

# Better the Devil you know than the Devil you don't: Dark traits and appearance-based inferences

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Every day, people make quick, spontaneous and automatic appearance-based inferences of others. This is particularly true for social attributes, such as intelligence or attractiveness, but also aggression and criminality. There are also indications that certain personality traits, such as the dark traits (i.e. Machiavellianism, narcissism, psychopathy, sadism), influence the degree of accuracy of appearance-based inferences, even though not all authors agree to this. Therefore, this study aims to investigate whether there are interpersonal advantages related to the dark traits when assessing someone's criminality. For that purpose, an on-line study was conducted on a convenience sample of 676 adult females, whose task was to assess whether a certain person was a criminal or not based on their photograph. The results have shown that narcissism and Machiavellianism were associated with a greater tendency of indicating that someone is a criminal, reflecting an underlying negative bias that the individuals high on these traits hold about people in general.

**Key words:** the Dark Tetrad, appearance-based inferences, criminality, negative bias

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## Introduction

### *Appearance-based implicit judgements*

People often form impressions about others rapidly, without conscious awareness and based only on their physical appearance (Todorov, Said, Engell, & Oosterhof, 2008; Willis & Todorov, 2006; Zebrowitz, Voinescu, & Collins, 1996). Appearance-based implicit judgements have an adaptive function since they could serve as social signals as to whether a person should be approached or avoided, and how capable a person is of causing us physical harm (Oosterhof & Todorov, 2008). These judgements are especially triggered by exposure to others' facial features (Todorov, 2012), since faces transmit information about important social categories including age, gender, and ethnicity (Mason, Cloutier, & Macrae, 2006), they signal evolutionarily salient information (e.g., attractiveness, trustworthiness), as well as emotions and intentions (DeBruine, 2002; Perrett et al., 1998).

Social attributions are constructed from multiple sources of information present in human faces: universal/global (e.g., masculinity/femininity, baby-face appearance), culturally specific (e.g., face typicality), and idiosyncratic facial information (e.g., resemblance to significant others), but also facial emotional expressions (e.g., angry), and the resemblance of the observed faces to specific emotional expressions (e.g. Todorov, Olivola, Dotsch, & Mende-Siedlecki, 2015).

Appearance-based implicit judgements have a strong impact on people's behaviour in social interactions (Todorov, Mandisodza, Goren, & Hall, 2005), although the validity of such inferences has been repeatedly questioned (e.g., Bengstrom & West, 2017; Kilianski, 2008; Olivola & Todorov 2010; Porter & ten Brinke, 2009; Wu & Zhang, 2016; Zebrowitz et al., 1996).

### *Judging criminality from faces*

The most studied domains within the literature on the consequences of social attributions from faces include judgements of trust, guilt and criminality (Todorov & Porter, 2014). The term criminality here is used to indicate the extent to which a person's appearance triggers stereotypes about criminals. The assessment of threat and danger posed by others is crucial to preserving human well-being (Todorov et al., 2008; Zebrowitz et al., 1996). Despite this, there are also potentially serious negative consequences of the judgements of persons' criminality, such as bias selection from police line-ups (Flowe & Humphries, 2011) and a higher likelihood of receiving guilty verdicts (Dumas & Test'e, 2006; Porter, ten Brinke, & Gustaw, 2010).

Like other trait judgements (e.g. trustworthiness and aggressiveness, Willis & Todorov, 2006), judgements regarding criminality are made after

a very short exposure to a face (Klatt et al., 2016). People show consensus about what kinds of faces are perceived as criminal ones (e.g. Bull, 1982; Flowe, 2012; MacLin & Herrera, 2006), as well as about the perception of the criminality trait (Funk, Walker, & Todorov, 2017). There is evidence that violent criminals could be differentiated from the non-violent criminals based on the photos of their faces (Stillman, Maner, & Baumeister, 2010), and there is a body of research investigating the characteristics of faces related to the judgement of criminality (e.g. Funk et al., 2017; Kleider, Cavrak, & Knuycky, 2012; MacLin & Herrera, 2006; Zebrowitz & McDonald, 1991). Across a wide range of behaviours (criminal acts, deception, selfishness, aggression), people who have deviant behaviour are assumed untrustworthy. For example, the faces of the America's Most Wanted criminals were rated as less trustworthy than the respectable society members, such as the Nobel peace prize winners (Porter, England, Juodis, ten Brinke, & Wilson, 2008). Based on the Oosterof and Todorov (2008) 2D model, which assumed that spontaneous trait inferences made on the basis of facial appearance arise from only two fundamental dimensions, valence and dominance, it was hypothesized that the faces perceived as criminal-looking would appear more threatening and dominant, and less trustworthy. Namely, Flowe (2012) hypothesized that criminality and threat were overlapping constructs, and that criminality can be subsumed under the general construct of the threat. She confirmed that the faces rated high in criminal appearance were perceived as less trustworthy and more dominant regardless of the type of photo used (police mugshots vs. the emotionally neutral photos) and persons' gender (female vs. male). However, other studies showed that criminals were not rated significantly differently from non-criminals in how trustworthy they appeared from their faces (among soldiers, executives, cheaters) (e.g. Rule, Krendl, Ivecic, & Ambady, 2013). Thus, the evidence of whether (un)trustworthiness is reflected in the (non)criminals' facial appearance is mixed.

