The Ability to Detect the Characteristics of the Dark Triad from Facial Composites of the Opposite Sex

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ABSTRACT

Individuals often resort to a reliance on perceptions of the facial features of others as facial information is more readily accessible than stable expressions of behaviour. The ability to identify the traits of an individual from their facial features has its basis in evolution. This has been demonstrated in several studies that have focused on the detection of extroversion, friendliness, honesty, and other desirable personality traits. However, the question remains as to whether individuals also possess the ability to detect negative traits, particularly those that pose a risk to a partnership. The present study aims to investigate how accurately individuals are able to detect dark triad traits, specifically narcissism, Machiavellianism, and subclinical psychopathy, and determine if there are any differences in their assessment of the individual traits. Additionally, the study aims to investigate whether there are gender differences in the ability to detect these traits in the faces of the opposite sex, and whether the probability of the occurrence of such an ability is greater than mere chance. The research was conducted using a sample of 631 participants, 51.2% of whom were female, aged 13-80 (mean age: 36.97 years). The research used computer-generated facial composites to produce male and female faces which were either high or low in the dark triad traits. The results indicated that individuals, both male and female, were able to accurately identify the faces, to a statistically significant degree, that exhibited dark triad traits. Women achieved their best results in the detection of subclinical psychopathy in male facial composites, while men achieved their best results in the detection of Machiavellianism in female facial composites.

1. Introduction

The choice of a mating partner is influenced by a complex interplay of various factors, some of which are subject to conscious evaluation and analysis, while others are the result of

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unconscious mechanisms shaped by ancestral evolutionary pressures. Ensuring the maximal transmission of one's genetic legacy to future generations is a fundamental biological imperative, and as such, individuals tend to exhibit a preference for partners who are likely to enhance the survival and fitness prospects of their offspring. Despite a contemporary societal context that is vastly different from the ancestral environment in which human behaviour evolved, evolutionary psychology continues to affirm the persistent influence of these evolved mechanisms in shaping human preferences for mating partners. Individuals are still able to perceive and favour desirable characteristics in potential partners.

The human face has garnered considerable attention in the context of partner selection. As the visual information that is typically immediately available to an individual within a social encounter and which is continuously visible during most forms of interaction, the face serves as a reliable source of information for individuals in their partner selection process. This is because face-based information is more readily accessible than stable expressions of behaviour. From the perspective of the preservation of genetic characteristics, the face provides valuable information regarding the age, fertility, and overall health of the particular individual. Research has shown that certain facial characteristics, such as facial symmetry (Penton-Voak & Perrett, 2000), which signals developmental stability and reflects the organism's ability to withstand various environmental or genetic influences (Møller, 1997), and neoteny (Furnham & Reeves, 2006), particularly in women due to their decreasing fertility during ontogenesis, play an important role in partner selection. Additionally, sexually dimorphic features such as masculinity and femininity (Rhodes et al., 2005), which indicate reproductive potential, fertility (Law Smith et al., 2006), and other variables related to general health, such as longevity (Reither et al., 2009), are also considered to be important in the selection process.

Similarly, psychological traits that are associated with enhanced reproductive potential can be detected in facial features and thus create the conditions for an optimal relationship. This has the potential to result in more successful child rearing which is characterised by the survival of healthy children and their subsequent reproduction. Moreover, it could lead to the production of successful, healthy, and viable offspring, who would have the capability to form relationships with their descendants. Research has demonstrated that individuals tend to prefer faces that indicate a high degree of specific performance or personality characteristics when they choose a mate. Features that indicate intelligence (Talamas et al., 2016), i.e., the ability of an individual to adaptively respond to changes in their environment and effectively solve problems, are considered attractive and are preferred. In addition, features that suggest extraversion (Penton-Voak et al., 2006), which aids in the formation and maintenance of social relationships (Ashton & Lee, 2007) and enhance an individual's social status (Anderson et al., 2001), are also seen as attractive. Other preferred traits include agreeableness (Little & Perrett, 2007), which is characterised by trust, cooperativeness, altruism, sympathy, modesty, morality (Calefato et al., 2017), as well as honesty (Zebrowitz et al., 1996). This allows a prediction of the behaviour of an individual based on the consistency of their opinions and expressions.

