



# Eyebrows cue grandiose narcissism

Miranda Giacomini | Nicholas O. Rule

University of Toronto

**Correspondence**

Miranda Giacomini, Department of Psychology, University of Toronto, 100 St. George Street, Toronto, Ontario, Canada M5S 3G3.  
Email: miranda.giacomini@utoronto.ca

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**Abstract**

**Objective:** Though initially charming and inviting, narcissists often engage in negative interpersonal behaviors. Identifying and avoiding narcissists therefore carries adaptive value. Whereas past research has found that people can judge others' grandiose narcissism from their appearance (including their faces), the cues supporting these judgments require further elucidation. Here, we investigated which facial features underlie perceptions of grandiose narcissism and how they convey that information.

**Method and Results:** In Study 1, we explored the face's features using a variety of manipulations, ultimately finding that accurate judgments of grandiose narcissism particularly depend on a person's eyebrows. In Studies 2A–2C, we identified eyebrow distinctiveness (e.g., thickness, density) as the primary characteristic supporting these judgments. Finally, we confirmed the eyebrows' importance in Studies 3A and 3B by measuring how much perceptions of narcissism changed when swapping narcissists' and non-narcissists' eyebrows between faces.

**Conclusions:** Together, these data show that distinctive eyebrows reveal narcissists' personality to others, providing a basic understanding of the mechanism through which people can identify narcissistic personality traits with potential application to daily life.

**KEYWORDS**

eyebrows, face perception, narcissism, personality, person perception

## 1 | INTRODUCTION

Making accurate first impressions can prevent costly interpersonal mistakes (e.g., dating or hiring the wrong person). Mixed signals from desirable and undesirable attributions may confound impression makers, however. For example, some people may initially appear friendly and outgoing but then become hostile, disagreeable, and defensive. Identifying “dark” personality tendencies, which sometimes lie beneath charismatic veneers, can allow one to avoid such toxic individuals.

Grandiose narcissism<sup>1</sup> (the tendency to be egotistical, self-focused, and vain) is a common “dark” personality trait (Furnham, Richards, & Paulhus, 2013). Despite expressing positive qualities, such as self-confidence and extraversion, narcissists also display selfishness, egotism, entitlement, and

vanity (Jones & Paulhus, 2010). Though initially well-liked, narcissists become disliked as people recognize that they care more about attention and admiration than intimacy or closeness (e.g., Back, Schmukle, & Egloff, 2010; Campbell, 2005; Paulhus, 1998). Their charm and charisma thus allow narcissists to manipulate social situations and lead people to make poor decisions when deciding whom to befriend, date, or hire (Campbell & Foster, 2007). Identifying narcissists early might therefore help one to avoid the negative interpersonal consequences often associated with narcissists (Funder, 1995; Muris, Merckelbach, Otgaar, & Meijer, 2017).

Although researchers have avidly studied how perceptions of narcissism influence the formation and longevity of relationships, few have considered how these perceptions develop. Here, we adopt a social-cognitive approach to examine the basic perceptual features that perceivers use to

judge narcissism. Specifically, we examined how naïve perceivers accurately detect grandiose narcissism from people's facial features.

### 1.1 | Person perception from facial cues

The face is often the first thing one notices about a person (Zebrowitz, 1997). People preferentially attend to others' faces prior to noticing their gestures or adorned physical appearance (Hewig, Trippe, Hecht, Straube, & Miltner, 2008; Kanwisher, 2000). Faces supply people with important nonverbal information about others that can dramatically influence interpersonal interactions. For instance, mere static photos of internal facial features signal individuals' social category memberships and personality characteristics (see Re & Rule, 2015, for a review). Moreover, such perceptions predict meaningful outcomes, such as hiring decisions (Bjornsdottir & Rule, 2017; Rule, Bjornsdottir, Tskhay, & Ambady, 2016). People therefore use facial information to determine whom to approach or avoid.

### 1.2 | Detecting narcissism at first glance

Studies have also shown that people can reliably "spot a narcissist" based on pertinent cues that manifest in physical appearance, including just the person's face (Holtzman, 2011; Holtzman & Strube, 2013; Naumann, Vazire, Rentfrow, & Gosling, 2009; Vazire, Naumann, Rentfrow, & Gosling, 2008). Specifically, individuals reporting high (vs. low) levels of narcissism tend to wear more fashionable, stylish, and expensive clothing; have a neater, more organized appearance; and look more attractive (Back et al., 2010; Vazire et al., 2008). Perceivers recognize these as valid cues and use them to accurately judge others' narcissism.

Yet Holtzman (2011) also found that participants could accurately judge grandiose narcissism from emotionally neutral faces free of cosmetics. More interesting, Holtzman and Strube (2013) found that narcissists could modulate their attractiveness through adornment better than non-narcissists but that both looked equally attractive when unadorned. Although narcissists may not naturally be more attractive than non-narcissists, narcissism seems to carry an enduring physical signature in the face that goes beyond adornment.

Here, we sought to determine what that is. Doing so may have broad implications for understanding the manifestation of personality traits in facial appearance and provide a fundamental understanding of how people construct impressions of others' narcissism. Examining the facial features linked to narcissistic traits can help to explain how narcissists modulate their appearance to gain the recognition, notoriety, or status that they often crave. Moreover, it may hold benefits for daily life by illuminating possible ways to avoid the detrimental interpersonal consequences that often arise from associating with narcissists.

## 1.3 | The current research

Although Holtzman (2011) found that emotionally neutral faces express grandiose narcissism, the underlying cues remain undetermined. Here, we isolated specific facial features to establish how people accurately identify narcissists. We then analyzed perceivers' judgments, the narcissists' traits, and the intervening cues by applying a lens model analysis to elucidate the features that perceivers use to accurately judge others' narcissism (Brunswik, 1952).

Several facial features could contribute to narcissism judgments. For instance, narcissism relates to social dominance (Twenge & Campbell, 2003), which can stem from multiple facial cues (see Re & Rule, 2015, for a review). Head tilt, eye gaze, mouth width, and angularity<sup>2</sup> inform judgments of dominance and related traits (e.g., anger, hostility; Adams & Kleck, 2005; Re & Rule, 2016). Because we did not predict which features might underpin the detection of narcissism a priori, we deconstructed the face using a data-driven approach.