The existing research usually assessed only the criminality of males and a smaller number of studies was devoted to investigating the extent to which the criminality appearance-based judgements were accurate (Johnson, Anderson, Westra, & Suter, 2018; Valla, Ceci, & Williams, 2011). The general conclusion of those research studies was that the accuracy of detecting non-criminals was higher than that of detecting criminals, but that both the accuracy of detecting non-criminals and criminals was greater than chance (e.g. Johnson, Anderson, Westra, & Suter, 2018; Porter et al., 2008).

### *Personality traits and appearance-based implicit judgements*

Previous research focused more on the target's characteristics (i.e. non-ambiguous facial cues; Todorov & Porter, 2014) than the perceiver's characteristics that may influence the accuracy of the appearance-based judgements (e.g., Ambady, Hallahan, & Rosenthal, 1995). However, it was

found that personality traits (e.g. neuroticism, extraversion, negative affect, anxiety, and aggression) shape affective information processing and the evaluation of emotionally neutral or ambiguous stimuli. For example, the individuals low on agreeableness, high on the aggressiveness trait and high on anxiousness tend to perceive unfamiliar faces as less trustworthy and neutral facial expressions as less friendly (Knyazev, Bocharov, Slobodskaya, & Ryabichenko, 2008; Mattarozzi, Todorov, Marzocchi, Vicari, & Russo, 2015).

Both lower agreeableness and higher aggressiveness are strongly linked to the so-called “dark” personality traits (e.g. Book et al., 2016; Paulhus, Curtis, & Jones, 2018; Jones & Paulhus, 2010). The term “dark personalities” refers to a set of socially aversive traits in the subclinical range, and the most prominent dark traits are narcissism, Machiavellianism, psychopathy, and, in the recent literature, everyday sadism, forming the Dark Tetrad (Paulhus, 2014). Although all four personality traits share a common core of callousness and disagreeableness and are linked to interpersonal manipulation and exploitativeness, criminality and different forms of misconduct (e.g. Azizli et al., 2016; Chabrol, Van Leeuwen, Rodgers, & Séjourné, 2009; Kavanagh, Signal, & Taylor, 2013), each has its specific characteristics. Narcissism is characterized by grandiosity and the need for admiration, Machiavellianism is characterized by the cynical world view and a tendency towards manipulation, psychopathy by callousness and impulsivity, and sadism is characterized by the tendency towards hurting people for pure enjoyment. Due to strong links of these traits to low agreeableness and high aggressiveness, it could be expected that “dark” personalities more often interpret ambiguous stimuli as hostile and are characterized by scepticism about other people’s motives, resulting in suspicion and unfriendliness.

Previous research demonstrated that people can accurately (i.e., at the levels greater than chance) judge dark personality traits from facial characteristics (Gordon & Platek, 2009; Holtzman, 2011; Shiramizu, Kozma, DeBruine, & Jones, 2019), and it is intriguing to explore whether the individuals higher on dark traits can more easily detect the dark traits in other persons’ faces. Specifically, the individuals high on dark traits usually have a negative view of others (e.g. Rogers, Le, Buckels, Kim, & Biesanz, 2018) and project their own unfavourable traits onto others (Black, Woodworth, & Porter, 2014; Mahaffey & Marcus, 2006; Rauthmann, 2012). Possible explanations for this negative view of others include their enhanced sensitivity to anger/hostility or the fact that they hold a negative other bias, i.e. a tendency towards evaluating people negatively in general (Back, Schmukle, & Egloff, 2011).

While there are some findings that the individuals high on dark traits are more accurate in assessing the characteristics of others (e.g. Book, Quinsey, & Langford, 2007; Lyons, Croft, Fairhurst, Varley, & Wilson, 2017; Wheeler, Book, & Costello, 2009), some studies indicate that this is not the case (e.g. Black et al., 2014; Jusyte & Schönenberg, 2017; Wai & Tiliopoulos, 2012). Generally,

it seems that extraverted, agreeable, and socially skilled individuals are more accurate in their ratings, while cold, defensive, and insensitive individuals are less accurate (e.g., Davis & Kraus, 1997; Funder, 1999; Letzring, 2008; Vogt & Colvin, 2003). Thus, the individuals with “bright”, socially desirable traits (linked to socio-emotional skills: e.g., empathy, sensitivity to cues of others) should be better in judging others and providing more differentiated judgements, while “dark”, socially undesirable traits, such as narcissism, Machiavellianism, or psychopathy could be linked to poorer judgements and simpler judgements (see Rauthmann, 2013; Vogt & Colvin, 2003). However, it is still not clear whether this hypothesis holds equally for all dark traits and regardless of the attributes/behaviours being judged. By now, the “dark” personalities’ ability to evaluate others was assessed only in regard to a limited number of traits and characteristics, such as vulnerability, assertiveness, intelligence, the Big-five traits (Black et al., 2014; Book et al., 2007; Rauthmann, 2012; Rauthman, 2013). Consequently, this study aims to address the existing knowledge gap and contribute to the generalizability of the findings related to the “dark” personalities’ ability of evaluating others by investigating the accuracy of “dark” personalities in assessing others’ criminality.