Analogously, it can be hypothesised that particular characteristics pose significant risks for cohabitation in a romantic partnership. Specifically, these pertain to behaviour that may be exhibited by a partner that has a negative effect on the process of child-rearing. An example of such "toxic" characteristics is the concept of the "dark triad" (DT). The DT encompasses a cluster of interrelated personality traits in psychology, that includes narcissism (N) (marked by grandiose behaviour, high expectations, dominance, and superiority), Machiavellianism (M) (characterised by manipulation, cunning, immorality, and deceit), and subclinical psychopathy (ScP) (defined by impulsiveness, a search for excitement accompanied by low

empathy and anxiety) (Dębska et al., 2021). The presence of these traits is linked to numerous forms of antisocial behaviour, including bullying (Baughman et al., 2012), bossing and mobbing (Furnham, 2010), academic dishonesty and plagiarism (Williams et al., 2010), manipulation and aggression in romantic relationships (Furnham et al., 2013), prejudice against minorities (Hodson et al., 2009), and various forms of criminality (Furnham et al., 2013). From an evolutionary perspective, the formation of a partnership with individuals that display DT traits is disadvantageous in terms of survival and gene preservation. Thus, it is advisable for individuals to avoid such interactions in order to foster the optimal environment for child-rearing and ensure the longevity of the partnership. It can be inferred, therefore, that evolutionary mechanisms have exerted pressure to develop the ability to detect these signs and consider them to be unattractive (perceived as aversive stimuli).

2. Problem

Research into the relationship between the DT facial features and mating preferences is unique and has produced controversial findings. For instance, Lyons and Simeonov (2016) discovered that women exhibit a weak preference for high DT faces, a finding that was consistent with the research conducted by Lyons et al. (2015). However, a closer examination of the individual DT characteristics revealed that women tend to exhibit a lower degree of aversion in response to M faces (Lyons & Simeonov, 2016). Further studies that focused on the specifics of the connection between facial preferences and the presence of DT traits indicated that female evaluations of physical attractiveness may vary based on factors such as socio-sexuality or contraceptive use (Marcinkowska et al, 2015). To date, there has been little research into men's preferences or aversions towards DT characteristics in women's facial features. These controversial outcomes suggest that various environmental conditions (Shiramizu et al., 2019) may play a role, and raise the question of whether individuals are capable of accurately detecting DT traits, and whether there are discrepancies in the evaluation of the individual characteristics (N, M, and ScP), or whether the ability to accurately detect these indicators in a face is purely coincidental.

3. Objectives

The objective of this study is to verify the hypothesis that individuals possess the ability to discern DT characteristics in the facial features of others. Given that evolutionary pressures, in the context of selecting a partner for the continuation of gene dissemination, are primarily exerted in partner selection, the ability to detect characteristic facial features will be evaluated in the opposing sex. Given the unique and inconclusive nature of previous research in this area, an exploratory approach was selected and the following research questions will be addressed:

RQ1: Can individuals detect dark triad traits (narcissism, Machiavellianism, and subclinical psychopathy) through the facial features of individuals of the opposite sex?

RQ2: Which of the dark triad traits (narcissism, Machiavellianism, and subclinical psychopathy) are the most accurately detected?

RQ3: Is the ability to discern specific dark triad traits (narcissism, Machiavellianism, and subclinical psychopathy) from facial features statistically significant (not random)?

4. Method

4.1. Procedure

Data collection was conducted using the online format of the Survio platform. Participants were recruited through personal outreach, and once they had consented to participate in the research, they were given access to the online questionnaire. This provided some degree of control over the data collection process. The use of the online platform ensured the confidentiality of the information gathered. A snowball sampling method was then employed to recruit additional participants. Prior to completing the study questionnaire, the participants were fully informed about the purpose of the research. They were given the option to withdraw at any point without any consequences.

4.2. Subjects

The study sample was made up of 675 participants; 44 (6.52%) were disqualified due to improperly completed or incomplete survey documents. Descriptive statistics of the final sample of 631 individuals are presented in Table 1.

Table 1.
Demographic data regarding the gender and age characteristics of the study sample

Gender	Age (years)		
	N (%)	Min./max.	Mean/SD
Male	308 (48.8)	13/79	38.11/17.73
Female	323 (51.2)	14/80	35.89/18.24
Total	631 (100.0)	13/80	36.97/18.01

Source: authors.