We began in Study 1 by sequentially assessing perceptions of individuals' entire faces, narrowing through holistic versus piecemeal face processing by examining judgments of inverted faces (Yin, 1969), calibrating to regions of the face (i.e., the upper and lower halves), isolating the eyes through several tests, and, finally, localizing participants' accurate judgments to the targets' eyebrows. We then focused on the characteristics of the eyebrows in Studies 2A and 2B, and constructed a lens model to determine which aspects of the eyebrows serve as valid cues to grandiose narcissism in Study 2C. Finally, we confirmed the brows' relevance in Studies 3A and 3B by experimentally manipulating targets' eyebrows and measuring how much it changed perceptions of narcissism.

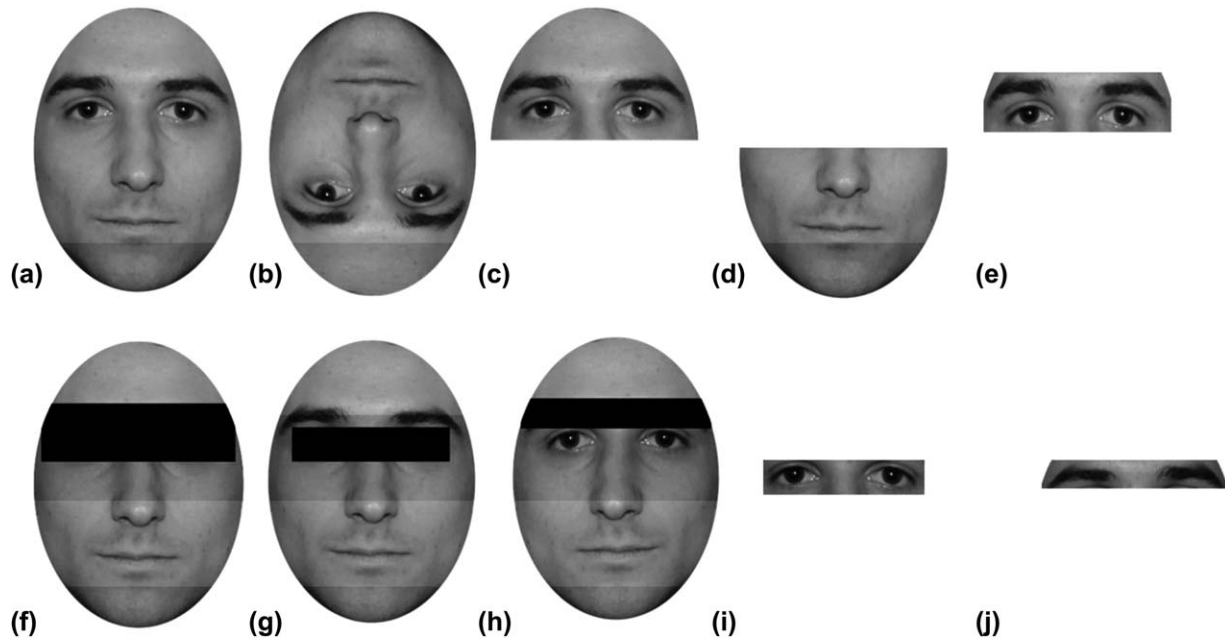
## 2 | STUDY 1

Our first goal was to identify which facial features people use to accurately judge narcissism. Though participants in Holtzman's (2011) research detected narcissism from neutral faces, the features that supported their judgments remain unknown. We therefore undertook an exploratory, data-driven approach in which we first assessed perceptions of targets' whole faces and then progressively isolated the relevant areas in a sequence of tests.

### 2.1 | Method

#### 2.1.1 | Materials

We photographed 39 undergraduate students ( $M_{\text{age}} = 21.83$  years,  $SD = 2.81$ ; 26 female, 13 male; 32 Caucasian, 7 non-Caucasian) posing neutral expressions under standardized conditions in a lab, after which they completed the



**FIGURE 1** Sample stimuli: (A) full face, (B) inverted face, (C) upper half of face, (D) lower half of face, (E) eyes and brows only, (F) face with eyes and brows occluded, (G) face with eyes occluded, (H) face with eyebrows occluded, (I) eyes only, and (J) brows only

Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988;  $M = 14.15$ ,  $SD = 5.85$ , range = 4–29;  $\alpha = .79$ ). We converted the photos to grayscale and initially cropped them to show only the internal facial features (i.e., excluding hair, ears, and clothing), subsequently cropping them relevant to each condition described below (see Figure 1).

The NPI assesses how much people endorse a series of narcissistic tendencies (e.g., “If I ruled the world it would be a better place”) and measures both adaptive (e.g., leadership) and maladaptive components of narcissism (e.g., grandiosity, entitlement). We adopted a three-dimensional approach (Ackerman et al., 2011) that divides the NPI into Leadership/Authority (L/A; e.g., “I like to have authority over other people”; 11 items,  $\alpha = .72$ ), Grandiose Exhibitionism (GE; e.g., “I like to show off my body”; 10 items,  $\alpha = .72$ ), and Entitlement/Exploitativeness (E/E; e.g., “I find it easy to manipulate people”; four items,  $\alpha = .20$ ).

### 2.1.2 | Procedure

To begin, 28 Mechanical Turk (MTurk) workers<sup>3</sup> ( $M_{\text{age}} = 31.96$  years,  $SD = 9.35$ ; 14 male, 14 female) rated how narcissistic they thought most people in society would probably consider each person, on a scale ranging from 1 (*not at all narcissistic*) to 8 (*extremely narcissistic*), in random order based on tightly cropped photos that showed only the face’s internal features.<sup>4</sup> Participants were told that “the word narcissist means egotistical, self-focused, and vain”; procedures were the same in all conditions.

We then tested whether perceivers’ judgments relied on the arrangement of a set of facial features (vs. an individual feature

alone) by asking 27 separate MTurk workers ( $M_{\text{age}} = 31.48$  years,  $SD = 10.84$ ; 14 male, 13 female) to judge the faces upside down. People process upright faces as unified wholes but process inverted faces as assemblies of their parts (e.g., eyes, mouth; Tanaka & Farrah, 1993). Thus, if participants still accurately judge others’ narcissism, it would suggest that they use specific features to make their judgments.

Observing the results of the inverted-face test, we asked new MTurk workers to judge either the upper ( $N = 30$ ;  $M_{\text{age}} = 31.87$  years,  $SD = 7.26$ ; 17 male, 13 female) or lower half of targets’ faces ( $N = 29$ ;  $M_{\text{age}} = 32.38$  years,  $SD = 10.99$ ; 18 male, 11 female) to home in on the features involved. Based on those results, we focused on the salient features in the upper half of the face by asking separate MTurk workers to rate either the eyes and eyebrows in isolation ( $N = 30$ ;  $M_{\text{age}} = 29.00$  years,  $SD = 8.50$ ; 13 male, 17 female) or full faces with the eyes and brows occluded (i.e., the complement;  $N = 27$ ;  $M_{\text{age}} = 31.26$  years,  $SD = 9.18$ ; 16 male, 11 female).

