

The face of personality: Adaptive inferences from facial cues are moderated by perceiver personality and motives

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Abstract

Humans have historically been interested in understanding stable individual differences in behavioral tendencies, often referred to as personality traits. Recent work suggests that between-person personality variability may be adaptive insofar as certain variations in personality constellations facilitate survival and reproduction across various types of groups and ecological niches. While past research has demonstrated that personality can be accurately inferred from self-reports, other-reports, and targets' past behavior, we discuss a more contemporary, yet understudied, means of personality inference: facial structure. We summarize research on personality traits that can be accurately inferred from facial structure, as well as how aspects of individuals' own personality, chronically accessible motives, and acutely activated goals lead to preferences for facially communicated personality that would aid in the satisfaction of these goals (e.g., higher need to belong predicts a stronger preference for faces whose structure communicates greater extraversion). We also discuss limitations of current approaches to understanding the relationship between perceiver personality and motives and their relation to perceptions of facially communicated personality as well as fruitful directions for future research.

1 | INTRODUCTION

Humans have a long history of fascination with personality. From Gall's phrenology work in the 19th century, whereby it was assumed aspects of one's character could be inferred from measurements of the human skull, to present-day attempts to understand the neuroscience of personality, scientists have found value in categorizing

individuals along relatively stable dimensions or traits (DeYoung, 2010; DeYoung et al., 2010; Parssinen, 1974). More recently, scientists have started considering the theoretical implications of personality diversity, such as the adaptive utility of different personality constellations across various ecological niches (Michalski & Shackelford, 2010). This has been mirrored by growing interest in how individuals extract information regarding another's personality, given that understanding others' personalities affords better prediction of their likely behavior across situations (Funder, 2012).

Following identification of another's personality, individuals can ultimately decide whether to associate with such conspecifics in the service of satisfying their most salient goals. Given that different personalities vary as a function of ecological niches, it would be adaptive for individuals to prefer those whose personalities could satisfy their goals for a given environment. It then becomes incumbent upon the perceiver to identify another's personality before making their affiliative decision through various channels through which personality can be inferred. This paper provides a summary of the evolutionary functions of between-person personality variability and focuses on an as-of-yet understudied cue for inferring another's personality, specifically facial structure, and how these inferences shape preferences for conspecifics as a function of their facial structure and perceivers' various motivational states. Additionally, we link these areas of inquiry by summarizing research whereby fundamental, and evolutionarily ancient, motives and personality traits influence the value we place on certain aspects of facially communicated personality in adaptive ways, thus forming the basis for our interpersonal preferences.

2 | ADAPTIVE FUNCTIONS OF PERSONALITY VARIABILITY

Regardless of how personality is assessed or measured, personality exhibits a considerable level of variability in humans in all studied cultures (i.e., between-person personality variability; Church et al., 2013). One reason may be a by-product of how natural selection operates, specifically by introducing variability into each generation of offspring produced. Because selection cannot faithfully predict future environments, variability across generations ensures at least some conspecifics in each generation have traits useful for survival and reproduction in a given environment. Personality may vary because selection produces variability across all phenotypes, including Big Five personality traits (i.e., extraversion, agreeableness, conscientiousness, openness, and neuroticism; Schmitt, Realo, Voracek, & Allik, 2008).

One argument for the adaptive *function* of between-person personality variability comes from theories informed by niche-fitting (Schaller & Murray, 2008). Throughout human history, environments would temporally vary unpredictably and personality variability may facilitate survival and reproduction across various ecologies. For example, one consistent, yet variable, environmental threat throughout human history was disease prevalence, or the probability of contracting a communicable disease (Schaller & Park, 2011). Historical pathogen prevalence is related to cross-cultural differences in Big Five traits, and cultures with greater historical pathogen threat demonstrate reduced contemporary levels of extraversion and openness, as well as greater sexual restrictedness (Schaller & Murray, 2008). Despite benefits to high extraversion (e.g., extensive social networks) and high openness (e.g., exposure to novel problem-solving strategies), high levels of these traits in pathogenically threatened cultures would be maladaptive due to the significant disease-facilitating costs of these traits (Nettle, 2005; Pollet, Roberts, & Dunbar, 2011).

Others have also argued for the adaptive utility of between-person personality variability from a frequency-dependent selection perspective (Book & Quinsey, 2004). Certain traits are only beneficial insofar as few people in the population have them. A common example is psychopathy, a trait defined by exploitive behavior (Glenn, Kurzban, & Raine, 2011). Psychopathy would only be beneficial if most other conspecifics in a group are cooperative; if too many others are psychopathic, the strategy becomes ineffective (e.g., reduce the group's ability to establish norms of reciprocal altruism). Because certain personality constellations better facilitate survival and reproduction depending on one's ecological niche, it would be adaptive for individuals to be sensitive to cues indicative of conspecifics' personality so as to associate with those most likely to satisfy one's own needs and goals.