4.3. Instruments

To investigate the ability to detect the presence of DT traits in the faces of individuals of the opposite gender, facial composites from the Faceaurus database (available at https://nickholtzman.com/faceaurus/) were utilised (with the author's consent). The facial composites are computer-generated faces (morphs) created using 10 male and 10 female faces that demonstrate the highest and lowest scores for a specific trait. These faces were selected from a larger dataset of participants who were assessed for N, M, and ScP through self- and peer-reports. The source data used in the creation of the facial composite came from the 10 participants with the highest scores and 10 participants with the lowest scores for a specific trait. The faces were meticulously marked with 112 nodes using FantaMorph™, version 4. The prototypes were created using FantaMorph Face Mixer, which averages node locations across faces (Holtzman, 2011). The resulting facial composites, that represent the prototypical faces of men and women showing the characteristics of high and low levels of N, M, and ScP, are presented in Figures 1-3.

The use of computer-generated facial composites offers an advantage over the use of real faces in assessments. The averaging process (morph creation) eliminates facial anomalies or specificities that may introduce unwanted variables which could inadvertently interfere with the evaluation process (e.g., a uniquely shaped nose, eyebrows, or chin). Such variables may trigger personal preferences or aversions, thereby altering the assessment of the face. The key factor that distinguishes a face produced as a facial composite and gives it prominence, especially in comparison with the other face in a pair of composites, is the presence of features that are characteristic of high levels of a given trait (in this case, N, M, and ScP).

Hence, the choice of a particular composite can be considered to be the selection of this particular characteristic.
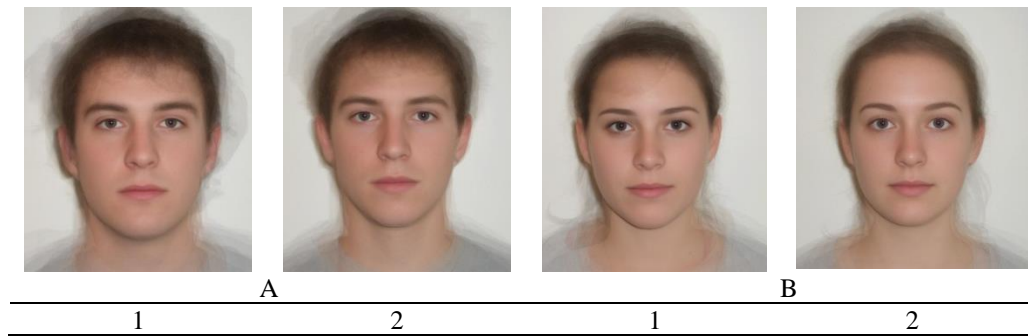

Figure 1. Male (A) and female (B) facial composites characteristic of high (1) and low (2) levels of narcissism
Note: reprinted with the permission of author.
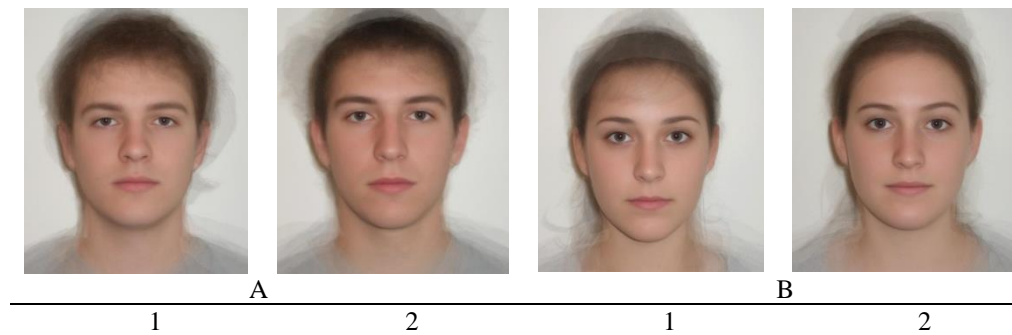*Source:* Holtzman (2018).