### *Gender and appearance-based implicit judgements*

Previous research demonstrated that there were gender differences in making judgements based on facial appearance, and that these differences were affected by the gender of the person presented on a photograph, as well as the personality of the observer. For example, Mattarozzi, et al. (2015) found that women tended to judge trustworthy-looking faces as significantly more trustworthy than men, but there were no gender differences in the judgements of untrustworthy-looking or neutral faces. Unlike men, women’s trustworthiness judgements were affected by the gender of the person in the photograph and associated with the observer’s personality traits (i.e. aggression). Women judged faces of other women as slightly more trustworthy compared to male faces, and emotionally-neutral or ambiguous stimuli were perceived as less friendly by more aggressive women. Previous research has also shown that women were more successful than men in detecting the dark triad traits from the emotionally-neutral faces (Holtzman, 2011), and that women can generally distinguish between high and low dark trait prototype male faces (see Lyons, & Blanchard, 2016; Lyons, Marcinkowska, Helle, & McGrath, 2015; Lyons, & Simeonov, 2016). Thus, there is substantial evidence indicating a female advantage in processing the face-specific information (e.g. Hampson, van Anders, & Mullin, 2006; McBain, Norton, & Chen, 2009; Thayer and Johnsen, 2000), as well as the support for gender differences in most aspects of personality, including the dark traits (e.g. Costa, Terracciano, & McCrae, 2001; Jonason, Li, Webster, & Schmitt, 2009). Previous research demonstrated that there were notable gender differences in the “dark” traits,

and that at least some gender differences in the accuracy of appearance-based implicit judgements could be expected, especially when raters are judging certain characteristics in females (e.g. trustworthiness). Consequently, it was decided to choose female raters to judge other females' criminality and relate their judgement accuracy to their dark traits.

### *The current study*

To the best of our knowledge, this is the first study that investigates the relations of all four dark personality traits with the accuracy of appearance-based judgements, rather than investigating them isolated from each other. In the absence of the conclusive support that appearance-based judgements may generalize across gender, and the lack of research on correlations between personality traits and accuracy in criminality judgement, this study aims to investigate if the perceptual sensitivity/response bias is linked to the appearance-based criminality judgements in females, and how it is related to the dark traits.

Since women are generally more accurate in processing the face-specific information (e.g. McBain et al., 2009), relatively high accuracy in appearance-based judgements can be expected in this research. However, judgement accuracy also depends on the gender of the target. Generally, women are rated to be more trustworthy than men (Wolffhechel et al., 2014), and women judge faces of other women as slightly more trustworthy compared to male faces (Mattrozzi et al., 2015). Thus, it could be expected that the "innocence" bias will be more present in this research in comparison to previous studies in which dominantly male faces were used. Moreover, judgement accuracy also depends on the individual characteristics of the observer. Although there are mixed findings regarding the accuracy of those with more pronounced dark traits in assessing characteristics of others, our hypothesis is that at least some of these traits will be related to the perceptual sensitivity/response bias to the appearance-based criminality. More specifically, we hypothesize that the dark traits (especially narcissism and Machiavellianism; e.g. Back et al., 2011; Rauthmann, 2012) will be positively linked to greater tendency of indicating appearance-based criminality.

## **Method**

### *Participants*

The study was conducted on-line, on a convenience sample of 1312 adult internet users who were recruited via social media postings. Only participants older than 18 and those who provided informed consent were allowed to take part in the study. For the purpose of this study, only the responses from

female participants who fully completed the whole study were analysed ( $N = 676$ ;  $M_{\text{age}} = 23.64$ ,  $SD_{\text{age}} = 6.23$ )<sup>2</sup>.

### *Procedure*

#### Photograph selection (Pilot study 1 and 2)

The initial set of photographs was chosen based on the following criteria: coloured, forward-facing photographs, a normal ID photo (not police mugshots, not selfies, but photos taken usually by others for ID documents), Caucasian, female, no facial scars or other marks (i.e. tattoos, highly visible makeup), but diverse in terms of age, professions, social status and the type of crime they are suspected of (e.g. murder, fraud, drug trafficking, terrorism, forgery). The initial set of photographs of criminals ( $N=47$ ) was selected from the publicly available Interpol database of wanted criminal suspects (<https://www.interpol.int/notice/search/wanted>), while the initial set of photographs of non-criminals ( $N=48$ ) was collected from the researchers' female friends and acquaintances. Non-criminals were acquainted with the aims and purpose of the study, and they gave written consent for using their photographs in the study. To ensure the uniformity of photographs, the region of the face, neck and shoulders was extracted, and photographs were cropped to remove most of the background. Photographs were aligned into the same size and scaling (resized to 360 pixels).

In the first pilot study, between 12 and 21 independent raters evaluated the quality (e.g. adequate illumination of the face, contrast) of each photograph on a 3-point scale (good, average, bad). The photographs' quality ratings were conducted on-line, individually. During the task, photographs were presented sequentially. The photographs remained on the screen until a response was given, although the instructions emphasized that judgements should be made fast. In each viewing session, the raters estimated the quality of up to 32 photographs, presented in a randomized order. Out of the initial set, only the photographs for which at least 75% of raters estimated that their quality was good were chosen ( $N = 35$ ).