3 | IDENTIFYING OTHERS' PERSONALITY

Like with any social selection process, personality-related selection success remains incumbent upon the variability of traits from which conspecifics can form the basis of their interpersonal preferences. Given the possible adaptive function of certain personality constellations in specific environments, it would thus be adaptive to identify those whose personalities would facilitate adaptive goal attainment. The ability to detect others' personality would afford perceivers opportunities to identify optimum conspecifics for a given environment to facilitate satisfaction of currently undermet or unmet needs.

Although typically assessed through self-report, additional means of determining another's personality occurs through other-reports from those familiar with the person (i.e., significant others and friends) and observations of behaviors that may be associated with underlying personality. According to the Realistic Accuracy Model (RAM; Funder, 1995), personality traits are real attributes of individuals and are therefore capable of being inferred through multiple channels. Humans may thus possess a level of systematic awareness of the social affordances imposed by others' personalities through actors' behavioral repertoires connoting their actual personalities. These perceptions would ultimately form the basis of their subsequent preferences. Importantly, such inferences can even occur through zero-acquaintance personality assessments (Ambady, Hallahan, & Rosenthal, 1995), brief exposure to another's behavior via video (Ambady & Rosenthal, 1992; Borkenau, Mauer, Riemann, Spinath, & Angleitner, 2004), and facial expressions (Naumann, Vazire, Rentfrow, & Gosling, 2009).

Importantly, previous research has found that perceptual acuity for Big Five traits is most apparent through interpersonal behaviors, particularly for perceptions of individuals' level of extraversion (Ambady et al., 1995; Borkenau et al., 2004). For example, individuals can infer the interpersonal facets of extraversion more easily than other aspects of the Big Five when observing another person tell a joke, among other social activities (Borkenau et al., 2004). Furthermore, and most germane to this conversation, accurate identification of extraversion occurs through more dynamic bodily features, including facial expressions and posture (Naumann et al., 2009). Specifically, individuals can readily detect extraversion from another's face through smiling. Although less robust than the acuity toward extraversion, perceptions of other Big Five traits nonetheless possess considerable veracity. Agreeableness is accurately inferred through perceptions of a relaxed stance whereas neuroticism is through a tense stance. Even more, whereas conscientiousness is inferred through having an ordinary appearance, openness is perceived through appearing distinct (Naumann et al., 2009). Taken together, these results suggest considerable reliance on various cues to infer all aspects of the Big Five.

Given that personality inferences may occur through facial expressions, it would seem sensible to predict that humans may utilize additional aspects of the face to form the basis of personality judgments, including facial structure. Faces are central to social perception, as humans have evolved for face-to-face contact from which they can infer another's motivational states and thus their behavioral intentions (Argyle & Cook, 1976; Parkinson, 2005). Certain facial features (e.g., eyes) and face perception processes (e.g., configural processing) elicit ascriptions of complex motivational states in faces (Deska & Hugenberg, 2017). These perceptual processes implicate an individual's underlying facial structure as indicative of various personality traits and the subsequent motives associated with it. Recent research has begun to document the veracity of such judgments.

4 | INFERRING PERSONALITY THROUGH FACIAL STRUCTURES

People can accurately infer personality from specific facial features. More specifically, there appears to be typical facial structures for various traits, including Big Five traits. Little and Perrett (2007) created composite faces of individuals self-reporting either high or low levels of each trait. Participants were asked to view facial images of these targets and indicate levels of each trait. Participants demonstrated considerable accuracy in identifying the communicated trait in each composite, especially among facially communicated extraversion. This detection also occurs

quickly, even at intervals between 50 and 150 ms, especially for extraversion and conscientiousness (Borkenau, Brecke, Möttig, & Paelecke, 2009). Such acuity is adaptive, given how facial features connote behavioral intentions and desirability (Parkinson, 2005; Rhodes, 2006), which would afford the ability to recognize others who could aid or hinder in solving salient adaptive concerns.

Facially communicated extraversion appears to produce a considerably more recognizable interpersonal signal relative to other Big Five traits with individuals typically inferring extraversion most accurately (e.g., Borkenau et al., 2009; Kramer & Ward, 2010; Little & Perrett, 2007). Detecting these facial structures would be adaptive for identifying conspecifics most capable of satisfying one's salient needs. For example, identifying more extraverted conspecifics through facial structures would facilitate the detection of gregariousness in the service of satisfying affiliative needs, whereas identifying agreeable conspecifics may assist recognizing those who would likely be the most benevolent, which could signal underlying cooperative intentions, thus facilitating a subsequent preference for such faces in the service of satisfying salient motives. Conversely, identification of facial structures connoting neuroticism could assist in the identification of emotionally unstable conspecifics and those who may not possess high levels of heritable fitness (Kerry & Murray, 2018), thus facilitating an adaptive aversion to neurotic individuals.