Figure 2. Male (A) and female (B) facial composites characteristic of high (1) and low (2) levels of Machiavellianism *Note:* reprinted with the permission of author.
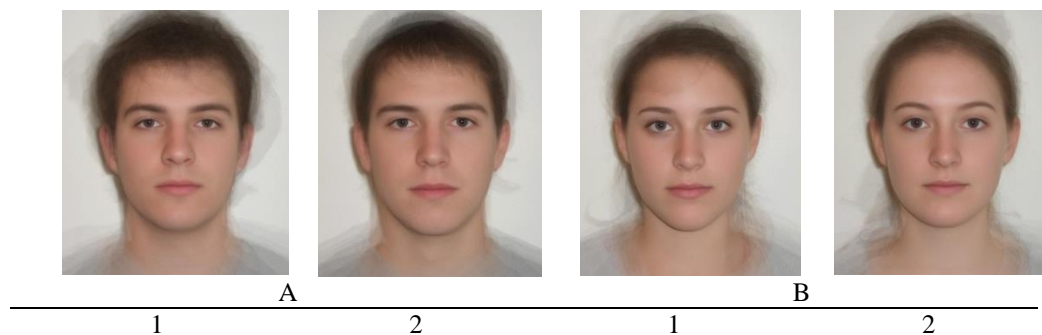*Source:* Holtzman (2018).

Figure 3. Male (A) and female (B) facial composites characteristic of high (1) and low (2) levels of subclinical psychopathy *Note:* reprinted with the permission of author.
Source: Holtzman (2018).

The investigation of the ability of an individual to recognise individual DT characteristics in the faces of individuals of the opposite gender was performed through a forced-choice methodology utilising two facial composites, along with a set of instructions (based on Heretik et al., 2017). These instructions were as follows:

"This represents a person who possesses an inappropriately positive self-image and exhibitionistic tendencies, who requires validation of their exceptionalism from others. Which face appears to be a better match?" for N;

"This represents an individual prone to cold, self-interested manipulation and exploitation of others. Which face appears to be a better match?" for M;

"This represents a person with a low degree of empathy, who is malicious towards others and society as a whole. Which face appears to be a better match?" for ScP.

Alongside the information regarding the number of correct and incorrect answers in the detection of the facial composite indicative of N, M, and ScP, the "Correctness Index" (CI) served as an indicator of the detection ability of an individual. CI expresses the ratio of correct answers to incorrect answers, and a higher figure indicates greater success in the identification of the presence of the specified characteristic (N, M, and ScP) in the facial composite of the opposite gender. CI allows for a comparison of the accuracy of detection between the different characteristics of the DT, as well as a comparison of the performance of the male versus female groups.

4.4. Data analysis

The data analysis was conducted using the computer software: SPSS version 28. Descriptive statistics were used to present the results. The Chi-Square test was utilised to examine if the accuracy of face detection was significantly greater than chance.

5. Results

5.1. Research Question 1

RQ1: Can individuals detect dark triad traits (narcissism, Machiavellianism, and subclinical psychopathy) through the facial features of individuals of the opposite sex?

Table 2 provides a summary of the female and male facial composites that the participants, both men and women, believed to possess high levels of N, M, and ScP. The results indicate that both male and female participants are predominantly capable of correctly identifying the DT traits N, M, and ScP in the facial composites – the number of correct responses was higher for every characteristic than the number of incorrect responses.

Table 2.
Frequency of accurate detection of the features of the Dark Triad

Gender	DT characteristic	Female face evaluation		
		Incorrect (N/%)	Correct (N/%)	CI
	Narcissism	135 (43.83)	173 (56.17)	1.281
Male	Machiavellianism	109 (35.39)	199 (64.61)	1.826
	Subclinical psychopathy	131 (42.53)	177 (57.47)	1.351
		Male face evaluation		
		Incorrect (N/%)	Correct (N/%)	CI
	Narcissism	145 (44.89)	178 (55.11)	1.228
Female	Machiavellianism	128 (39.63)	195 (60.37)	1.523
	Subclinical psychopathy	103 (31.89)	220 (68.11)	2.136

Note: CI = Correctness Index, DT = Dark Triad.
Source: authors.

5.2. Research Question 2

RQ2: Which of the dark triad traits (narcissism, Machiavellianism, and subclinical psychopathy) are the most accurately detected?

Results from the Correctness Index indicate that women were able to most accurately evaluate male facial composites with high levels of ScP (CI = 2.136). Conversely, men were most accurate in their ability to evaluate female facial composites with high levels of M (CI = 1.826). Women were able to accurately evaluate M in a facial composite (CI = 1.523), while men were able to accurately evaluate ScP and N in a facial composite (CI = 1.281 and CI = 1.351 respectively). Women's least accurate results came from their evaluation of N (CI = 1.228).

When evaluating the accuracy of the detection of DT facial features by both genders through the creation of an average Correctness Index, it was found that individuals were most likely to correctly identify the presence of ScP, followed by M and, with the lowest degree of reliability, but still with a statistically significant level of accuracy, the characteristic features of N (as shown in Table 3).