Upon determining the eye region’s relevance, we aimed to distinguish the eyes’ and brows’ contributions by asking new MTurk workers to rate full faces with the eyes (but not brows) occluded ( $N = 27$ ;  $M_{\text{age}} = 33.44$  years,  $SD = 7.93$ ; 14 male, 13 female), full faces with the eyebrows (but not eyes) occluded ( $N = 33$ ;  $M_{\text{age}} = 30.94$  years,  $SD = 5.57$ ; 19 male, 14 female), the eyes alone ( $N = 29$ ;  $M_{\text{age}} = 35.79$  years,  $SD = 10.65$ ; 15 male, 14 female), or the eyebrows alone ( $N = 29$ ;  $M_{\text{age}} = 31.11$  years,  $SD = 9.32$ ; 15 male, 13 female, 1 unknown).

## 2.2 | Results and discussion

We correlated every participant’s rating of each target with the targets’ overall self-reported NPI scores. We transformed

**TABLE 1** Study 1: Descriptive statistics and results of one-sample *t* tests for the Fisher-transformed accuracy correlations across conditions

Condition	<i>Mz</i> ( <i>SD</i> )	95% CI	<i>t</i>	Cohen's <i>d</i>
Full face	.07 (.16)	[.01, .13]	2.32*	0.44
Full face (Sample 2)	.07 (.16)	[.01, .13]	2.49*	0.44
Inverted face	.12 (.20)	[.04, .20]	3.02**	0.60
Upper half of face	.07 (.12)	[.03, .12]	3.27**	0.58
Lower half of face	−.01 (.20)	[−.09, .07]	−0.33	−0.05
Eyes and brows only	.07 (.16)	[.01, .13]	2.33*	0.44
Face with eyes and brows occluded	.01 (.17)	[−.05, .08]	0.45	0.06
Face with eyes occluded	.08 (.18)	[.01, .15]	2.25*	0.44
Face with eyebrows occluded	.03 (.15)	[−.03, .08]	0.99	0.20
Eyes only	.02 (.15)	[−.04, .07]	0.60	0.13
Eyebrows only	.04 (.17)	[−.03, .10]	1.11	0.24

Note. CI = confidence interval.

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

these accuracy correlations to Fisher's *z*s and compared them to zero using one-sample *t* tests to measure the participants' accuracy (see Table 1).

As expected, perceivers could detect others' narcissism from upright faces. Moreover, they also detected narcissism from inverted faces, suggesting that independent features may support accurate perceptions. Tests of the upper and lower halves of the faces showed that participants accurately detected narcissism from the upper but not lower half of the face. We therefore narrowed our search to the salient features in the upper half of the face—the eyes and brows. Participants continued to accurately judge narcissism when viewing the combined eye and brow region, but not when this same area was occluded in the full face, confirming that narcissism's cue lies in the eye region. A subsequent test focusing on just the eyes (without brows visible) left participants unable to accurately detect narcissism, whereas complementarily occluding the eyes from full faces did evidence accurate judgments; thus, the cue appeared to reside within the eye region but not within the eyes themselves. A final test of just the eyebrows did not result in accurate judgments; yet, people could not accurately detect narcissism from the face when the eyebrows were occluded. Although we did not find direct positive evidence implicating the eyebrows as the definitive cue to narcissism, the combination of (a) significant accuracy for the total eye region (but not when occluding it), (b) significant accuracy when occluding the eyes but not brows, and (c) no accuracy when occluding the eyebrows from the full face suggests that the eyebrows play a critical role in perceptions of narcissism.

Calculating accuracy correlations for the NPI subscales provided additional insight. Because the E/E subscale showed

particularly low interitem reliability, we examined the L/A and (most critical) GE subscales (contact the corresponding author for E/E subscale results). The participants' accuracy correlations did not significantly differ from zero for the targets' L/A subscale scores in any condition (see Table 2). The associations with the GE subscale, however, supported the eyebrows' value: The accuracy correlations significantly exceeded zero when participants judged the upper half of the

**TABLE 2** Study 1: Mean Fisher-transformed accuracy correlations for the NPI subscales

Condition	L/A	GE
Full face	.05 (.20)	.05 (.19)
Full face (Sample 2)	.06 (.18)	.04 (.17)
Inverted face	−.02 (.18)	.06 (.18)†
Upper half of face	.00 (.11)	.10 (.15)*
Lower half of face	−.05 (.21)	−.01 (.20)
Eyes and brows only	.02 (.16)	.08 (.16)*
Face with eyes and brows occluded	.02 (.18)	.02 (.20)
Eyes only	−.03 (.19)	.04 (.13)
Face with eyes occluded	.00 (.19)	.12 (.18)*
Eyebrows only	−.04 (.15)	.14 (.16)*
Face with eyebrows occluded	−.01 (.17)	.04 (.14)

Note. L/A = Leadership/Authority subscale; GE = Grandiose Exhibitionism subscale. Standard deviations are in parentheses.

†*p* < .06. \**p* < .05. \*\**p* < .01.



face, the eye region, the full face when only occluding the eyes, and the eyebrows alone. This sequence of results helps to establish the importance of the eyebrows for cuing grandiosity.

Given the different gender norms associated with eyebrow grooming, it seemed reasonable that the findings might differ by target gender. Because we had only 13 male targets, any such comparison remains highly tentative. Nevertheless, separate exploratory accuracy correlations showed that participants accurately identified narcissism from women's ( $M_z = .08$ ,  $SD = .20$ ), 95% CI [.01, .16],  $t(28) = 2.44$ ,  $p = .022$ ,  $d = 0.40$ , but not men's eyebrows ( $M_z = .00$ ,  $SD = .34$ ), 95% CI [-.14, .13],  $t(28) = -0.01$ ,  $p = .99$ ,  $d = 0.00$ . The same pattern emerged for separate accuracy correlations for the GE subscale: Participants accurately identified GE from women's ( $M_z = .15$ ,  $SD = .20$ ), 95% CI [.08, .23],  $t(28) = 4.10$ ,  $p < .001$ ,  $d = 0.75$ , but not men's eyebrows ( $M_z = .00$ ,  $SD = .26$ ), 95% CI [-.11, .10],  $t(28) = -0.09$ ,  $p = .93$ ,  $d = 0.00$ . Though provisional, these distinctions might help to illuminate why ratings of the eyebrows alone did not significantly relate to targets' overall (cf. GE) NPI scores.