The perceived maturity of a face (i.e., babyfacedness) may further connote another's levels of Big Five traits, particularly as it relates to the size of an individual's eyes, and therefore modulate subsequent decisions to engage another (Berry & Brownlow, 1989; Sacco & Hugenberg, 2009). For example, faces possessing neotenous features (e.g., big eyes) are perceived as warmer than those whose faces connote maturity (e.g., small eyes) and foster perceptions of an individual as being more approachable. Importantly, such perceptions of warmth paralleled the self-reports of targets' own warmth, thus suggesting a veracity in faces' connotation of self-reported personality traits (Berry & Brownlow, 1989). These inferences of warmth further connote a sense of trustworthiness that would then form the basis of an interpersonal preference toward those whose facial structures connote approachability (Oosterhof & Todorov, 2008). Following these inferences, individuals would subsequently categorize these conspecifics based on their interpersonal affordances before deciding whether to associate with such conspecifics based on their perceptions of that person's ability to satisfy their most salient goals (Zebrowitz & Collins, 1997).

If detecting structures connoting Big Five traits facilitates identifying *benevolent* conspecifics, perhaps identifying *exploitative* conspecifics, such as those higher in Dark Triad traits (i.e., narcissism, psychopathy, and Machiavellianism), from facial structures would aid in identifying, and avoiding, threatening conspecifics. Much like Big Five traits, there are typical facial structures connoting Dark Triad personality traits. Holtzman (2011) created facial composites of individuals scoring high or low in Dark Triad personality traits based on self- and other-reports (see Figure 1). When

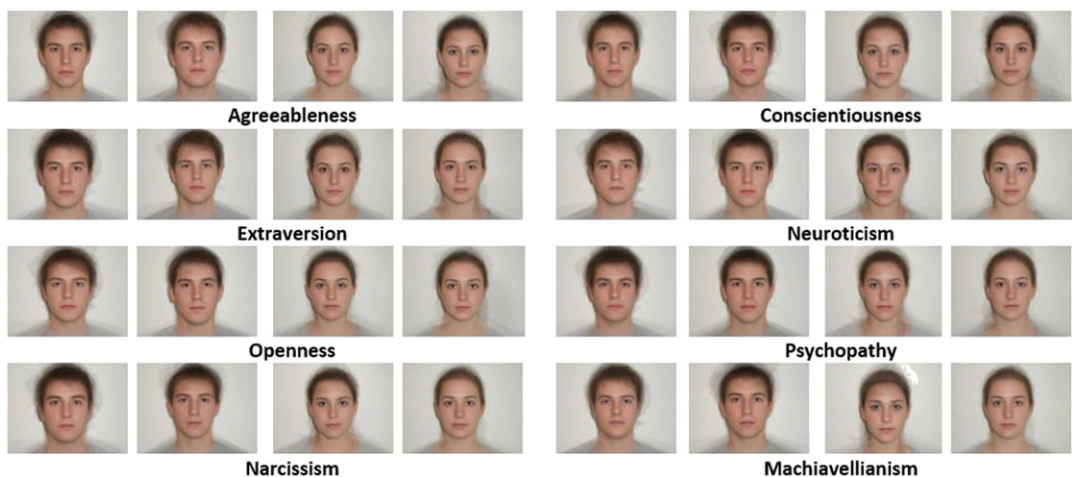


FIGURE 1 Facial prototypes for high (left) and low (right) levels of Big Five and Dark Triad personality traits in male and female faces (Holtzman, 2011)

tasked with indicating their levels of Dark Triad traits, participants accurately perceived each trait based solely on facial structure, with psychopathy being the most accurately inferred. Such sensitivity would further allow perceivers to recognize the affordances of these conspecifics as likely interpersonal threats, which could ultimately elicit an aversion to them.

