UNIVERSITY of CALIFORNIA PRESS | Collabra: Psychology

Rode, T., Kordsmeyer, T. L., & Stern, J. (2022). The Relationship Between Body Morphology and Narcissism at Zero Acquaintance. *Collabra: Psychology*, *8*(1). https://doi.org/10.1525/collabra.37150

Personality Psychology

The Relationship Between Body Morphology and Narcissism at Zero Acquaintance

Tjark Rode[1], Tobias L. Kordsmeyer[1], Julia Stern[2] [a]

[1] Department of Psychology, University of Göttingen, Goettingen, Germany, [2] Department of Psychology, University of Göttingen, Goettingen, Germany; University of Bremen, Bremen, Germany

Keywords: zero acquaintance, personality judgment, lens model, attractiveness, body morphology, narcissistic admiration and rivalry

https://doi.org/10.1525/collabra.37150

Collabra: Psychology

Vol. 8, Issue 1, 2022

Narcissistic people are exceedingly successful in conveying positive first impressions to their social surrounding, yet, they appear to be the driving force behind unfavorable long-term social and romantic relationships. Hence, a quick identification of narcissistic people may be of adaptive value for their social partners. Narcissism perception research, however, is lacking evidence on human body morphology. In this study, N = 110 raters evaluated natural 3D body scans of unacquainted N = 307 target participants (152 men and 155 women) regarding narcissistic admiration and rivalry. Based on the Brunswikian lens model, multiple regression models revealed that bodily attractiveness (β = .54, 95% CI = [0.41; 0.66]), BMI (β = .32, 95% CI = [0.13; 0.51]), shoulder-to-hip ratio (β = .33, 95% CI = [0.20; 0.47]) and physical strength (β = .23, 95% CI = [0.07; 0.39]) were utilized in judging narcissistic admiration and rivalry. Shoulder-hip ratio showed small relationships with self-reported narcissistic admiration (β = .21, 95% CI = [0.03; 0.38]) and rivalry (β = .23, 95% CI = [0.07; 0.39]) that were not robust across all analyses. Correlations between self-reported and judged narcissism showed a significant positive association for narcissistic admiration (r = .17, 95% CI = [0.06; 0.28]). Results indicate a perceptual bias when judging narcissism, as perceivers used body cues to draw inferences about target's levels of narcissism that were not significantly related to self-reported narcissistic admiration and rivalry (and can thus be seen as invalid). However, perceivers were able to somewhat accurately judge target's levels of narcissistic admiration and rivalry, based on body morphology alone. Thus, people's bodies might disclose social information at zero acquaintance, but different stimuli material with more information on the targets may lead to more accurate judgments.

Introduction

Humans as a highly social species, are constantly exposed to social interactions in which personality judgments may have consequences for further behavioral outcomes (Harris & Garris, 2008). So-called first impressions shape whom individuals intend to cooperate with (e.g. in jobs), aim to avoid in social conflicts, and seek to approach in interpersonal contact (Haselton & Funder, 2006). For example, entering a romantic relationship is influenced by the desired personality profile of a potential partner (Eastwick et al., 2011). In social interactive settings, some scholars found a substantial consensus in personality judgments (Hall et al., 2008). In fact, personality judgments may not solely rely on immediate interactions (Albright et al., 1988; Borkenau & Liebler, 1992; Carney et al., 2007; Hall et al., 2008), but may also be drawn from pure physical appearance (Albright et al., 1988; Borkenau & Liebler, 1992; Naumann et al., 2009; Vazire et al., 2008; Yeagley et al., 2007). Hence, the perception of personality traits is related to visual attributes, which are further utilized for the evaluation of individuals' personalities. These *targets* are classically evaluated by *perceivers* in person perception research (Hirschmüller et al., 2018; Lönnqvist et al., 2020). Provided that no previous interaction occurred between perceiver and target, judgments are performed on a *zero acquaintance* level (Borkenau & Liebler, 1992; Nestler & Back, 2013).