Although these data suggest that eyebrows may constitute a primary cue for accurately detecting grandiose narcissism, considering this exploratory study's many limitations (e.g., susceptibility to false-positive results due to multiple, albeit funneled, testing; the small number of targets judged in each condition; and the very few male targets in the sample), we engaged in confirmatory testing of the brows' role in Study 2.

### 3 | STUDY 2

Converging results in Study 1 suggested that eyebrows cue grandiose narcissism. We sought to confirm this using improved methods in Study 2. First, we recruited a larger sample of targets. Although the proportion of men remained low, we managed to recruit enough men for a reasonably powered analysis using accuracy correlations (Cronbach & Shavelson, 2004). Second, given our interest in grandiose narcissism and the greater precision of the GE subscale in Study 1, we focused on targets' overall narcissism and GE scores (contact the corresponding author for L/A and E/E subscale results).

In Study 2A, we replicated the eyebrows-only condition from Study 1 with this larger target sample. In Study 2B, we decomposed the eyebrows further by examining the legibility of narcissism from each single brow to determine the importance of the relation between the eyebrows as a pair versus specific features (e.g., grooming, hair density). We then coded the physical details of the targets' brows in Study 2C, applying a lens model analysis to glean which aspects of the

eyebrows contribute to individuals' perceptions (cue utilization) and accuracy (cue validity; Brunswik, 1952).

### 3.1 | Study 2A

#### 3.1.1 | Method

##### Materials

We photographed 121 undergraduates ( $M_{\text{age}} = 18.62$  years,  $SD = 2.56$ ; 89 female, 32 male; 45 East Asian, 21 Caucasian, 15 Southeast Asian, 11 South Asian, 10 Middle Eastern, 8 Hispanic, 3 African descent, 8 "other") posing neutral expressions under standardized conditions in our lab; all completed the NPI ( $M = 14.12$ ,  $SD = 6.24$ ; range = 2–32;  $\alpha = .81$ ). Even among this larger sample, the targets showed low interitem reliability for the E/E subscale ( $\alpha = .28$ ) but good reliabilities for both the L/A and GE subscales ( $\alpha \geq .76$ ). We focused our analyses on the overall NPI score and GE subscore.

##### Procedure

MTurk participants ( $N = 182$ ;  $M_{\text{age}} = 32.69$  years,  $SD = 10.94$ ; 87 female, 93 male, 2 no response) rated the targets' photos cropped to show only their eyebrows (see Figure 1J), following the same procedure as in Study 1 (examples are available from the corresponding author).<sup>5</sup>

#### 3.1.2 | Results

We again converted the accuracy correlations to Fisher's  $z$ s, comparing them to zero using a one-sample  $t$  test for the entire sample and separately for the male and female targets. The mean accuracy correlations significantly exceeded zero for the full sample and for both genders (see Table 3). Last, the Fisher's  $z$ s for the GE subscores showed that they too significantly related to the narcissism ratings, as expected (see Table 4).

### 3.2 | Study 2B

#### 3.2.1 | Method

##### Materials

We used the same facial photos from Study 2A but also decomposed the eyebrows by cropping the left and right brow to each serve as independent stimuli.

##### Procedure

MTurk participants ( $N = 557$ ;  $M_{\text{age}} = 33.99$  years,  $SD = 11.13$ ; 269 female, 281 male, 7 missing) rated narcissism, as above. Here, participants were randomly assigned to one of five conditions: viewing both eyebrows ( $n = 139$ ), the left eyebrow ( $n = 144$ ), the mirror image of the left eyebrow ( $n = 69$ ), the right eyebrow ( $n = 140$ ), or the mirror image of

**TABLE 3** Studies 2A and 2B: Descriptive and test statistics for the accuracy correlations

Condition	<i>Mz (SD)</i>	95% CI	<i>t</i>	Cohen's <i>d</i>
Study 2A				
Both eyebrows				
All targets	.06 (.11)	[.04, .07]	7.36**	0.55
Female targets	.06 (.13)	[.03, .07]	5.22**	0.46
Male targets	.08 (.25)	[.05, .12]	4.46**	0.32
Study 2B				
Both eyebrows				
All targets	.03 (.09)	[.01, .04]	3.46**	0.33
Female targets	.03 (.10)	[.01, .05]	3.69**	0.30
Male targets	.04 (.18)	[.01, .07]	2.44*	0.22
Left eyebrow				
All targets	.04 (.07)	[.02, .04]	7.20**	0.57
Female targets	.05 (.13)	[.03, .06]	8.25**	0.38
Male targets	.02 (.17)	[−.00, .04]	1.84	0.12
Right eyebrow				
All targets	.02 (.08)	[.01, .03]	4.17**	0.25
Female targets	.03 (.09)	[.02, .04]	4.73**	0.33
Male targets	.03 (.18)	[.01, .06]	2.77**	0.17

Note. *SD* = standard deviation; *CI* = confidence interval.

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

the right eyebrow ( $n = 65$ ).<sup>6</sup> Participants saw one photograph of each target in a random order.

### 3.2.2 | Results

Replicating Study 2A, the mean accuracy correlation significantly exceeded zero for judgments of the full brows (both overall and for both genders separately; see Table 3) and even from just a single eyebrow, sparing one exception: Participants did not accurately judge the male targets' narcissism from their left eyebrow. Accuracy did not vary between the conditions across genders,  $F(2, 554) = 1.43$ ,  $p = .24$ ,  $\eta_p^2 = .01$ , or for male targets,  $F(2, 554) = 0.46$ ,  $p = .63$ ,  $\eta_p^2 = .00$ , but it did differ for female targets,  $F(2, 554) =$

**TABLE 4** Studies 2A and 2B: Mean Fisher-transformed accuracy correlations for the GE subscale

Condition	<i>Mz (SD)</i>	95% CI	<i>t</i>	Cohen's <i>d</i>
Study 2A				
Both eyebrows	.10 (.13)	[.08, .12]	10.63**	0.77
Study 2B				
Both eyebrows	.07 (.09)	[.06, .09]	8.67**	0.77
Left eyebrow	.08 (.09)	[.06, .09]	12.20**	0.88
Right eyebrow	.07 (.09)	[.06, .09]	11.34**	0.77

Note. GE = Grandiose Exhibitionism subscale. Standard deviations are in parentheses.