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2 Data from the male participants who completed the survey ( $N=157$ ), from the participants who did not complete the survey ( $N=458$ ) and from the participants who responded using obvious patterns such as straight lining (e.g., claiming that every photo depicts a non-criminal) were excluded from the analysis ( $N_{\text{female}} = 15$ ;  $N_{\text{male}}=7$ ). Acknowledging that straightliners may have thoughtfully considered each response category, which resulted in identical responses, it was decided to exclude the straightliners' data from the analysis since: straightlining is often related to satisficing behaviour, undesirable speeding in answering questions, poor data quality, and excluding straightliners may reduce the measurement error (see Schonlau and Toepoel, 2015). Further, the percentage of excluded straight-liners was very small (2.2% females) and their exclusion did not substantively affect the conclusions of this research.



In the second pilot study, between 24 and 39 independent raters estimated the facial characteristics and expressions of the photographed females. The purpose was to control for the characteristics for which previous studies have shown that they influence social attributions (e.g. Flowe & Humphries, 2011; Klatt et al., 2016; Langlois et al., 2000; Rule & Ambady, 2008; Zebrowitz & Montepare 1992). The photographs were presented to small groups of university students, using a PowerPoint presentation. The participants provided their responses in the paper-pencil format protocols. Their task was to evaluate each face in several dimensions. The photographs were presented sequentially, and each was exhibited in the centre of the screen with the number above it. Since this task was administered in small groups, the order of facial stimuli and judgement scales was the same for all participants. The photograph remained on the screen until a response was given by all participants. However, the instructions emphasized that all judgements should be fast, spontaneous and not to spend much time on each face. To minimize the interpretative subjectivity, the instructions included an example photo, accompanied with a brief oral description for each of the rating dimensions and instructions on how to make judgements. The first was the age estimation task, followed by judging each of the faces with respect to their facial characteristics (e.g. symmetry, femininity, attractiveness, averageness, babyfacedness, emotionality), then their facial emotional expression (e.g. anger, happiness, remorse, sadness, guilt), and at the end the personality traits and competences (e.g. intelligence, sociability, gentleness, responsibility, agreeableness). Each of these characteristics was estimated on a 7-point scale. Based on these ratings, a set of criminals' photos ( $N = 10$ ) and a set of non-criminals' photos ( $N = 10$ ) that have similar profiles on the judged characteristics were selected. The raters from pilot studies did not participate in the criminality ratings in the main study.

### The main study

Participants were informed that the aim of the study was to assess how we made judgements about ourselves and others. In the first part of the study, the participants' task was to assess females' criminality based on their physical appearance. The instructions emphasized that all judgements should be fast and spontaneous. After the example of viewing and judging the task, the participants saw 20 female faces in a randomized order. The participants did not know in advance how many photographs they would be presented with, and they did not know how many, if any of the presented females, were criminals. Each face was presented for 3 seconds. The participants were asked to assess whether and to what degree the presented faces looked like criminals. After that, the participants filled in personality questionnaires, and those who were interested in the accuracy of their judgements of faces provided their email addresses for receiving feedback. All the aspects of the study were approved by the Ethical Board of the Institute of Social Sciences Ivo Pilar (No. 11-74/18-391).



### *Instruments*

The Short Dark Triad (SD3; Jones & Paulhus, 2014) contains 27 items and measures three dark traits (with 9 items per each) – Machiavellianism ( $\alpha = .75$ ; sample item: *It's not wise to tell your secrets*), narcissism ( $\alpha = .69$ ; sample item: *I know that I am special because everyone keeps telling me so*), and psychopathy ( $\alpha = .72$ ; sample item: *It's true that I can be mean to others*). Participants were asked to indicate how much they agreed or disagreed with each item on a 5-point Likert-type scale (ranging from 1 = *strongly disagree* to 5 = *strongly agree*).

The Assessment of Sadistic Personality (ASP; Plouffe, Saklofske, & Smith, 2017) contains 9 items that measure sadistic personality ( $\alpha = .81$ ; sample item: *I would hurt somebody if it meant that I would be in control*). Items were presented in the 5-point Likert-type format (from 1 = *strongly disagree* to 5 = *strongly agree*).

The 4-point scale (from 1= *does not look like a criminal at all* to 4= *looks a lot like a criminal*) was used for the assessment of criminality of the presented faces.

### *Statistical analyses*

The relations between the appearance-based criminality judgements and the dark traits were assessed through zero-order correlations. Since there were significant moderate correlations among all dark traits, their relationships with the appearance-based criminality judgements were assessed through linear multiple regression analysis in order to examine their specific contributions. Hits, misses, false alarms and correct rejections for the recognition of (non-) criminals were calculated in order to get the measures of recognition sensitivity and response bias. The differences in the accuracy in the appearance-based criminality judgements between those high and low on the dark traits were assessed through *t*-tests.

## **Results**

The descriptive values of the SD3 subscales (Table 1) and their internal consistencies were in line with those obtained in the previous research for female samples (e.g. Jones & Paulhus, 2014; Pavlović, 2017; Wertag, Vrselja, & Tomić, 2011), as well as the intercorrelations between the SD3 subscales (Plouffe, et al., 2017; Rogoza & Ciecuch, 2017). The descriptives for the ASP scale, its internal consistency, as well as the magnitude of the relationships between the ASP and the SD3 scales were in line with those reported in Plouffe et al. (2017).