An increasing body of research suggests that personality judgments at zero acquaintance become more accurate the more visible information about the target is available to perceivers (Back et al., 2010; Borkenau & Liebler, 1992; Naumann et al., 2009). For instance, Borkenau and Liebler (1992) conducted a study in which perceivers evaluated targets' Big Five personality traits based on stimulus material, which ranged from a videotaped weather forecast read out by the targets to a photograph. Their results indicate that

a **Corresponding author:** jstern@uni-bremen.de

the degree of accuracy is negatively associated with the gradual removal of perceptible information ("thin-slicing", e.g. for extraversion the self-other agreement based on video with sound was r = .55, whereas it was r = .33 for photograph only). Apart from that, personality traits such as extraversion and conscientiousness tend to have the highest consensus among perceivers (Borkenau & Liebler, 1992; Hall et al., 2008; Kenny et al., 1992; Naumann et al., 2009; Norman & Goldberg, 1966). Thus, these traits can be judged more accurately using static cues than other personality traits (e.g. neuroticism had a self-other agreement of r = .06 for photographs) (Borkenau & Liebler, 1992; Naumann et al., 2009).

In recent years, one specific personality trait gained much attention in person perception research due to its ambiguous interpersonal effects (Miller et al., 2017): *Grandiose narcissism* is defined by "a grandiose, yet vulnerable self-concept" (Morf & Rhodewalt, 2001, p. 178), which is achieved and maintained by dominant, self-assured, and expressive behaviors, such as charmingness (Back et al., 2013). This assertive strategy is broadly perceived as appealing and competent by the narcissistic people's social environment (Back et al., 2010, 2013; Dufner et al., 2013; Paulhus, 1998; Wurst et al., 2017). Nevertheless, as soon as narcissistic people experience contrary social outcomes, such as rejection or criticism, their vulnerable self-concept is revealed. Consequently, narcissistic targets aim to protect their grandiose self by hostile, arrogant, and superior behaviors, such as aggressiveness (Back et al., 2013). This antagonistic strategy is largely perceived as competitive and disagreeable by others (Back et al., 2013; Paulhus, 1998; Wurst et al., 2017). These two distinct narcissistic pathways are integrated in a two-dimensional process model of narcissism: the narcissistic admiration and rivalry concept (NARC, Back et al., 2013). The dimension of *narcissistic admiration* corresponds to an individual's assertive strategy and desired social outcomes, including social status, success, and evoking social interest. *Narcissistic rivalry*, on the contrary, is linked to an individual's antagonistic strategy and negative social outcomes such as unpopularity and relationship transgressions. Overall, narcissistic admiration and rivalry were found to be moderately intercorrelated (rs = .30 – .60, Back et al., 2013; Leckelt et al., 2017; Rogoza et al., 2016).

In social interactions, narcissistic people are oriented towards manipulating and exploiting their social environment for personal gain in order to maintain their grandiose self (R. P. Brown et al., 2009; Campbell, 1999; Morf & Rhodewalt, 2001). This interpersonal characteristic remains, however, broadly unrecognized by their interaction partners at first glance. Instead, narcissistic targets are perceived as more popular and attracting at first sight (Back et al., 2010; Dufner et al., 2013; Holtzman & Strube, 2010; Wurst et al., 2017). Dynamic and acoustic cues, such as humorous verbal expressions as well as self-assured body movements, may mediate this impression (Back et al., 2010; Campbell, 1999; Paulhus, 1998), but yet underlie the superordinate mechanism of exploiting and manipulating others. A rapid identification of narcissism may be in the interest of others in order to overcome biased first impressions and, thus, prevent unfavorable social relationships.