Table 3.
Average values (for both genders) of the Correctness Index for three DT characteristics

DT characteristic	CI for female face	CI for male face	Average CI
Narcissism	1.281	1.228	1.255
Machiavellianism	1.826	1.523	1.675
Subclinical psychopathy	1.351	2.136	1.744

Note: CI = Correctness Index, DT = Dark Triad.
Source: authors.

5.3. Research Question 3

RQ3: Is the ability to discern specific dark triad traits (narcissism, Machiavellianism, and subclinical psychopathy) from facial features statistically significant (not random)?

The significance of the differences in the selection of facial composites and their association with one of the DT traits was determined using a Chi-Square test. The results are presented in Table 4.

When evaluating the traits of N, M, and ScP in facial composites of individuals of the opposite gender, both male and female participants demonstrated a statistically significant tendency to more often correctly identify the facial composite than incorrectly.

Table 4.
Results of the Chi-Square tests used to analyse the significance of the correct selection of a facial composite

Gender	Trait	Choice	Observed N	Expected N	Residual	Chi-Sq.	Asymp. Sig.
Males	Narcissism	Incorrect	135	154.0	-19.0	4.688	0.030*
		Correct	173	154.0	19.0		
	Machiavellianism	Incorrect	109	154.0	-45.0	26.299	< 0.001***
		Correct	199	154.0	45.0		
	Subclinical psychopathy	Incorrect	131	154.0	-23.0	6.870	0.009**
		Correct	177	154.0	23.0		
Females	Narcissism	Incorrect	145	161.5	-16.5	3.372	0.017*
		Correct	178	161.5	16.5		
	Machiavellianism	Incorrect	128	161.5	-33.5	13.898	< 0.001***
		Correct	195	161.5	33.5		
	Subclinical psychopathy	Incorrect	103	161.5	-58.5	42.481	< 0.001***
		Correct	220	161.5	58.5		

Note: * p < .05; ** p < .01; *** p < .001.
Source: authors.

6. Discussion

6.1. Interpretation of Results

At the broadest level, research has suggested that individuals possess the ability to discern DT characteristics within facial composites of individuals of the opposite sex. This ability was found to be statistically significant across all three traits and in both genders, with women exhibiting a higher level of accuracy in the identification of ScP, than men (Table 4). These findings are consistent with results obtained by Holtzman (2015), who discovered that study participants were able to reliably detect DT characteristics in facial prototypes, particularly in female faces. Alper et al. (2021) also reached similar conclusions in their study, which also utilised facial composites from the Faceaurus database (https://nickholtzman.com/faceaurus/). According to their findings, the accuracy of detection of all three DT traits ranged from 60.0 to 67.5%. However, in this study, the accuracy of the identification of N in the male face did not provide a statistically significant result (Alper et al., 2021). Our data further substantiates this conclusion, as evidenced by the lowest level of CI that was recorded for N in the male face (see Table 2).

As indicated in the introduction of this work, the ability to effectively detect high risk personality characteristics in the faces of individuals of the opposite gender may have evolutionary origins. Cohabitation with a partner results in a highly intense and intimate relationship (Reis & Shaver, 1988), where the risky behaviour of one partner has a significant impact on the other individual in the partnership. The situation is further compounded if the behaviour in question is inherently toxic and potentially harmful to the relationship. N in relationships is marked by dominant, self-centred, utilitarian, secretive, suspicious, and norm-avoiding behaviours; individuals with these characteristics are emotionally unstable and exhibit anxiety in close relationships (Ináncsi et al., 2015). Machiavellians are recognised by their use of interpersonal manipulation, alliance-building tactics (Maneiro et al., 2020), their cynical disregard for laws and ethics, a focus on their self-interests, and deception (Furnham & Treglown, 2021). The behaviour of subclinical psychopaths is characterised by high impulsivity, thrill-seeking, low empathy, and anxiety (Paulhus & Williams, 2002), as well as selfishness, callousness, and a lack of remorse (Furnham & Treglown, 2021). Therefore, choosing a partner with these characteristics can not only be detrimental, but might also pose a direct risk. Several studies have highlighted the fact that the presence of DT traits in a partner leads to host of issues, for example, an increase in sexist attitudes and behaviour (Jonason & Lavertu, 2017), prejudice (Jones & Neria, 2015), a poor attitude towards rape (Yost & Zurbriggen, 2006), or exploitative partnerships (Jonason et al., 2011). To optimise the environment for reproduction and childrearing (cohabitation), it is therefore beneficial to be able to identify such traits in potential partners and respond to them aversely.