Table 1  
*Descriptive statistics*

	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>N</i>	<i>S</i>
P	1.00	3.67	2.06	0.54	.53**	.35**	.66*
M	1.33	4.67	2.99	0.58	-	.34**	.49**
N	1.00	4.78	2.68	0.56	-	-	.28**
S	1.00	3.78	1.65	0.55	-	-	-

Note. P – Psychopathy; M – Machiavellianism; N – Narcissism; S – Sadism.

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

The criminality ratings of photographs made on a 4-point Likert scale were recoded into binary criminality ratings. Responses 1 and 2 were recoded into non-criminality ratings (0), and responses 3 and 4 into criminality ratings (1). The respondents' answers were checked against factual criminality of the person in the photograph, and accordingly recoded into binary accuracy ratings (accurate – inaccurate). The rationale for this decision was threefold. First, we were interested in calculating the rates of accurately recognized (non-)criminals. Despite the increasingly frequent use of a plethora of different measures, the studies based on recognition tasks traditionally use binary scales (i.e. “yes” or “no”, “old” or “new”) in order to assess the participants' recognition abilities. Second, we wanted to be able to directly compare the rates of successful (non-)criminal recognition to those reported in other relevant studies (i.e. Valla et al., 2011). Third, although we are well aware of the psychometric limitations of binary scales, there are some indications they do not fare significantly worse in terms of the test-retest reliability, internal consistency and validity than three- or four-point scales (Preston & Colman, 2000).

Total accuracy ratings were calculated as a ratio between the total number of successfully recognized (non-)criminals and the total number of photographs ( $N=20$ ). Separate accuracies for the non-criminals' and criminals' photographs were calculated by dividing the number of the successfully recognized photos with the number of photos in the respective category ( $N=10$ ) (Table 2). The accuracy of (non-)criminality ratings for all photographs was slightly above the chance level, since 57% of all photos were correctly classified. The classification of non-criminals was more accurate (70%) than the classification of criminals (44%), indicating “innocence” bias among our respondents ( $r(676) = .407$ ;  $p < .01$ ;  $t(675) = 22.56$ ,  $p < .001$ ). These results are concordant with previous studies, since in Johnson, Anderson, Westra, and Suter (2018) and Porter, England, Juodis, ten Brinke, and Wilson (2008) the results indicated that the average accuracy score for detecting criminals was also lower than the average accuracy score of detecting non-criminals (59% vs. 72% and 48.8% vs. 62.7%, respectively).

**Table 2**  
*Accuracy of (non-)criminality ratings*

<i>Rating accuracy</i>	<i>M</i>	<i>SD</i>
Non-criminals	.70	.17
Criminals	.44	.19
Total	.57	.10

All dark traits were significantly related to more accurate ratings of criminals and less accurate ratings of non-criminals, but those associations were very weak (Table 3).

**Table 3**  
*Correlations between the dark traits and accuracy of (non-)criminality ratings*

<i>Traits</i>	<i>Rating accuracy</i>		
	Total	Non-criminals	Criminals
P	.02	-.13*	.13**
M	.02	-.14**	.15**
N	.07	-.10*	.16**
S	.03	-.13*	.15**

*Note.* P – Psychopathy; M – Machiavellianism; N – Narcissism; S – Sadism.

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

In line with the found personality-accuracy association, we confirmed that the respondents with the most pronounced dark traits were statistically less accurate in recognizing non-criminals, but were statistically more accurate in recognizing criminals than those with the least pronounced dark traits (Table 4).

**Table 4**  
*Accuracy of (non-)criminality ratings with regard to extreme scores on the dark traits (25% of scale results)*

<i>Traits</i>	<i>Recognition non-criminals</i>							<i>Recognition criminals</i>						
	<i>Lowest 25%</i>			<i>Highest 25%</i>			<i>t-test</i>	<i>Lowest 25%</i>			<i>Highest 25%</i>			<i>t-test</i>
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>		<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	
P	230	.73	.17	166	.67	.16	3.72**	230	.41	.20	166	.49	.18	3.84**
M	205	.73	.17	166	.66	.16	4.29**	205	.40	.20	166	.49	.17	4.35**
N	168	.73	.17	175	.68	.18	2.58*	168	.39	.20	175	.48	.18	4.34**
S	166	.73	.16	155	.67	.17	3.30**	166	.41	.20	155	.49	.18	3.90**

*Note.* P – Psychopathy; M – Machiavellianism; N – Narcissism; S – Sadism.

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

Two separate linear multiple regression analyses showed that the contribution of the dark traits to the explanation of accuracy of (non-) criminality ratings was significant, but minor (Table 5). Moreover, after controlling for the effect of other dark traits, only narcissism had a significant effect on the accuracy of criminality ratings ( $\beta = .12$ ;  $t = 2.79$ ;  $p < .01$ ), indicating that, out of all four dark traits, only narcissism was related to higher accuracy in recognizing criminals, but this effect was small.