But is it even possible to detect narcissism based on physical appearance only? There is a long history of psychologists trying to link psychological traits to morphological characteristics. While some early approaches (e.g. phrenology) received strong criticism and are long condemned as being pseudo-science (e.g. Gould, 1981), other early theories, although being criticized and not empirically supported, inspired later work. One of these early theories stems from Sheldon (1940), who assumed that human bodies can be classified in three distinct categories that are linked to different personality traits. For example, so called "mesomorphs" – humans who have a muscular body with low fat – were assumed to be more competitive, assertive and aggressive. In fact, previous findings indicate that narcissism is indeed anchored in controllable and adjustable domains of physical appearance: Holtzman and Strube (2013) reported that narcissistic people are more effective in adorning themselves, compared to individuals lower in narcissism. Hence, narcissistic people appear to possess the ability to improve their physical appearance by means of adjustable indicators of attractiveness, such as clothing or hairstyle (Back et al., 2010; Vazire et al., 2008; Weber et al., 2021). However, as these indicators are highly prone to manipulation and self-enhancement to elicit certain impressions in others, the question of valid and static physical cues remains unclear.

Previous research reports that perceivers are, indeed, able to accurately judge narcissism based on photographs (d = .36 in N = 81 targets; Holtzman, 2011), possibly due to facial cues of attractiveness (Giacomin & Rule, 2019). Besides being potentially manifested in faces, there is evidence that actual narcissism might also be manifested in the unadorned bodily appearance, as facial and bodily attractiveness seem to be correlated at least with targets' actual narcissistic admiration (Weber et al., 2021). Moreover, perceivers seem to evaluate narcissistic targets as being slightly more attractive overall (r = .07 for narcissistic admiration with N = 1388 targets rated by interview partners or r = .10 with N = 391 based on photographs; Weber et al., 2021). The authors interpreted their results as providing some evidence that narcissism may not only be perceptible based on targets' adornment but also their "natural beauty" (although effects were smaller, non-significant and sometimes even in the opposite direction for narcissistic rivalry, r = .01 with N = 1388 targets rated by interview partners or r = -.08 with N = 391 based on photographs). But is the body and its attractiveness also utilized in judging narcissism? The present study aims to examine the role of the human body in narcissism perception by considering specific attractiveness-related body cues.

Empirical evidence demonstrated that BMI and the waist-to-hip ratio (WHR) were highly correlated with bodily attractiveness in women judged by unacquainted observers (r = -.45 for WHR and r = -.80 for BMI in N = 33 females; Grillot et al., 2014). The commonly known "hourglass" shape of the female body is primarily captured by the WHR, manifested in wide hips and a narrow waist (Andrews et al., 2017; Singh, 1993). Moreover, another characteristic of this favored body shape is the bust-under-bust ratio (BUR), a morphological cue for bust size (M. L. Fisher & Voracek, 2006; Singh & Young, 1995). Women with a medium to large bust

size are interculturally perceived as most attractive, compared to women with a small-sized bust (Dixson et al., 2015; Havlîc ˇ ek et al., 2017; Zelazniewicz & Pawlowski, 2011).

In male bodies the most favored body shape is the "V-shape" torso, reflecting broad shoulders relative to narrow hips (Cloud & Perilloux, 2015; Dixson et al., 2010). In particular, men with a higher shoulder-to-hip ratio (SHR), a measure of the circumference of the shoulder relative to the hips, are perceived as most attractive and more socially and physically dominant (Buunk & Dijkstra, 2005). Furthermore, there is evidence that physical strength is a key component in male body attractiveness (Franzoi & Herzog, 1987; Sell et al., 2017). In zero acquaintance, physical strength can be primarily perceived through body girths, e.g. the upper arm girth (e.g. Kordsmeyer et al., 2019), which reflects the circumference of the biceps, which seems to be mainly used by women in determining opposite-sex attractiveness (Franzoi & Herzog, 1987).

A lens model approach

To understand narcissism judgments based on the human body morphology at zero acquaintance, the present study applies Brunswik's (1956) lens model. This approach is a methodological conception which elucidates how individuals evaluate unobservable features of human beings by focusing their judgments on observable cues the target discloses. In particular, the perceptible body cues may function as a lens through which perceivers judge targets' narcissism. Hence, the lens model allows to determine the extent to which these body cues are relied on the narcissism judgment (*cue utilization*), and to which extent they correspond to targets' actual narcissism (*cue validity*). Furthermore, the lens model can provide insights on the self-other agreement between targets and perceivers (*accuracy*), as this measure increases with the perceivers' utilization of observable cues, which in fact correspond to targets' actual narcissism.