Perhaps unsurprisingly, considering RAM further (Funder, 1995), the two personality traits most associated with interpersonal dominance in their own capacity, extraversion and psychopathy, are perceived most readily by individuals through one's craniofacial structures among various other pieces of information attesting to the veracity of these inferences. Extraverted and high-psychopathy male faces are perceived as especially masculine and interpersonally dominant (Kramer, King, & Ward, 2011; Little & Perrett, 2007; Lyons, Marcinkowska, Helle, & McGrath, 2015), aspects of a facial structure connoting high levels of testosterone (Penton-Voak & Chen, 2004). This perception of extraverted male faces as masculine, in particular, would further align with research indicating extraverted men are physically stronger than introverted men (Lukaszewski & Roney, 2011). Furthermore, on a genetic level, extraversion is associated with short cytosine-adenosine-guanine codon repeats, a gene expression implicated in increased androgenic receptor activity further predicting heightened physical strength and interpersonal dominance in men that is a facet of the trait (Cheng, Tracy, & Henrich, 2010; Lukaszewski & Roney, 2011; Simmons & Roney, 2011; Westberg et al., 2009). This perception of dominance would further align with research on perceptions of gendered facial morphology indicating a perceptual acuity toward anger in male faces (Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007). Despite this perceived dominance, extraverted male faces are ultimately perceived as more sociable and attractive (Anderson & Shirako, 2008; Kramer, King, & Ward, 2011; Lukaszewski & Roney, 2011) and afford considerable affiliative opportunities for their conspecifics (Pollet et al., 2011) with individuals typically wanting more extraverted relationship partners (Figueredo, Sefcek, & Jones, 2006). This would further suggest that individuals could potentially engage in trade-offs and categorize conspecifics of the same trait as either beneficial or costly based on their most relevant goals before deciding to affiliate with them.

5 | PREFERENCES FOR FACIALLY COMMUNICATED PERSONALITY

After identifying a conspecific's personality, one must then decide whether that conspecific would optimize attaining their current goals (Zebrowitz & Collins, 1997). Because various personalities afford different social opportunities or costs (e.g., Jonason, Li, Webster, & Schmitt, 2009; Nettle, 2005; Pollet et al., 2011), it would seem sensible to predict individuals will strategically increase or decrease their preference for various traits communicated through variations in facial structure as a function of their own personalities and motives. These indicated preferences would ultimately necessitate trade-offs, as selecting one trait may be at the expense another (e.g., Sacco, Young, & Hugenberg, 2014). Furthermore, variations in these motivational states may translate to adaptive preferences for specific aspects of facially communicated personality, given that certain personalities are associated with different benefits and costs. Recent research reveals that preferences for faces of prospective conspecifics vary based on their ability to optimally satisfy a perceiver's salient needs, as indexed by personality measures, individual differences in chronically activated social motives, and acutely activated social motives. Critically, these studies have all utilized preference tasks in which participants selected their preferences for varying levels of personality among pairs of faces of a unique identity blended to contain Holtzman's (2011) prototypical faces of either high or low levels of a personality trait.

5.1 | Big Five face preferences

5.1.1 | Big Five personality traits

The Big Five represents some of the fundamental aspects of how individual differences influence interpersonal processes with the traits contained within the model capable of predicting adaptive face preferences. In an initial demonstration of Big Five preferences, extraverted women have a heightened preference for masculine male faces

(Welling, DeBruine, Little, & Jones, 2009). Given the link between extraversion and utilization of short-term mating strategies (Schmitt & Shackelford, 2008), it would be adaptive for extraverted women to be sensitive to the benefits of faces connoting heritable fitness in men (Penton-Voak & Chen, 2004).

Research has also considered the roles of similarity and complementarity as it relates to both perceivers' and targets' levels of Big Five traits (Sacco & Brown, 2018). When tasked with selecting faces they preferred among all the Big Five traits, a similarity effect for openness to experience occurred. That is, highly open individuals preferred faces connoting similarly high levels of openness, suggesting interest in identifying conspecifics capable of best satisfying a mutual interest in diverse experiences. Conversely, effects of complementarity emerged for neuroticism, such that highly neurotic women preferred agreeable male and antagonistic (i.e., low agreeableness) female faces. Such preferences could have been in the service of identifying men who would be less prone to infidelity (Schmitt & Shackelford, 2008) and women who could be deemed undesirable partners, making neurotic women look better in comparison (Smith, 2000). For neurotic men, however, a preference for highly open male faces emerged that was complemented by an aversion to open female faces. This aversion to open women could provide a similar function to avoid mates with greater proclivity toward infidelity. These results suggest that the interpersonal motives of personality traits facilitate the identification of conspecifics capable of satisfying various goals through the identification of these affordances in facial structures.

5.1.2 | Chronic motives

Along with traits traditionally classified as personality, various motivational states assume properties of these traits, given the variation in activation between individuals and such activation's chronic nature (McConnell, 2011; Neel, Kenrick, White, & Neuberg, 2016). Such chronic motives are typically in the service of attaining a survival or reproductive goal and necessitate individuals to prioritize certain goals over others, thus manifesting as a trade-off (Kenrick, Griskevicius, Neuberg, & Schaller, 2010). In relation to facially communicated extraversion, a personality trait implicated in various costs and benefits as they relate to specific social motives is differentially preferred and avoided as function of perceivers' most salient goals, namely, those related to affiliation, pathogen avoidance, and mating.