Table 5

*Predicting accuracy of (non-)criminality ratings based on the dark traits*

	Recognition non-criminals			Recognition criminals		
	R	AR <sup>2</sup>	F(4,671)	R	AR <sup>2</sup>	F(4,671)
Model	.17	2.2	4.76**	.21	4.3	7.46**
Traits	$\beta$			$\beta$		
P		-.03			-.01	
M		-.08			.07	
N		-.04			.12**	
S		-.06			.09	

Note. P – Psychopathy; M – Machiavellianism; N – Narcissism; S – Sadism.

\*\*  $p < .01$

The pattern of correlations between the dark traits and accuracy of (non-)criminal recognition suggests that the participants with the dark personality traits might be prone to negative bias in making inferences about criminality. More precisely, their results could reflect a systematic tendency to judge someone as a criminal. To investigate this possibility, and in order to separate two aspects of performance – discrimination accuracy<sup>3</sup>, in terms of recognition sensitivity, from response bias<sup>4</sup> – we opted to calculate the signal detection theory (SDT) parameters. Those two parameters of detection skill are conceptually and computationally independent. High accuracy values indicate an ability to discriminate accurately among the criminals and non-criminals, while higher response bias scores indicate a tendency to misidentify non-criminal faces as criminal.

First, we calculated the number of hits, misses, false alarms and correct rejections for the recognition of (non-)criminals (Table 6). Because some of the participants achieved extremely high or low results (i.e. zero or the maximum number of hits or correct rejections), those parameters were transformed using the loglinear approach before calculating their rates in order to calculate the sensitivity index ( $d'$ ) and the area under the ROC curve ( $A_d'$ ) for all participants. All indices were calculated according to the formulae described in Stanislaw and Todorov's (1999) paper.

3 Correctly detecting a signal (a criminal face) versus correctly rejecting its absence (a non-criminal face).

4 The threshold of evidence necessary for an individual to respond that a signal (a criminal face) has been presented.

The results indicated that the participants were slightly sensitive to identifying criminals ( $d' = 0.38$ ,  $A_{d'} = .60$ ). Compared to the study of Valla et al. (2011), the value of the sensitivity index we obtained is somewhat smaller.

Table 6

*Hit, false alarm, miss and correct rejection rates for (non-)criminal recognition*

	Hit	Miss	False Alarm	Correct Rejection
Non-criminal	N/A	N/A	.32	.68
Criminal	.45	.55	N/A	N/A

Additionally, none of the dark traits were related to accuracy in terms of sensitivity, but all were negatively related to response bias, indicating that the participants with the dark personality traits were inclined to judge others as criminals (Table 7).

Table 7

*Correlations between the dark traits, discriminability index and response bias for (non-)criminal recognition*

Traits	$d'$	$c$
P	.01	-.16**
M	.01	-.18**
N	.07	-.15**
S	.02	-.18**

Note. P – Psychopathy; M – Machiavellianism; N – Narcissism; S – Sadism;  $d'$  – Sensitivity index;  $c$  – Response bias

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

To investigate which specific dark personality trait significantly predicted the tendency to judge others as criminals, we conducted a linear multiple regression analysis with the dark traits as predictors and response bias as the criterion. The results indicated that the contribution of the dark traits to the explanation of response bias was significant, albeit small (only 4.5%). After controlling for other dark traits, only Machiavellianism and narcissism proved to be significant predictors of judging someone as a criminal, but this effect was minor (Table 8).

Table 8

*Predicting response bias for (non-)criminal recognition based on the dark traits*

	$R$	$AR^2$	$F(4,671)$
Model	.22	4.5	8.89**
Traits	$\beta$		
P		-.01	
M		-.10*	
N		-.09*	
S		-.09	

Note. P – Psychopathy; M – Machiavellianism; N – Narcissism; S – Sadism.

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

## Discussion

Making quick, but also accurate judgements of others, and detecting threat and criminality in others is important and self-preserving adaptive behaviour (e.g. Flowe & Humphries, 2011; Funk & Todorov, 2013). While some researchers speak in favour of our ability to make relatively accurate and reliable inferences on others' criminality (e.g. Valla et al., 2011; Wu & Zhang, 2016), others argued that a person's facial appearance is not a valid indicator of their underlying characteristics due to the shortcomings of previous research (e.g. Todorov et al., 2015). Being valid or not, there is a quite robust finding that people quickly extract information about other people's characteristics from their faces and that our judgements about others have a strong impact on our behaviour in social interactions (e.g. decision-making on political candidates, Todorov, Mandisodza, Goren, & Hall, 2005; Todorov, 2012).

The results of our study speak in favour of at least some validity of our spontaneous judgements (Borkenau & Liebler, 1993; Porter et al. 2008; Rule et al. 2013; Roney et al., 2006; Shevlin, Walker, Davies, Banyard, & Lewis, 2002; Valla et al., 2011), since the respondents' overall accuracy of the appearance-based judgements was significantly better than expected by chance. However, the mean accuracy rate was far from perfect (57%), and it can be concluded that "intuition plays a minor facilitative role in reading faces" (see Porter et al., 2008, p. 171).