The values of CI for N, M, and ScP differ, which may suggest that there is variation in the significance of the need to identify the individual DT characteristics. This postulation (which requires further verification through research on a representative sample of subjects, as highlighted in the section on "Limitations and Opportunities for Further Research"), raises the possibility that different levels of risk are associated with the different behaviour that results from the individual features of the DT. As indicated in Table 2, the ability to detect facial features is highest for ScP, followed by M, and is the weakest for N. These results lead to the conclusion that individuals are most perceptive to characteristics of psychopathy, then M, and finally N. In light of the personality and behavioural characteristics of psychopaths, Machiavellians, and narcissists, it can be inferred that this order corresponds to the "dangerousness" of the individuals that possess such traits. This is not only supported by

descriptions of these traits but also by several studies. For instance, Carter and Egan (2022) observed that it was ScP (not M and N) that was a predictor of physical and psychological intimate partner violence; Tetreault et al. (2021) found that ScP was a predictor of the majority of types of partner aggression. Hudek-Knezevic et al. examined the risk related to the presence of individual features of the DT in partner interactions and found that men's ScP, and to a lesser extent men's M (but not N), had a detrimental effect on their partner's health-protective behaviour (Hudek-Knezevic et al., 2021). If these findings were to be generalised, it could be inferred that individuals with N traits do not pose the same level of risk to partners as Machiavellians or subclinical psychopaths. This is then reflected in the lesser ability of an individual to correctly detect N type facial features.

6.2. Limitations and Opportunities for Further Research

While the use of computer-generated facial composites that allow selection through selection has undeniable advantages, it is important to acknowledge that the findings are based on a selection of artificial (non-existent) faces. The application of the findings to the detection of DT facial features in real-life interpersonal interactions may vary, and it is unclear if the effect will be positive or negative. In real interactions, we must consider the influence of other factors that may significantly improve the ability to detect DT traits, such as facial expressions, posture, behaviour, and verbal cues, as well as factors that may impair detection, such as the effect of disruptive elements in the face that may overpower the indications of the DT.

A further constraint of the study is the age demographic of the sample. The results of the Shapiro-Wilk test revealed a non-normal age distribution and the Mann-Whitney U test showed a statistically significant difference in the ages of the male participants (Mean Rank = 331.05) compared to the female participants (Mean Rank = 300.72), with a Mann Whitney U of 44,807 and p value of 0.036. Age plays a crucial role in the examination of behaviour influenced by evolutionary factors, as it impacts reproductive capacity. The reproductive potential of men (when compared to women) is retained for a significant portion of their life but still deteriorates with age. As a result, older men may be less sensitive to signals of female mating partner quality in comparison to younger men. They may also have a lesser, reduced ability to detect characteristics from facial features. A sample of men that is more balanced in terms of age distribution (i.e., younger) might provide even better results on the CI.

These limitations can serve as a prompt to reassess these findings under other circumstances that take these factors into consideration. Despite these constraints, the primary outcome of the study remains the discovery that individuals, both male and female, possess the ability to accurately detect the presence of DT traits in the faces of individuals of the opposite gender. This information serves as a starting point for further research that would examine the extent of attractiveness or aversion, reflecting selective pressures in sexual selection, towards facial composites that embody prototypes of DT traits. An examination of the preference for, or avoidance of, certain facial features would be questionable without this evidence of an individual's ability to detect such traits.

7. Conclusion

The assessment and selection of a mate is influenced by a multitude of factors. In early interpersonal interactions a critical role is played by information about the other person obtained through facial perception. These evaluation processes are often unconscious and are believed to have been strongly influenced by evolution. The varying outcomes of studies on

the preference/aversion of specific features in faces highlight the importance of considering factors that may influence evaluation, leading to a better understanding of inconsistent results. One of the key determinants of research into preferences/aversions is the ability of individuals to detect certain features in the face. The study in question confirmed that both men and women have the capacity to recognise DT traits, including narcissism, Machiavellianism, and subclinical psychopathy, in the faces of the opposite gender. These results provide a basis for further research into an examination of preferences for DT traits (or other characteristics) in human faces.

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