Hypotheses

In line with the empirical evidence that narcissism appears to be positively related to physical attractiveness (Holtzman & Strube, 2010; Weber et al., 2021; Wurst et al., 2017) and primarily attributable to appeal in early stages of acquaintance (Dufner et al., 2013; Wurst et al., 2017), we hypothesize that bodily attractiveness, BUR, physical strength, SHR and upper arm girth are positively, whereas BMI and WHR are inversely related to self-reported and judged narcissistic admiration (Hypothesis 1). Furthermore, we predict that these effects are larger in men compared to women (Hypothesis 2), since narcissism was found to be associated more strongly with male self-presentation (Sorokowski et al., 2015). Narcissistic rivalry will be investigated in an exploratory manner, because narcissistic rivalry is moderately intercorrelated with narcissistic admiration (*r*s = .30 – .60; Back et al., 2013; Leckelt et al., 2017; Rogoza et al., 2016), but yet most evident in long-term acquaintance (Wurst et al., 2017) and apparently unrelated to physical attractiveness (Dufner et al., 2013; Weber et al., 2021; Wurst et al., 2017).

Methods

Data and analysis script are publicly available at the Open Science Framework (https://osf.io/gynx9). All participants signed a written consent before participating in the study.

Participants

A total of N = 110 (n = 88 females) raters (aged 18-56 years, M = 23.0, SD = 5.3), took part in the present study. One-hundred-and-five participants indicated their occupation as students (83 specified their subject as psychology), four participants as employed and one as unemployed. Participants received candy and course credit for participation in the current study.

Stimuli

Overall N = 307 target body stimuli (aged 18-35 years, M_{male}= 24.3, SD_{male} = 3.2, M_{female}= 23.3, SD_{female} = 3.4) served as basis for narcissism judgments. Female (n = 155) and male (n = 152) target body stimuli were surveyed separately in two previous, independent studies (Jünger et al., 2018; Kordsmeyer & Penke, 2019).[1] Target participants were almost exclusively of European origin and predominantly students. In the present study, we subdivided the body stimuli into eight rating sets (to avoid rater fatigue), each consisting of n = 76-78 single entities, based on the following procedure: raters either rated female or male 3D body scans as well as either narcissistic admiration or narcissistic rivalry. These four rating sets were then halved (for an overview see Table 1).

Procedure and study design

Raters were randomly assigned to one out of the eight rating sets. The study was conducted using the open source framework Alfred (Treffenstädt & Wiemann, 2018), which is based on the programming language Python (version 2.7.11, Python Software Foundation, 2016). First, demographic data were collected. Then, depending on the assigned rating

1 Please note that the target stimuli in this study were used for the purpose of a secondary data analysis. They were originally collected as a sideline in studies focusing on different research questions, mainly on hormonal correlates of individual differences in mating contexts. Female stimuli were collected in a study on ovulatory cycle shifts in women's mate preferences, male stimuli were collected in a study on testosterone reactivity in a competitive mating context. These body stimuli have never been previously rated on narcissism (these ratings were only collected for the current study). Here, we list all studies in which subsamples of the body stimuli were previously used for investigating research questions fully independent of the current study. Female bodies: Stern et al., 2021. Male bodies: Jünger et al., 2018; Kordsmeyer et al., 2018; Kordsmeyer, Freund, et al., 2019; Kordsmeyer, Stern, et al., 2019; Stern et al., 2021; von Borell et al., 2019.