Extraverted individuals are especially gregarious and capable of facilitating social bonds (Ashton & Lee, 2007) while association with them affords access to extensive social networks (Pollet et al., 2011). This would implicate extraverted conspecifics as optimal to facilitate affiliative opportunities. When tasked with selecting between experimentally manipulated extraverted and introverted faces (see Figure 2 for sample stimuli), participants preferred facially communicated extraversion overall, although this preference is especially apparent among those with chronically heightened affiliative motives, as indexed by individual differences in need to belong (Brown & Sacco, 2017a). Conversely, extraverted individuals' increased interpersonal contact implicates them as pathogenic threats (Nettle, 2005), necessitating those with chronically activated pathogen-avoidance motives to avoid extraverted conspecifics. Indeed, individuals with chronically heightened pathogen-avoidant motives reported a reduced preference for facially communicated extraversion of the opposite sex (Brown & Sacco, 2016). Taken together, these results suggest that individuals are capable of identifying the trade-off associated with extraversion through facial structures and prefer faces representing affordances that would facilitate chronic goal acquisition.

Furthermore, chronically activated mating motives provide the basis of preferences for facially communicated extraversion. Along with sociability, extraversion corresponds with masculinity in male faces (Kramer et al., 2011). This connection could indicate that more extraverted men possess greater heritable fitness and therefore are more attractive as short-term mates (Li & Kenrick, 2006). Furthermore, extraverted men's own unrestricted sociosexuality, which is associated with greater interest in sexual promiscuity and sexual variety (Schmitt & Shackelford, 2008), implicates them as especially desirable for women motivated by short-term mating goals who are particularly sensitive to facial features connoting sexual receptivity (Sacco, Hugenberg, & Sefcek, 2009). Indeed, sociosexually unrestricted women exhibit heightened preferences for facially communicated extraversion in male faces, whereas



FIGURE 2 Female and male face composites communicating high (50% original face/50% composite extraversion composite) and low (50% original face/50% introversion composite) levels of extraversion (Brown & Sacco, 2016)

restricted women, those interested in long-term mating, preferred introversion (i.e., low extraversion) in male faces (Brown & Sacco, 2017b). Unexpectedly, unrestricted men also preferred extraverted male faces. This preference would likely not be for the same reason as women, as men's preference for may reflect a sensitivity toward facial features that would connote extraverted men as sexual rivals (Schmitt & Shackelford, 2008).

5.1.3 | Acute motives

Along with investigating how chronic motives heighten preferences for facially communicated extraversion, research has started to consider how acutely activated motivational states influence personality preferences. Given the association between dispositional need to belong and a preference for facial extraversion and that social exclusion heightens preferences toward facial features connoting affiliative opportunities (Bernstein, Sacco, Brown, Young, & Claypool, 2010), acutely activated affiliative motives should elicit similar preferences. In fact, following an exclusionary experience via Cyberball, individuals reported heightened preferences for facially communicated extraversion (Brown, Sacco, & Medlin, under review). Interestingly, such heightened preferences were only apparent among men, which could suggest that men may be more attuned to the trade-off as a function of inclusionary status compared to women. Men were more cautious about extraversion following satisfaction of their affiliative needs, and they would subsequently value the dominance and potential intrasexual threat of extraversion that co-occurs with the gregariousness (Cheng et al., 2010; Nettle, 2005). However, the thwarting of belongingness needs elicited greater valuation of the gregariousness of extraversion to ensure optimum affiliative opportunities. That is, when men's affiliative needs are met, the interpersonal dominance signal associated with extraversion may create caution toward extraverted persons; however, when affiliative needs are thwarted through the experience of rejection, men seem to emphasize the value of the affiliative function of the extraversion signal over the interpersonal threat signal of extraversion.

5.2 | Dark Triad preferences

Along with indicating preferences for faces connoting the Big Five, research has also investigated how various motivational states influence preferences for facial structures connoting the Dark Triad. For example, in an assortative mating process, highly narcissistic women, along with those with heightened reproductive success, typically prefer male faces connoting high levels of narcissism over low levels of narcissism (Lyons & Blanchard, 2016). Much like extraversion, narcissistic facial structures could connote men's interest in short-term mating, thereby facilitating identification of mating opportunities. This possibility is further bolstered by research indicating sociosexually unrestricted women are particularly sensitive to these communicative properties in narcissistic faces and prefer them over non-narcissistic faces (Marcinkowska, Helle, & Lyons, 2015). However, unrestricted women are nonetheless averse to faces connoting high levels of psychopathy and Machiavellianism and are unwilling to make that preferential trade-off. This aversion to Dark Triad faces is also apparent among sensation-seeking women who may be especially averse to the costs despite their desire for sexual gratification (Brewer, Carter, Lyons, & Green, 2018).