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

3.49,  $p = .03$ ,  $\eta_p^2 = .01$ . Moreover, GE subscores were related to perceptions of narcissism, as in Study 2A (see Table 4).

## 3.3 | Study 2C

### 3.3.1 | Method

To examine cue utilization and validity across Studies 2A and 2B, three coders independently rated the targets' eyebrows along several dimensions (e.g., amount of grooming, plucking, and arching). We calculated the inter-rater reliability for each item across the three coders (see Table 5).<sup>7</sup> In addition, 20 MTurk participants ( $M_{\text{age}} = 28.55$  years,  $SD = 3.95$ ; 11 male, 9 female) rated the brows' femininity on a scale ranging from 1 (*extremely feminine*) to 8 (*extremely masculine*), which we reverse coded. Another 20 MTurk participants ( $M_{\text{age}} = 37.42$  years,  $SD = 11.30$ ; 9 male, 11 female) rated how distinctive the brows looked on a scale ranging from 1 (*not at all distinctive*) to 8 (*extremely distinctive*).

We then conducted a principal components analysis with varimax rotation on the categories that had acceptable inter-rater reliability (above .75). This produced three factors, which we used to form grooming, distinctiveness, and femininity composites. Grooming positively correlated with distinctiveness,  $r(120) = .57$ ,  $p < .001$ , and femininity,  $r(120) = .36$ ,  $p < .001$ , and distinctiveness correlated with femininity,  $r(120) = .19$ ,  $p = .03$ .

### 3.3.2 | Results

#### Cue utilization

To examine cue utilization, we averaged perceivers' narcissism ratings for each target across the participant samples in Studies 2A and 2B to create an aggregate perceived narcissism score.<sup>8</sup> The mean narcissism ratings correlated strongly and positively with each of the composite grooming, distinctiveness, and femininity scores, indicating that participants used all three dimensions to form their impressions of the targets' narcissism (see Table 6).

#### Cue validity

To assess cue validity, we correlated the targets' self-reported overall NPI and GE subscores with each of the composite scores. The overall scores did not correlate with the composites, but the GE subscores positively correlated with distinctiveness, suggesting that grandiose narcissists may have more grandiose eyebrows.

#### Mediation model

We conducted a multiple mediation model using PROCESS (Hayes, 2013) with 5,000 bootstraps to test a lens model relating the GE subscores to perceptions of narcissism via eyebrow distinctiveness, grooming, and femininity. The path

**TABLE 5** Inter-rater agreement and results of the principal components analysis for the eyebrow coding data

	ICC	Grooming	Distinctiveness	Femininity
Do the eyebrows look well groomed?	.90	<b>.88</b>	.34	.13
How shaped are this person's eyebrows?	.86	<b>.84</b>	.37	.20
How similar are the two eyebrows in terms of thickness?	.75	<b>.49</b>	.28	.19
Are the eyebrows plucked?	.87	<b>.90</b>	.24	.14
How much are the eyebrows filled in with makeup?	.89	<b>.68</b>	.48	.11
Are the eyebrows trimmed?	.77	<b>.91</b>	.13	.13
How many stray hairs appear around the eyebrow? (R)	.87	<b>.93</b>	.09	-.04
How far apart are the eyebrows? (R)	.86	.17	<b>.68</b>	.03
How dark are the eyebrows?	.85	.20	<b>.81</b>	.04
How thick are this person's eyebrows?	.80	.29	<b>.84</b>	-.15
How dense are the eyebrows in terms of amount of eyebrow hair?	.89	.36	<b>.84</b>	-.09
How distinctive?	.95	.21	<b>.80</b>	.27
How arched are this person's eyebrows?	.89	.12	.44	<b>.67</b>
How masculine or feminine? (R)	.97	.21	-.28	<b>.76</b>
Eigenvalues		7.24	2.11	1.07
Variance explained		51.69%	15.07%	7.65%
Cronbach's alpha		.94	.90	.24
Mean (SD)		2.93 (1.02)	3.55 (0.75)	3.67 (0.77)
Range		1.24–4.95	1.93–4.93	1.64–5.41

Note. *SD* = standard deviation; ICC = intraclass correlation coefficient. (R) denotes a reverse-scored item. All factor loadings greater than .45 are boldfaced and indicate items included in each factor.

analyses demonstrated that distinctiveness,  $b = 0.47$ ,  $SE = 0.04$ , 95% CI [0.39, 0.56],  $t(116) = 10.67$ ,  $p < .001$ , grooming,  $b = 0.26$ ,  $SE = 0.05$ , 95% CI [0.17, 0.35],  $t(116) = 5.80$ ,  $p < .001$ , and femininity,  $b = 0.54$ ,  $SE = 0.04$ , 95% CI [0.46, 0.63],  $t(116) = 12.60$ ,  $p < .001$ , all related to perceived narcissism when controlling for GE, suggesting

**TABLE 6** Zero-order correlation coefficients between perceptions of narcissism from eyebrows (cue utilization) and targets' self-reported narcissism and GE (cue validity)

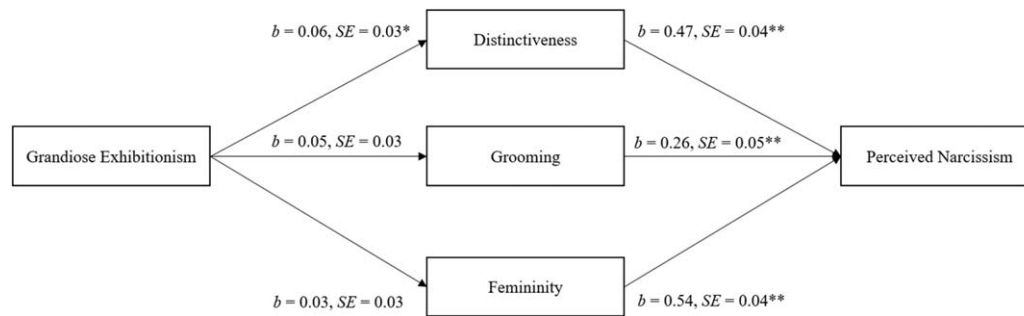
Coding composites	Cue utilization	Cue validity	
		NPI total	GE
Eyebrow grooming	.71**	.05	.16
Eyebrow distinctiveness	.72**	.08	.19*
Eyebrow femininity	.67**	.04	.09

Note. NPI = Narcissistic Personality Inventory; GE = Grandiose Exhibitionism subscale.