In the current study, the identification of female non-criminals was more accurate than the identification of female criminals, which is in line with previous findings on the judgements of male photographs (Johnson et al., 2018; Valla et al., 2011). Moreover, the results revealed bias-dependent accuracy. It was found that judgement accuracy for criminals' identification was slightly below chance, while only the identification of non-criminals was above chance, which is contrary to the conclusion of Valla et al. (2011) that criminals are rated more likely to have committed a crime than non-criminals are. However, Valla et al. (2011) told their participants in advance how many photographs they would see, and that some of the photographed men were convicted criminals. Letting participants know in advance that there is indeed a mixture of criminals and non-criminals among stimuli could be considered as a suggestive/leading instruction and could potentially affect the responses. In our study, it was not specified in advance how many photographs the participants would be exposed to, or that some of the photographs depicted criminals. The difference between the biased instruction of Valla et al. (2011) and our unbiased instruction before the judging task might have been a potential trigger for greater proneness to non-criminality judgements in our study. In support of this explanation, after separating the sensitivity of recognition and response bias through the calculation of signal detection

indices, it was shown that the participants were slightly sensitive to recognizing criminals, just as previously reported in the study of Valla et al. (2011).

The results of this study have confirmed the results of Johnson et al. (2018) and Porter et al. (2008) that indicated that the identification of non-criminals was more accurate than the identification of criminals because participants were more prone to label the targets as non-criminals. While making judgements in ambiguous situations like these<sup>5</sup>, the respondents probably rely on their knowledge or assumptions on the base criminality rate among females, which is very low (i.e. on the assumed ratio of female criminals in the general population)<sup>6</sup>. Assuming someone is not a criminal seemed like a safer choice because there is only a small percentage of female criminals in the general population. Since the set of stimuli presented to the respondents did not follow this base female criminality rate but had a significantly higher proportion of female criminals (50%), a more accurate identification of non-criminals than criminals was not a surprise. Also, it might be the case that in some females, when judging criminality from other female faces, the heuristics of “the presumed innocence” becomes activated (Johnson et al., 2018; Tamborini, Huang, Mastro, & Nabashi-Nakahara, 2007).

Moreover, previous studies revealed that criminality was often associated with male gender (Maclin & Herrera, 2006), masculinity (Ward, Flowe, & Humphries, 2012), facial appearances that emanate a threat (Flowe, 2012), and the perceptions of dominance and untrustworthiness (Funk et al., 2017; Porter et al., 2008). Women in previous research were assessed as more trustworthy than men (Wolffhechel et al., 2014), especially by other women (Mattrozzi et al., 2015). Consequently, male faces and/or female faces having those “masculine” characteristics could much easily activate the criminality stereotype. In addition, human criminality is very complex, and it is more difficult to make inferences about someone’s criminality based on her/his facial appearance than on the expression of basic emotions. Taken together, the difficulty of the task of judging appearance-based criminality, the low base rate of female criminals in the general population and the existence of the commonly shared stereotypes about criminals’ outlook at least partially contributed to the appearance-based inferences in this study. Due to previous criticism of the studies in this field, the design of this study and the choice of only female respondents were guided by the idea of providing as conservative as possible test of the affirmative appearance-based criminality judgement’s hypothesis.

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5 in which reference point was lacking

6 For example, in 2015 the U.S. has incarceration rate of 670 people per 100,000 population, which was the highest incarceration rate in the world, and only 7% percent were women (<https://www.sentencingproject.org/wp-content/uploads/2016/02/Facts-About-Prisons.pdf>).



Previous research has demonstrated that certain dimensions of malevolent dispositions were linked to the perception of others as threat (Brankley & Rule, 2014), as well as the accuracy and positivity of the first impressions of others (Rogers et al., 2018). In our study, the females with more pronounced all four dark traits were less accurate in recognizing non-criminals and more accurate in recognizing criminals compared to those with less pronounced dark traits. Still, only narcissism was a significant predictor of better inference about criminality in others. In terms of the signal detection theory, it was revealed that, actually, none of the dark traits were related to accuracy in terms of sensitivity, but that participants with the dark traits were “just” more inclined to judge others as criminals. After controlling for other dark traits, only Machiavellianism and narcissism were significant predictors of judging someone as a criminal, indicating that the individuals with pronounced Machiavellianism and narcissism have the strongest “negative other” response biases. This was in line with our hypotheses and previous findings (e.g. Back et al., 2011; Rauthmann, 2012). More specifically, previous research has shown that narcissism (Black et al., 2014; Rauthmann, 2012) and the associated characteristics such as self-centredness (Back et al., 2011) were linked to negative evaluations of other people. For example, Rauthmann (2012) showed that the hypothesis that dark personalities would see others in a negatively tainted way was clearly supported only for Machiavellianism, partially for narcissists, while psychopaths had neither significantly positive nor negative views of others. Due to their need for admiration, higher competitiveness, exploitativeness, anger, hostility, and aggression (for a review see Campbell & Miller, 2001), it is possible that narcissists tend to perceive others more unfavourably and have antagonistic relational patterns with others. A higher inclination to judge others as criminals among Machiavellians is maybe related to the notion that women higher on Machiavellianism use manipulation and aggression in interpersonal relationships (Abell & Brewer, 2014; Abell, Brewer, Qualter, & Austin, 2016; Rauthmann, 2013). Some of the previous research has shown that psychopathy is linked to higher accuracy in the identification of some characteristics of the observed individuals (Wheeler et al., 2009); however, our data indicate this is not the case when it comes to accuracy of appearance-based criminality judgements. Since there is evidence that the psychopathy-prone females do not demonstrate the same cognitive and perceptual deficits as the psychopathy-prone males (e.g., Vitale, Maccoun, Newman, 2011), it is possible that the positive correlation between psychopathy scores and accuracy in the identification of certain characteristics (such as vulnerability) exists only in males, which has been corroborated by our results. Moreover, psychopathy seems to be more adaptive for men than for women (e.g. Međedović, Wertag, & Sokić, 2018), and the results showing that there is no link between the accuracy of appearance-based criminality judgements and psychopathy in females support this. The research