Table 1. Rating conditions reflecting the eight different rating sets with the corresponding sex of the body stimuli, rating dimension as well as the amounts of body stimuli and raters

Rating set number	Stimuli set number	Rating dimension	Sex of body stimuli	*n* body stimuli	*n* raters
1	1	admiration	female	*n* = 78	*n* = 14
2	2	admiration	female	*n* = 77	*n* = 13
3	1	rivalry	female	*n* = 78	*n* = 14
4	2	rivalry	female	*n* = 77	*n* = 13
5	3	admiration	male	*n* = 76	*n* = 14
6	4	admiration	male	*n* = 76	*n* = 15
7	3	rivalry	male	*n* = 76	*n* = 14
8	4	rivalry	male	*n* = 76	*n* = 13

dimension (admiration or rivalry), participants were provided with the definition of either narcissistic admiration or narcissistic rivalry:

- *Narcissistic admiration*: People who are high in narcissistic admiration are more likely to believe that they should be seen as great personalities, more likely to show others how special they are and are more likely to attract attention in conversations, compared to people who score lower in narcissistic admiration.
- *Narcissistic rivalry*: People who are high in narcissistic rivalry are more likely to react annoyed when another person steals the show from them, are more likely to believe that most people won't achieve anything and are more likely to respond to criticism in an annoyed manner, compared to people who score lower in narcissistic rivalry.

They were then instructed that they will have to rate bodies on perceived narcissism as defined in the instruction they received (either admiration or rivalry). Next, stimuli were presented to the participants in a randomized order. Every stimulus was rated separately on a 10-point scale that ranged from 1 (*not narcissistic at all*) to 10 (*very narcissistic*) ("How narcissistic is this man / woman?"). Interrater reliabilities for both narcissism dimensions were acceptable (Cronbach's $\alpha > 0.73$ for narcissistic admiration and > 0.71 for narcissistic rivalry), thus, ratings were averaged across participants.

Materials

Body scans

As described above, all 3D body stimuli were obtained from two previous studies (target women from Jünger et al., 2018; target men from Kordsmeyer & Penke, 2019). The body scans were natural stimuli of men and women in standardized tight underwear, captured with a high-resolution Vitus Smart XXL 3D body scanner (Human Solutions GmbH, Kaiserslautern, Germany). Men and women were instructed to stand upright with their legs hip-widely apart, arms extended and held slightly away from the body. Furthermore, they were asked to make a fist with their thumbs showing forward, to position their head in accordance with the Frankfort Horizontal, and to breathe normally during the scanning process. Body models were scaled, thus, they retained original height differences. To minimize the influence of confounding variables, such as facial attractiveness or skin color, all bodies were truncated above the neck and consistently colored in grey (using the software Blender, version 2.75, www.blender.org), so that they appeared without texture and head on the screen as shown in Figure 1. The 3D body scans thus contained only information about body morphology. The bodies rotated around their vertical axis so that they could be inspected from all sides. Participants rated each stimulus after at least one full rotation but were able to inspect them without time limitation.

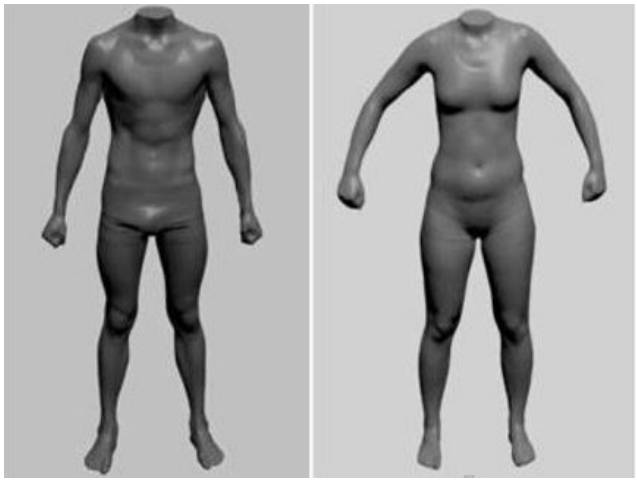

Figure 1. Illustrative and static example of one standardized male and one female 3D body scan

Body cues

Body height (in cm) was measured twice with a stadiometer (SECA® 213) whilst participants were barefoot. Both values were averaged. Weight (in kg) was measured with the body scanner's integrated scale (SECA® 635). BMI was determined afterwards based on height and weight measures (kg / m^2). Visual cues of the upper body were directly measured during the scanning process using the automatic measures of the software AnthroScan (all according to ISO 20685:2005). The following parameters are relevant to this study: bust-chest girth (AnthroScan measure 4510),