Another social motive that could moderate preferences for faces connoting the Dark Triad includes chronic self-protection motives, or those implicated in preventing physical harm. Research indicates that such motives moderate sensitivity in discerning trustworthy facial features from untrustworthy, especially among women (Sacco, Brown, Lustgraaf, & Young, 2017). When considering how such motives influence aversion to exploitative personalities, participants were tasked with indicating their preference among face pairs communicating high and low psychopathy before indicating their dangerous world beliefs, a proxy for chronic self-protection motives (see Figure 3 for sample stimuli; Brown, Sacco, Lolley, & Block, 2017). Women with chronically activated self-protection motives reported particularly high aversion to psychopathic faces. Conversely, men with similar beliefs reported tolerance for these faces. This sex difference suggests that men are more willing to make the trade-off of associating with exploitative



FIGURE 3 Female and male face composites connoting high (50% original face/50% high psychopathy composite) and low (50% original face/50% low psychopathy composite) levels of psychopathy (Brown et al., 2017)

conspecifics, which may serve as the basis of coalition building with members possessing willingness to aggress in group conflict (Bugental & Beaulieu, 2009). Because of physical size asymmetries imposed by sexual dimorphism (Sell, Hone, & Pound, 2012), women would be vulnerable to exploitation from such conspecifics. Thus, women would be less willing to make that trade-off. These findings suggest that self-protection motives serve to determine whether psychopathic individuals are perceived as allies or enemies.

When considering acutely activated motives, or instances, in which individuals value trade-offs of targets as a function of specific mating contexts, adaptive preferences for Dark Triad faces also emerge. When specifically considering long- versus short-term mating contexts, targets consistently prefer male faces communicating low levels of all three Dark Triad traits in both explicitly described long- and short-term mating contexts (Lyons et al., 2015). This suggests that women, in general, consider Dark Triad men too costly for either type of relationship. Although sensible for long-term mating as means to mitigate concerns of infidelity, the aversion in short-term mating may reflect awareness of the potential exploitation from such men that sociosexually unrestricted women would be more willing to potentially incur (Marcinkowska, Lyons, & Helle, 2016). Further, temporally activated resource acquisition motives influence preferences for Dark Triad faces. Specifically, priming women with resource abundance heightened their preference for male faces communicating high levels of Machiavellianism, a potentially adaptive preference in the service of acquiring a partner who may be better capable of maintaining access to resources (Lyons & Simeonov, 2016). Interestingly, research has also extended into ostensibly augmenting mating desires through alcohol consumption only to find a similar aversion to the Dark Triad (Brewer et al., in press). That is, intoxicated women are similarly averse to Dark Triad faces, which further illuminates the magnitudes of costs associated with these personalities.

6 | LIMITATIONS AND FUTURE DIRECTIONS

These results indicate that humans can infer personality through facial structure alone and ultimately determine their interest in such personalities in predictable, adaptive capacities. This suggests that humans can infer another's behavioral intentions and subsequently associate with those who may best satisfy their salient needs. However, despite evidence suggesting these preferences occur, the extant literature considering face preferences as a function of social motives has focused almost exclusively on how perceiver individual differences influence these preferences (for examples of studies that attempted experimental manipulations, see Brown & Sacco, 2016; Lyons & Simeonov, 2016). Future research would benefit by investigating how acute activation of various social motives moderates preferences for facially communicated personality. Research could consider temporal activation of motives through priming, including immersive narratives in physically or pathogenically threatening situations to activate acute disease concerns (White, Kenrick, & Neuberg, 2013). To activate mating motives, researchers could use sexually arousing primes, which elicit heightened sensitivity toward facial cues connoting short-term mate quality (Brown & Sacco, 2018).

Along with previously mentioned examples of socially motivated preferences for facially communicated personalities, considerably less work has considered the specific structural changes associated with these traits. Indeed, individuals can infer personality through facial structures and individual facial features (e.g., Kramer & Ward, 2010; Little & Perrett, 2007) and perceptions of dominance correspond with facial extraversion and psychopathy (Kramer et al., 2011; Lyons et al., 2015), but the actual nature of these features has yet to be elucidated. Future studies may benefit from using composite face paradigms while tasking participants to rate the appearance of individual facial features. If extraversion and psychopathy correspond with dominance and masculinity in male faces, it would seem reasonable to predict such ratings would be especially apparent if the jawline were visible. If the jawline were occluded, perhaps ratings of masculinity or dominance would be muted, as the critical facial cues necessary for this inference would be limited. Another approach to investigating typical facial structures of personality could include having participants indicate which facial features they perceive as exemplifying various personality traits in a data-driven approach

(Dotsch & Todorov, 2012). Specifically, participants could rate a plethora of targets with varying facial structures on the extent to which each face exemplifies a trait. From there, researchers can extrapolate a typically selected face for each trait, which could build on the structural prototypes of other faces. This could afford researchers the opportunity to know which specific facial features connote personality based on others' perceptions.