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

that perceivers used all three to judge narcissism. Distinctiveness,  $b = 0.06$ ,  $SE = 0.03$ , 95% CI [0.01, 0.12],  $t(119) = 2.14$ ,  $p = .03$ , but not grooming,  $b = 0.05$ ,  $SE = 0.03$ , 95% CI [-0.01, 0.11],  $t(119) = 1.75$ ,  $p = .08$ , or femininity,  $b = 0.03$ ,  $SE = 0.03$ , 95% CI [-0.03, 0.08],  $t(119) = 1.02$ ,  $p = .31$ , related to the GE subscores, highlighting it as the only valid cue. Yet, the indirect effects demonstrated that both distinctiveness,  $b = 0.03$ ,  $SE = 0.01$ , 95% CI [0.004, 0.06], and grooming,  $b = 0.01$ ,  $SE = 0.01$ , 95% CI [0.001, 0.03], mediated the association between the GE subscores and perceived narcissism, whereas femininity did not,  $b = 0.02$ ,  $SE = 0.01$ , 95% CI [-0.01, 0.04] (see Figure 2).

Despite the significant indirect effect of eyebrow grooming, its zero-order correlation and pathway to the GE subscores were only marginally significant. Further analysis of the indirect effect showed that it depended on removing the shared variance with distinctiveness and femininity. That is, the indirect effect of a separate mediation analysis with eyebrow grooming as the sole mediator was not significant,  $b = 0.04$ ,  $SE = 0.02$ , 95% CI [-0.001, 0.08]; moreover, when



**FIGURE 2** Multiple mediation model testing how composite scores for eyebrow grooming, distinctiveness, and femininity explain the association between the Grandiose Exhibitionism subscale of the NPI and the participants' perceptions of narcissism averaged across Studies 2A and 2B.  $b$  = unstandardized beta coefficients;  $SE$  = standard error. \* $p < .05$ . \*\* $p < .01$

distinctiveness was added to this model, the indirect effect was significant for eyebrow distinctiveness,  $b = 0.03$ ,  $SE = 0.01$ , 95% CI [0.004, 0.06], but not grooming,  $b = 0.02$ ,  $SE = 0.01$ , 95% CI [-0.01, 0.05]. This suggests that eyebrow distinctiveness (e.g., thickness, density) may be the primary characteristic supporting narcissism judgments.

### Gender differences

Although male and female targets did not have statistically different NPI scores,  $t(119) = 0.44$ ,  $p = .66$ ,  $d = 0.09$ , participants rated the female targets ( $M = 4.33$ ,  $SD = 0.87$ ) as more narcissistic than the male targets ( $M = 3.72$ ,  $SD = 0.57$ ),  $t(119) = 3.64$ ,  $p < .001$ ,  $d = 0.83$ , and as having more feminine eyebrows (female:  $M = 0.19$ ,  $SD = 0.70$ ; male:  $M = -0.54$ ,  $SD = 0.61$ ),  $t(119) = 5.21$ ,  $p < .001$ ,  $d = 1.11$ . Grooming (female:  $M = 0.01$ ,  $SD = 0.87$ ; male:  $M = -0.03$ ,  $SD = 0.83$ ),  $t(119) = 0.24$ ,  $p = .81$ ,  $d = 0.05$ , and distinctiveness did not differ by gender (female:  $M = 0.01$ ,  $SD = 0.85$ ; male:  $M = -0.01$ ,  $SD = 0.82$ ),  $t(119) = 0.08$ ,  $p = .94$ ,  $d = 0.02$ , and the multiple mediation (lens) model returned identical results when including target gender.

### 3.4 | Discussion

The results of Study 2 confirmed that people can accurately identify narcissism from facial features, even as little as a single eyebrow. Moreover, although perceivers considered eyebrow femininity, grooming, and distinctiveness when judging narcissism, only the last of these related to their accuracy. Grandiose narcissists thus seem to have more distinct eyebrows (e.g., thicker and denser), explaining how participants arrived at their accurate narcissism judgments. To definitively verify the eyebrows' role in narcissism perceptions, we supplemented these correlational data by experimentally manipulating targets' eyebrows in Study 3.

## 4 | STUDY 3

If eyebrows are important for determining people's narcissism, then we should see changes in how individuals are perceived

when donning more or less narcissistic eyebrows. In Study 3A, we manipulated the faces of targets with moderate narcissism scores to display the eyebrows of targets high in narcissism ("narcissists") and low in narcissism ("non-narcissists"), expecting that these otherwise narcissism-neutral targets would look more narcissistic when possessing the former rather than the latter. In Study 3B, we switched narcissists' and non-narcissists' eyebrows between their faces and compared narcissism judgments of the two. We predicted that people would perceive narcissists as less narcissistic when donning non-narcissists' brows and, conversely, would perceive non-narcissists as more narcissistic when donning narcissists' brows.

### 4.1 | Study 3A

#### 4.1.1 | Method

##### Materials

We selected five Caucasian women with low ( $M = 6.60$ ,  $SD = 1.67$ ), moderate ( $M = 14.00$ ,  $SD = 1.58$ ), and high NPI scores ( $M = 22.80$ ,  $SD = 3.38$ ) from the targets used in Study 1. We then digitally cropped the eyebrows of the high and low narcissism targets and placed them onto the moderate narcissism faces. This created 10 new photos of each moderate-narcissism target bearing the five narcissistic and five non-narcissistic targets' eyebrows.

##### Procedure

MTurk participants ( $N = 313$ ;  $M_{\text{age}} = 32.27$  years,  $SD = 9.37$ ; 124 male, 186 female, 3 "other") rated the photos using the same procedure as in Study 1. They saw one version of each face, never seeing the same brows or face twice (i.e., five ratings total).

#### 4.1.2 | Results

We calculated separate means for each participant's ratings of the faces with narcissistic and non-narcissistic eyebrows. A paired-samples  $t$  test indicated that they viewed faces as significantly less narcissistic when donning non-narcissistic



( $M = 4.21$ ,  $SD = 1.46$ ) versus narcissistic eyebrows ( $M = 4.61$ ,  $SD = 1.40$ ),  $t(312) = -3.95$ ,  $p < .001$ ,  $d = 0.28$ .

## 4.2 | Study 3B

### 4.2.1 | Method

#### Materials

Using the full-face photos of the narcissistic and non-narcissistic women from Study 3A, we cropped each target's brows to create five new photos of each target bearing the eyebrows from the opposite group. For instance, if a target was low in narcissism, we created five new photos of that person using the eyebrows from each of the five high-narcissism targets.