Table 2. Descriptive statistics of data on our target samples

	Male bodies				Female bodies			
	M	*SD*	*Min*	*Max*	*M*	*SD*	*Min*	*Max*
Bodily attractiveness	-0.18	1.83	-4.80	3.27	-0.04	1.01	-2.90	2.00
BMI	23.93	3.67	16.90	41.58	22.58	3.42	16.81	36.36
WHR	0.84	0.05	0.74	1.03	0.72	0.05	0.63	0.86
SHR	0.43	0.02	0.37	0.53	0.39	0.03	0.33	0.49
BUR	1.09	0.02	1.02	1.14	1.17	0.05	1.06	1.29
Strength	48.48	7.89	26.00	77.50	25.43	5.10	13.33	39.67
Upper arm girth	30.16	2.54	23.37	37.05	27.77	2.69	21.90	36.75
NARQ adm (self-report)	2.87	0.83	1.00	5.00	2.60	0.83	1.00	4.67
NARQ riv (self-report)	2.40	0.82	1.00	4.67	1.76	0.74	1.00	4.67

buttock girth (7520), cross shoulder over neck (3010), upper arm girth (8520), and waist girth (6510). We divided cross shoulder over neck (shoulder width, measured over the neck) by hip girth (in AnthroScan, this measure if named "buttock girth", which is the closest measure to the waistband, see also Kordsmeyer et al., 2019) to calculate SHR. Finally, we calculated WHR by dividing waist girth by buttock girth and BUR was determined by dividing bust girth by under-bust girth. Men's and women's dominant hand grip and upper body strength, measured with a hand dynamometer (Saehan® SH5001), were aggregated and finally used to operationalize physical strength following the procedure described in Sell and colleagues (2009). The maximum strength of three trials for each measurement was used. In addition, attractiveness ratings of the body stimuli were assessed using an independent sample of n = 60 raters who evaluated males' (Kordsmeyer et al., 2018), and n = 84 raters who evaluated females' body attractiveness on a 11-point Likert scale from -5 (*extremely unattractive*) to +5 (*extremely attractive*), including zero as a neutral point (Cronbach's α = .98 for female body stimuli and α = .92 for male body stimuli). Descriptive statistics for all assessed variables can be found in Table 2. We dummy coded gender with 1 = female and 0 = male.

Participants' self-reported narcissism

Female narcissism was measured using the Narcissistic Admiration and Rivalry Questionnaire (NARQ, Back et al., 2013), male narcissism was determined with the short scale version (NARQ-S, Leckelt et al., 2017). Both questionnaires reflect the two-dimensional structure of the NARC (Back et al., 2013) and consider narcissistic admiration as well as narcissistic rivalry equally in the 18 and 6 items, respectively.[2] On a six-point rating scale from 1 (*not agree at all*) to 6 (*agree completely*) participants rated how well the items applied to them. Item values for both NARQ dimensions were aggregated to create an overall score for each subscale (internal consistencies: men/women: α = .71/.82 for narcissistic admiration and α = .56/.85 for narcissistic rivalry). To increase comparability between our two target datasets, we decided to only use the items of the NARQ short scale version for female targets in our main analyses (Cronbach's α = .65 for admiration, α = .65 for rivalry). This decision was made during the review process and we report results of analyses using all items of the long scale version in the supplementary material (Figures S1 – S4). Importantly, n = 14 female participants dropped out, as they did not fill out the narcissism scales, resulting in n = 141 female participants for further analyses.