Studies considering face preferences typically focus on personality traits that connote a certain level of physical dominance, such as extraversion (Cheng et al., 2010; Kramer et al., 2011). Although individuals are aware of the gregariousness conveyed in these facial structures, it is also likely for that gregariousness to have coevolved with a level of dominance necessary to engage others effectively (Penke, Dennisen, & Miller, 2007). Thus, individuals are potentially categorizing extraverted conspecifics as affording both affiliative opportunities and interpersonal threats with a salient context determining whether they prefer them. This is especially apparent for extraverted male face faces, as extraversion in female faces is unilaterally preferred whereas individuals more strongly consider the affordances of male faces (e.g., Brown & Sacco, 2017b). Given that faces may communicate both dominance and trustworthiness (Oosterhof & Todorov, 2008), perhaps the latter dimension may provide similar theoretically sensible results without having to consider that trade-off. For example, like trustworthiness, agreeableness may communicate benevolent intentions without having the covarying information present connoting dominance. In fact, research indicates an overall preference for agreeable faces in both male and female faces, suggesting an affiliative function not covarying with interpersonal costs (Sacco & Brown, 2018). Research would benefit from considering how motives to ensure safe or cooperative interactions facilitate identification of and preferences for benevolent conspecifics.

Much of this research involves focusing on the processes involved with extraverted facial features. Although these results remain theoretically sensible, they are nonetheless limited in their breadth. This limitation may be rooted in the fact that accuracy in detecting extraversion in faces is much higher than it is for traits such as openness to experience and neuroticism (Little & Perrett, 2007). Thus, identifying the social value of extraversion and deciding to affiliate with extraverted conspecifics may be a more automatic process than other traits, whereas certain traits or facets of these traits may be less easily detected; it ultimately becomes incumbent upon future research to determine the extent to which personality can be inferred through facial structures while identifying how personality cannot be inferred through these structures. Nonetheless, there is certainly value in considering how other traits may facilitate adaptive mating decisions.

Like extraversion, differential mating motives may also predict preferences similarly to agreeableness, for example, because of the consonant mating strategy connoted in agreeable facial structures. Extraverted individuals are particularly interested in utilizing short-term mating strategies, which could be a product of their selected gregariousness for initiating various relationships (Nettle, 2005; Schmitt & Shackelford, 2008). In fact, women with an unrestricted sociosexually prefer extraverted male faces, potentially from their inference of such men as possessing consonant mating strategies (Brown & Sacco, 2017b). Conversely, agreeable individuals prefer long-term mating and produce considerable marital satisfaction (Botwin, Buss, & Shackelford, 1997; Schmitt & Shackelford, 2008), which would implicate agreeable faces as indicative of someone with long-term mating goals and therefore ideal for that context. Perhaps sociosexually *restricted* women prefer agreeableness. Such a preference would seem sensible, given humans' ability to infer behavioral intentions from facial structures. Furthermore, activating long- or short-term mating goals may adaptively fluctuate women's interest in these traits to foster association with men with similar mating goals (Griskevicius, Cialdini, & Kenrick, 2006).

6.1 | Complementary and alternative explanations

Although we posit individuals are accurately inferring these specific traits and making decisions based on the affordances of these inferences, such inferences are likely not independent of those for other dimensions of facial structures. Inferences could be made toward the overall trustworthiness, dominance, and attractiveness of these faces, which elicit similar preferences based on salient social motives (Oosterhof & Todorov, 2008; Sacco, Brown,

& Lustgraaf, 2016; Sutherland et al., 2013). In fact, previous research indicates that specific behavioral repertoires and appearances ultimately covary with certain personalities that would implicate a simultaneous detection of these more basal facial traits. For example, extraverted individuals are more interpersonally dominant and attractive than introverted individuals (Cheng et al., 2010; Lukaszewski & Roney, 2011), with selection of extraverted faces being reflected by these facts in previous research (Brown & Sacco, 2016, 2017a, 2017b). However, identifying these basal traits could ultimately inform inferences of a superordinate trait based on the combination of the basal traits. Considering extraversion further, these structures could have communicated both dominance and an intention to affiliate (i.e., trustworthiness and warmth), with such faces being more attractive, and individuals would decide whether to value certain aspects of this superordinate trait in indicating their preferences. For those seeking affiliation, individuals would recognize both the affiliative intent and dominance in these faces and ultimately value the former in their decision, as such conspecifics would afford satisfaction of salient goals (Brown & Sacco, 2017a). Conversely, those disinterested in affiliation may value the faces' dominance over the intent and ultimately become averse to extraverted faces. When inferring agreeableness in faces, individuals may ultimately be inferring high trustworthiness and low dominance, which would result in an overall preference for agreeableness without having to consider a trade-off (Sacco & Brown, 2018). Thus, although individuals would infer the basal traits in the faces, their decisions are rooted in inferences of the combination of different traits and how that combination would satisfy their needs.