#### Procedure

MTurk participants ( $N = 260$ ;  $M_{\text{age}} = 33.00$  years,  $SD = 10.89$ ; 102 male, 149 female, 9 no response) rated the photos as in Study 1. We excluded three people for not rating every target. They saw one version of each face (i.e., 10 face ratings total), randomly assigned to one of five stimulus sets. A subset of the participants rated the 10 original faces to allow a baseline measure of narcissism ( $n = 44$ ;  $M_{\text{age}} = 34.32$  years,  $SD = 11.99$ ; 22 male, 21 female, 1 unknown).

### 4.2.2 | Results

We averaged each participant's ratings of the five high-narcissism faces and five low-narcissism faces and submitted the scores to a 2 (Face: low, high narcissism)  $\times$  2 (Eyebrows: original, manipulated brows) ANOVA with repeated measures on the first factor. No significant main effects emerged for either factor (both  $F_s \leq 0.94$ ,  $p_s \geq .33$ ,  $\eta_p^2_s = .00$ ), but the two significantly interacted,  $F(1, 255) = 13.68$ ,  $p < .001$ ,  $\eta_p^2 = .05$ .

Simple effects tests showed that participants rated the narcissists ( $M = 4.40$ ,  $SD = 1.15$ ) as more narcissistic than the non-narcissists ( $M = 4.05$ ,  $SD = 0.94$ ) in their original photos,  $t(43) = -2.44$ ,  $p = .02$ ,  $d = 0.34$ . Moreover, they rated the non-narcissists' faces with narcissists' brows ( $M = 4.15$ ,  $SD = 1.23$ ) as more narcissistic than the narcissists' faces with non-narcissists' brows ( $M = 3.94$ ,  $SD = 1.23$ ),  $t(213) = 3.40$ ,  $p = .001$ ,  $d = 0.17$ . Narcissists' faces were rated as less narcissistic than their original photos when donning non-narcissists' eyebrows,  $t(255) = 2.26$ ,  $p = .03$ ,  $d = 0.39$ . Participants did not rate the non-narcissists as significantly more narcissistic when they had narcissists' eyebrows, however,  $t(255) = -0.51$ ,  $p = .61$ ,  $d = 0.09$ .

## 4.3 | Discussion

Experimentally changing people's eyebrows can therefore alter perceptions of their narcissism. Introducing narcissists'

and non-narcissists' eyebrows to narcissism-neutral faces respectively increased and decreased narcissism judgments in Study 3A. Moreover, participants in Study 3B rated narcissists' faces as less narcissistic when they donned non-narcissists' eyebrows, though they did not rate non-narcissists as more narcissistic when donning narcissists' eyebrows. This asymmetry may reflect greater difficulty in increasing people's perceptions of negative versus positive traits (Wood, Harms, & Vazire, 2010). Thus, eyebrows can enhance and diminish perceptions of narcissism, further implicating the brows' role in narcissism perceptions.

## 5 | GENERAL DISCUSSION

Narcissism influences both the positivity of first impressions as well as the function and maintenance of interpersonal relationships (e.g., Campbell & Campbell, 2009). Though initially well-liked, narcissists tend to see their first impressions sour quickly (Back et al., 2010; Paulhus, 1998). Yet, people can accurately assess others' narcissism based on their physical appearance alone (Holtzman, 2011; Vazire et al., 2008). Previous research found that these distinctions rely on controllable aspects of appearance (e.g., attire), but they also appear among unadorned faces (Holtzman, 2011; Vazire et al., 2008). Here, we examined the specific facial features that underlie perceptions of narcissism, isolating the eyebrows as the key definitive feature.

In Study 1, we explored the facial features that people use to perceive narcissism, finding that perceivers principally depend on the eyebrows to reach accurate judgments. We confirmed this in Study 2, finding in a mediation-based lens model analysis that targets' self-reported narcissistic grandiosity and exhibitionism related to how distinct their eyebrows looked. In Study 3, we found that people looked more narcissistic when donning more narcissistic brows and that narcissists looked less narcissistic when viewed with non-narcissists' brows. These data suggest that narcissism carries an enduring physical signature expressed in the face, that people attune to narcissistic cues, and that the eyebrows play an important role in perceiving narcissism.

### 5.1 | Why eyebrows?

Though understudied, eyebrows may be the most expressive feature of the face, serving several important social functions (Linstrom, Silverman, & Susman, 2000). Contributing to a broad range of emotional expressions, such as anger, fear, happiness, and surprise (Ekman, 1993; Ekman & Friesen, 1971), eyebrows can nonverbally communicate and accentuate distinct messages; for example, raising an eyebrow can signal a question just as raising one's vocal pitch can (Flecha-Garcia, 2010; Granström & House, 2005). The brows

also provide high-contrast lines that can reveal involuntary expressions or gestures from far away.

Eyebrows also support face recognition, affecting identity perception even more than the eyes themselves. Sadr, Jarudi, and Sinha (2003) found that people recognized celebrities without their eyes but not without their brows (e.g., Richard Nixon, Winona Ryder). Because grandiose narcissists strongly desire recognition and admiration, they may seek to maintain distinct eyebrows to facilitate others' ability to notice, recognize, and remember them, thereby increasing their likability and reinforcing their overly positive self-views (e.g., Duke, Fiacconi, & Kehler, 2014; Jacoby, Woloshyn, & Kelley, 1989).

Eyebrows also influence attractiveness and mate selection (Bruce et al., 1993; Cosio & Robins, 2000). Both men and women commonly groom their eyebrows (Russell, 2010). Tweezing, coloring, waxing, botulinum toxin injections, and permanent tattooing are common means of accentuating brow arch and fullness. These practices may make people look more attractive and influence their apparent masculinity or femininity. Indeed, people use both eyebrow thickness and lateral separation to distinguish male and female faces, facilitating mate selection and competition (Bruce et al., 1993). Given that narcissists often behave aggressively in sexual competition, and typically enjoy success in securing short-term sexual partners, their grandiose eyebrows could signal this prowess to others (Campbell & Campbell, 2009). It thus makes sense that narcissists might selectively alter their brows to appear more attractive.

## 5.2 | Do narcissists have particular morphological characteristics?

Holtzman (2011) created prototypes of individuals high and low in grandiose narcissism, concluding that narcissism relates to a set of particular physical-morphological characteristics (e.g., sharper facial features and angles). No similar structural feature reliably cued narcissism here. Rather, despite marking the underlying brow ridge, we found that eyebrows cue narcissism. This raises the question of whether eyebrows represent adorned or unadorned facial features.