investigating the relations of sadism and appearance-based judgements is scarce, but it is assumed that sadism is probably positively linked to cognitive empathic capabilities (O'Meara, Davies, & Hammond, 2011) and emotion recognition. However, our study has shown that there is no link between the accuracy of appearance-based criminality judgements and sadism.

### *Study limitations and further directions*

This study contributed to the existing knowledge gap on the associations between personality, especially the dark traits, and accuracy in criminality appearance-based judgements. It also added to expanding the conclusions of previous research on appearance-based criminality judgements, gained mostly using male photographs, to females. However, certain study limitations should be acknowledged, together with the recommendations for further studies.

Primarily, a relatively small set of photographs ( $N = 20$ ) was used in the current study. Since the selection of the used photographs and their quality have had a direct influence on the conclusion whether a person's facial appearance is a valid indicator of his/her underlying characteristics (e.g. Jenkins, White, Van Montfort, & Burton, 2011; Todorov & Porter, 2014), a more standardized set of stimuli and/or stimuli presenting an authentic interaction between the observer and the target as much as possible (e.g. allowing multiple views, direct personal interaction) should be used in future studies to improve the results' (external) validity .

We did not have any control of the process of assessing the photographs online, so it is possible that there were some distractions which influenced the accuracy of the inferences. However, it is not plausible to assume systematic effect of these potential distractors on the results. Still, to minimize those possibilities, future on-line studies should either include more thorough responses' quality control (e.g. checking in more detail for speeding, straight-liners, implementing attention checks) and it would be good to replicate the findings in more controlled experimental conditions.

In addition to the afore-mentioned suggestions, it would be interesting to directly compare the recognition rates in experimental conditions with the previously announced vs. unannounced ratios of the (non-)criminal photographs, and to investigate whether systematic variations in the ratios of (non-)criminal photographs have impact on accuracy rates, sensitivity and response bias, and if they do, what impact. Not only could this provide additional information about general decision-making and the strategies people use when recognizing criminals and innocent persons, but it could also offer more detailed answers to the question of the relationships between the dark traits and "negative other" bias.

Finally, we used short measures of the dark traits, which only enabled assessing these traits on a global level. However, these traits are actually multidimensional (e.g. Cain, Pincus, & Ansell, 2008; Hare & Neumann, 2005; Rauthmann & Will, 2011; Paulhus & Dutton, 2016). Moreover, previous studies have shown that only certain dimensions of these traits are related to an enhanced identification of facial expressions (e.g. Konrath, Meier, & Bushman, 2014). Therefore, it would be good to investigate the relations between the accuracy of appearance-based criminality judgements and the dark traits using full-length instruments, which would enable assessing the dimensional nature of the dark traits. In addition, one of the potential fruitful directions of research would be to investigate the relationship between individual differences in the dark traits and beliefs in the respondents' own competencies to make inferences about others from facial cues and the judgements' accuracy.

## Conclusion

Generally, our results showed that the identification of female non-criminals was more accurate than the identification of criminals. None of the dark traits were related to accuracy in terms of sensitivity, but narcissism and Machiavellianism were associated with greater tendency of indicating that someone was a criminal, reflecting their negative bias towards others and corroborating the importance of individual characteristics in making appearance-based judgements.

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## **Bolje vrug kojeg znaš nego onaj kojeg ne znaš: Mračne crte i sudovi bazirani na izgledu**

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Ljudi svakodnevno donose brze, spontane i automatske sudove o drugima bazirano na njihovom fizičkom izgledu. Ovo se naročito odnosi na društvene attribute, poput inteligencije, atraktivnosti, agresije i kriminaliteta. Također, postoje indikacije da neke crte ličnosti, kao što su mračne crte (makijavelizam, narcizam, psihopatija, sadizam), utiču na stepen tačnosti pri donošenju sudova na osnovu nečijeg izgleda, iako se ne slažu svi autori s tim. Stoga je cilj ovog istraživanja bio ispitati da li postoje interpersonalne koristi mračnih karakteristika kada se procenjuje nečiji kriminalitet. U tu svrhu provedeno je onlajn istraživanje na uzorku od 676 odraslih žena čiji je zadatak bio da na osnovu fotografija procene da li je neka osobakriminalac ili ne. Rezultati su pokazali da su narcizam i makijavelizam bili povezani s većom tendencijom da se nekoga identificira kao kriminalca, odražavajući negativnu pristranost koju pojedinci visoko na ovim crtama imaju prema ljudima općenito.

**Ključne reči:** Mračna tetrad, sudovi bazirani na izgledu, kriminalitet, negativna pristranost