners scored higher on the Dark Triad traits, particularly on psychopathy, used MR and especially C-I B more frequently. On the other hand, men used more C-I B only when their partners were higher on psychopathy. This is in accord with the results that psychopathy in women is one of the most important predictors of their infidelity tendencies (Kardum et al., 2015). Similarly, partner effects of narcissism in men are in accord with the research showing positive relationships between higher narcissism and short-term mating (Schmitt et al., 2017). On the other hand, we may explain smaller number of partner effects of Machiavellianism by successful partner manipulation accomplished by hiding the strivings toward other potential sexual partners, thus leading to less frequent partner's MR behaviors, and at the same time, allowing individuals higher in Machiavellianism to be unfaithful.

To summarize, our results show that actor effects of the Dark Triad traits on MR were more pronounced in men than in women, and at the same time, the Dark Triad traits in men exerted more frequent MR in women than women's Dark Triad traits in men. As predicted, psychopathy had the strongest actor and partner effects on MR behaviors, both in men and women. Regarding MR domains, actor effects on C-I B were found only in men, whereas actor effects on B-P B were found in both men and women. The Dark Triad traits, especially in men, exerted stronger partner effects on C-I B than on B-P B domain, which may suggest that women have a tendency to reciprocate men's antisocial, promiscuous, and manipulative behaviors by using C-I B to retain them in a relationship. Additionally, all Dark Triad traits are characterized by low empathy (Wai & Tiliopoulos, 2012), which may also facilitate the engagement in more negative MR behaviors such as C-I B. As expected, almost all actor and partner effects of psychopathy and narcissism remained significant after controlling for the other two Dark Triad traits, whereas all unique actor effects of Machiavellianism became nonsignificant. These results are in accord with the evidence that core Machiavellianism is to a lesser degree a part of fast life history strategy than psychopathy and narcissism (Jones & de Roos, 2017a). It seems that the higher degree of behavioral flexibility differentiates Machiavellianism from other fast life history traits (Bereczkei, 2015), evidenced, for example, by the findings that individuals high in Machiavellianism use negative MR behaviors more frequently in those situations in which these behaviors were more beneficial to them (Jones & de Roos, 2017b). Therefore, in some conditions, they seek benefit from short-term strategies, whereas in other they tend to inhibit momentary motivations and seek long-term benefits (Bereczkei, 2018). Having in mind relatively high correlations with psychopathy, especially primary psychopathy (Ali & Chamorro-Premuzic, 2010), it is possible that reproductive success of Machiavellianism comes through its psychopathic links. It should be noted that despite the differences obtained without and with the control of the other two Dark Triad traits, they were not large and were found only for Machiavellianism.

Additionally, to summarize and simplify the relationship between actor and partner effects, we computed a quantitative index k that allows the conclusion about the most plausible dyadic pattern (Kenny & Ledermann, 2010). Our study shows that without the control for the other two Dark Triad traits, the most frequent plausible dyadic patterns were actor-only ($k = 0$) and couple ($k = 1$) pattern (Table 3). The exceptions are actor-only dyadic patterns obtained for Machiavellianism on C-I B in men and Machiavellianism on B-P B when dyad members were indistinguishable (Table 3), showing that Machiavellianism of one partner has an effect on his or her own MR but not on his or her partner's MR behaviors. These results are in accord with those showing negative correlations between Machiavellianism and short-term mating behaviors in both men and women (Jones & de Roos, 2017a), implying that their partners are to a lesser degree prompted to use MR behaviors.

After the control for the other two Dark Triad traits, actor-only and couple models remained the most frequent plausible dyadic patterns. However, along with the actor-only, three contrast dyadic patterns ($k = -1$) were obtained, narcissism on C-I B and OMR in women as well as Machiavellianism on C-I B in men. Higher narcissism in women decreased their use of C-I B and OMR behaviors, and at the same time, their partner's narcissism increased women's use of these behaviors. The contrast models were obtained because of the stronger negative women's actor effects when controlling for the other two Dark Triad traits, whereas partner effects remained the same with and without the control for the other two Dark Triad traits (Table 4). When we controlled for the effects of the other two Dark Triad traits, narcissism in women becomes less compatible with the essence of MR behaviors, especially C-I B. On the other hand, higher narcissism in men remains a potential facilitator of their infidelity thus prompting women partners to use more MR behaviors. These results are similar to the findings showing that higher partners' narcissism correlated with both increased aggression and also with the greater cooperation (Keller et al., 2014). The contrast model that describes the effects of Machiavellianism on C-I B in men suggests that higher Machiavellianism in men increases their use of C-I B, whereas higher Machiavellianism in women decreases it. Although the effect of women's Machiavellianism on C-I B in men was relatively small, it may be the consequence of the negative relationships between Machiavellianism and short-term mating behaviors in both sexes (Jones & de Roos,

2017a). Alternatively, this result may reflect the successful manipulation of women higher in Machiavellianism, which may lead to the less frequent MR behaviors in their partners.

One advantage of this study is in analyzing the partner effects of the Dark Triad traits on MR behaviors, which was not, as far as we know, addressed in previous studies. Namely, "the presence of partner effects implies that something relational has occurred in that a person's response depends on some property of the partner" (Kenny & Cook, 1999, p. 435). Majority of studies about the Dark Triad and relationship outcomes include only intrapersonal perspective, that is, the perspective of those participants whose Dark Triad traits are measured. Thus, we have a large amount of knowledge about how individuals higher on the Dark Triad traits experience their relationship outcomes, but our knowledge of how they influence their partners' experience is very limited. Our results unambiguously show that partner's Dark Triad traits affect MR behaviors of the other partner. These findings are even more important if we bear in mind that partner effects obtained are not the artifact of the common method variance. Another advantage of this study is in controlling for the overlap between the Dark Triad traits that allows better understanding of potential specific mechanisms through which these traits affect important outcomes.

However, our study has a few limitations. Firstly, its cross-sectional design did not allow causal interpretations, and the use of only self-report opens the possibility that actor effects were biased by common method variance. Additionally, the power of detecting partner effects was somewhat lower than recommended. Furthermore, the results may be specific regarding sociodemographic characteristics of participants and their relationships. Namely, the participants had homogeneous social characteristics and came from the same geographical area, which limits the generalizability of our findings. Moreover, the relatively young age, small age range, and relationship length of the participants may restrict the variability of their MR behaviors due to the lack of experience in a relationship and make the identification of potential moderator effects of age and relationship length on MR behaviors difficult. Nevertheless, the results obtained could provide a guide to future research. They should include several measurement points to examine how specific constellations of actor and partner effects of the Dark Triad traits on MR influence some delayed relationship outcomes such as relationship satisfaction, decline of a romantic relationship, success in parenting, and so on. Additionally, research should include partner's reports to avoid problems related to common method variance in actor effects as well as some important moderator variables such as socioeconomic status, physical attractiveness, and age differences between partners. Furthermore, future studies should measure the Dark Triad traits as multifactorial constructs because it is possible that their various components have different actor and partner effects on MR behaviors. For example, individuals higher in grandiose narcissism may manifest more MR behaviors, and at the same time, their partners may also show more MR behaviors compared to individuals higher in vulnerable narcissism. Future research should also try to find different cues (e.g., verbal and nonverbal behaviors) related to psychopathy, narcissism, and Machiavellianism that prompt their partners to use more MR behaviors as well as potential gender differences in utilization of these cues.

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Note

1. Controlling for sociodemographic (men and women's age and education) and couple characteristic (relationship length) included as within- and between-dyad covariates, we obtained similar results to those presented in Table 3 (analyses available upon request).

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