Notwithstanding previous research finding narcissists' and non-narcissists' unadorned facial features equally attractive, eyebrow grooming may constitute a type of adornment, as their shape, density, tidiness, and color are easily altered. Though narcissism did not significantly relate to eyebrow grooming here, grooming mediated how grandiosity related to perceived narcissism when controlling distinctiveness and femininity, and previous research found that eyebrow plucking relates to women's narcissism (Vazire et al., 2008). What narcissists do with their facial features (e.g., grooming, makeup) may therefore increase their appeal. Although people can control their brows' appearance, the distinctiveness

we observed could stem from unadorned heritable features (e.g., people born with fuller or thicker brows). Future research should determine whether the brows' role in narcissism perception arises from adornment. Indeed, further investigation might also elucidate the brows' broader role in person perception.

## 6 | LIMITATIONS

Although the mean accuracy levels indicated modest effect sizes, their small magnitudes likely stem from the very narrow scope of the physical and visual real estate upon which the judgments rest. Yet, it is impressive that we could nevertheless isolate a facial characteristic related to narcissistic grandiosity (i.e., the eyebrows) and, crucially, show that people can identify and use this cue to evaluate others' narcissism.

Another limitation of these studies is the NPI subscales' reliability. Researchers have vigorously debated the factor structure underlying the NPI (e.g., Ackerman et al., 2011; Emmons, 1984; Raskin & Terry, 1988). In the three-factor structure we adopted, the E/E subscale consistently had low reliability, likely due to the few items composing it, requiring cautious interpretation. We also only measured targets' self-reported narcissism. Although previous studies found that peer reports of narcissism closely relate to self-reports (e.g., Holtzman, 2011), convergent evidence from both sources would help to buttress the present findings. Our samples likewise suffered from a limited number of male targets. Although perceptions of narcissism were only accurate for female brows in Study 1, increasing the number of male targets in Study 2 showed that these results generalized to men. Future research may want to more fully explore gender differences in the facial features leading to perceptions of narcissism and potential differences in the cues that people use to accurately detect it.

## 7 | FUTURE DIRECTIONS

Future studies should also continue to consider how narcissism develops and is perceived. For instance, does social perception of one's physical features influence how personality develops over time, or might people embody their personality through changes in the face's actual physical structure (e.g., Zebrowitz, Collins, & Dutta, 1998)? Research suggests that grandiose narcissism has a heritable component (Jang, Livesley, Vernon, & Jackson, 1996). Narcissists may therefore naturally have more distinctive brows. Additionally, it seems likely that people's narcissistic tendencies would influence how they care for their brows (e.g., Vazire et al., 2008). Future work may reveal precisely how.

Because many studies on facial recognition have identified the eyes as the most salient internal feature, researchers have often either excluded the brows or grouped them with the eyes (Davies, Ellis, & Shepherd, 1977). The current findings may represent the first indication of the brows' relevance to the perception of personality traits. Given its value for carrying nonverbal signals, perceivers may attune to the brows during facial recognition and impression formation. Indeed, people use obvious qualities in physical appearance to accurately infer ambiguous attributes (e.g., Rule & Sutherland, 2017); they may do the same to detect their personality traits. Future research should investigate how else the eyebrows feature in social perception.

## 8 | CONCLUSIONS

The ability to identify dark personality traits at zero acquaintance provides particular value for avoiding exploitation and manipulation (e.g., narcissism, Machiavellianism, psychopathy; Fowler, Lilienfeld, & Patrick, 2009; Vazire et al., 2008). The increasing incidence of narcissism underscores this value (e.g., Twenge, Konrath, Foster, Campbell, & Bushman, 2008; though see Wetzell et al., 2017). Fortunately, people can accurately judge others' narcissism based on how they act, what they say, what they wear, and what their faces look like (e.g., Vazire et al., 2008). Here, we isolated the facial features that explain the last of these, finding that narcissism judgments principally depend on targets' eyebrows. This research will help to increase understanding of the general processes involved in impression formation and contribute to better understanding when and why people approach or avoid specific individuals.

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## CONFLICT OF INTERESTS

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## NOTES

<sup>1</sup> We focus on grandiose narcissism as a subclinical personality trait, rather than narcissistic personality disorder or pathological forms of

narcissism. In addition, we refer to individuals high (low) in grandiose narcissism as "narcissists" ("non-narcissists") for short, despite measuring narcissism as a continuous variable.

<sup>2</sup> These are also directly related to narcissism (Holtzman, 2011).

<sup>3</sup> All MTurk participants were recruited from the United States. We heuristically predetermined a sample size of 30 participants, excluding participants who responded uniformly or suggested during debriefing that we not use their data (i.e., answered "no" to the question, "Should the researchers include your responses in our final data analysis?"). Other samples exceeded our goal when participants completed the study without collecting compensation.

<sup>4</sup> We asked participants ( $N = 31$ ;  $M_{\text{age}} = 27.90$  years,  $SD = 3.74$ ; 18 male, 13 female) in the sample "Full Face 2" to indicate "How narcissistic do you think this person is?" to examine whether that alternative prompt influenced perceivers' responses; it did not.

<sup>5</sup> A priori power analysis using G\*Power indicated that 139 participants in Studies 2A and 2B would afford 80% power in two-tailed one-sample  $t$  tests based on the effect size obtained in the eyebrow condition in Study 1 (Cohen's  $d = 0.24$ ; Faul et al., 2007). We nevertheless oversampled because we expected the effect size to be smaller than in Study 1, given the limited number of participants there.

<sup>6</sup> Mean accuracy correlations did not differ between ratings of an individual eyebrow or its mirror image, all  $r_s \leq 0.69$ ,  $p_s \geq .48$ ,  $|d|s \leq 0.10$ ; we therefore combined the participants in the mirror-image conditions with the participants in the (respective) single-brow conditions.

<sup>7</sup> We also coded how similar the two eyebrows looked but observed low inter-rater reliability ( $ICC = .59$ ) and, thus, excluded it from our analyses.

<sup>8</sup> The overall mean accuracy correlation was significant ( $M_z = .04$ ,  $SD = .09$ ), 95% CI [.03, .05],  $t(738) = 11.08$ ,  $p < .001$ ,  $d = 0.44$ . The results did not differ when separately using the Study 2A and 2B averages, or left and right brow averages.

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