Although our results are ultimately couched in an evolutionary framework, alternative frameworks could potentially provide complementary explanation for our findings. For example, our results could be explained through a Dorian Gray effect, or that idiosyncratic variation in appearance predicts the nature of interpersonal interactions and shapes personality over time (Zebrowitz, Voinescu, & Collins, 1996). Specifically, impressions of another's traits ultimately elicit overgeneralizations toward those of specific facial qualities instead of making inferences drawn from the veridical cues to their personality (Zebrowitz, Fellous, Mignault, & Andreoletti, 2003). However, these generalizations can ultimately be further couched into another adaptive framework that elicits a reciprocal feedback loop of conveyed personality and perceived personality. From a facultative calibration perspective (e.g., Lukaszewski & Roney, 2011; von Rueden, Lukaszewski, & Gurven, 2015), individuals possess certain physical phenotypes that could afford them the opportunity to engage others in an effective capacity, which would ultimately shape their personality. Given that personality has situationally predicted properties (McConnell, 2011), it would seem sensible to predict that personality could be influenced in that capacity and perceivers could recognize that these individuals possess the social affordance for interactions, which could provide a complementary piece of information about another's personality.

6.2 | Methodological considerations

Although various studies implementing preference tasks appear theoretically sensible, they are often constrained by methodological limitations. Face preference tasks typically consider general preferences without specifying context. For example, a task may ask participants to indicate which face in a pair they prefer without context for that preference. Researchers can assess both opposite- and same-sex perceptions within the same study for facial extraversion in mating studies (Brown & Sacco, 2017b), but the task's ambiguity may not necessarily reveal the basis for the decision to select one face versus another. For sociosexually unrestricted women's heightened preference for male extraversion, it would seem sensible to predict that this preference may be tied to perceiving such men as better short-term mates than introverted men; researchers could task women to indicate their preferences within specific mating contexts.

Sociosexually unrestricted men's similarly heightened preference for extraverted male faces may not necessarily reflect interest in such targets, rather a measure of sensitivity toward facial features connoting intrasexual competition (Brown & Sacco, 2017b). To clarify the basis of this unexpected finding, male participants could be tasked with indicating which face in extravert-introvert pairs appears more promiscuous or intrasexually threatening. Future research could also clarify the basis for the apparent aversion to psychopathy as interaction partners (Brown et al., 2017). Perhaps the aversion is related to perceptions of psychopathic faces as more dangerous than non-psychopathic faces.

Holtzman (2011) validated the original Dark Triad composites using scalar responses for various aspects of the three traits, by showing perceptions of these faces corresponded with the self- and other-reports that drove the composites' creation. This could suggest that facially communicated personality may produce a unique signal from which individuals can categorize faces into exemplifying various traits at high and low levels. Not only would these faces exemplify higher or lower levels of various personality traits, using categorization tasks could help determine if facially communicated personality operates in distinct categories. Future research could test this possibility using categorization tasks, in which participants may respond to various unique targets by indicating that target's membership in a category. For example, it may be possible for participants to view faces communicating high and low levels of extraversion and accurately categorize them as being an "Extravert" or "Introvert." Given work demonstrating narcissistic individuals' sensitivity toward faces with similar traits (e.g., Lyons & Blanchard, 2016), it may be possible that certain personality traits may more accurately categorize faces communicating high levels of those traits. For example, individuals who perceive the world as a dangerous place may more accurately identify psychopathy from non-psychopathy, which could potentially be the product of their ability to perceive the criteria necessary to identify a face as psychopathic.

7 | CONCLUSION

Variability in human personality may be adaptive insofar as various personality "types" are conducive to enhanced survival and reproduction in various kinds of social groups and ecological niches. The ability to use a variety of cues to infer another's relative personality would be adaptive in facilitating the identification of conspecifics that would be most capable of satisfying a perceiver's goals, such as securing mating opportunities and social affiliation and avoiding exploitative or threatening conspecifics. Such identification would ultimately elicit a preference for these conspecifics who would optimize attainment of one's goals. Beyond self-assessment, other-assessment, and inference from targets' past behavior, the current work discusses individuals' ability to accurately infer personality from facial structural cues as well as how dispositional and fundamental social motives lead to adaptive target personality preferences based on such thin slices with respect to conspecifics.

CONFLICT OF INTEREST STATEMENT

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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How to cite this article: Sacco DF, Brown M. The face of personality: Adaptive inferences from facial cues are moderated by perceiver personality and motives. *Soc Personal Psychol Compass*. 2018;e12410. <https://doi.org/10.1111/spc3.12410>