Statistical analyses and test power

Men's and women's body measures were z-standardized using Fisher's z-transformation (R. A. Fisher, 1915). Then, Brunswikian lens model analyses were conducted to examine the cue validity, cue utilization, and accuracy of narcissism judgments (see Figure 2). For cue validity and cue utilization, the body cues were introduced as predictors and (self-reported and judged) narcissistic admiration or rivalry as outcome variables in separate multiple linear regression models. In line with previous research, we included all sexually dimorphic body cues in the regression models for both female and male body scans (Brooks et al., 2015; Fan et al., 2005; Maisey et al., 1999; Pazhoohi et al., 2019). To assess the accuracy of narcissism judgments, self-reported and judged narcissistic admiration and rivalry were correlated. All statistical analyses were calculated using the statistic software R, version 4.0.4 (R Core Team, 2021). The following packages were used: car (Fox & Weisberg, 2019), psych (Revelle, 2017), sjPlot (Lüdecke, 2018), ggplot2 (Wickham, 2011), openxlsx (Schauberger et al., 2019), and

2 Please note that the data from the target stimuli were collected as part of two previous, separate studies with initially different study aims, which is the reason why male and female targets completed different versions of the NARQ. Their data are used in the current study for the purpose of a secondary data analysis.

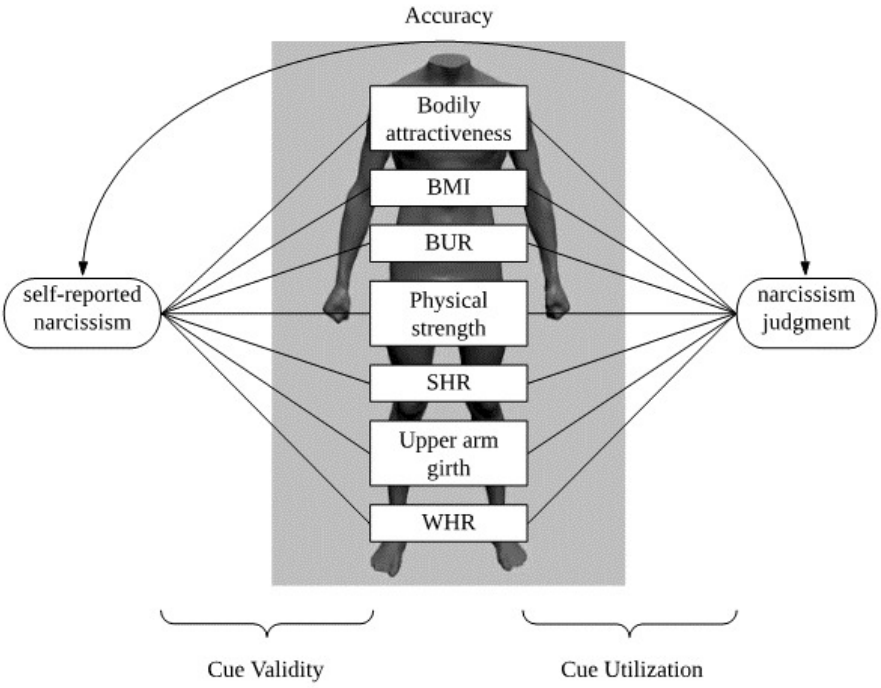

Figure 2. Lens model based on Brunswik (1956) with observable body cues investigated in the present study

QuantPsyc (Fletcher, 2012). An a priori power analysis (G*Power 3.1.9.2) suggested that, to detect a medium effect size in a linear multiple regression with 95% power, we would need an *N* of 89 participants (in our case stimuli) with an α level of 0.05, or *N* = 123 participants with a corrected α level of 0.01 (to account for multiple testing). We decided to collect ratings for all body targets available, to even increase test power and make it more likely to also find effects of smaller magnitudes.

Results

Preliminary analyses

First, we tested whether the data met the assumption of collinearity, as some of our variables were intercorrelated (see Table 3). For this purpose, we calculated the variance inflation factor (VIF) for all body cues included as predictors in the regression models, a method for producing collinearity diagnostics that indicates whether predictors have strong relationships with other predictors researchers should be concerned about (e.g. Field et al., 2012). Results revealed no strong multicollinearity (Bowerman & O'Connell, 1990; Menard, 1995), see the open analysis script for a detailed overview and test statistics. Accordingly, all body cues were analyzed in the same regression model predicting self-reported and judged narcissistic admiration or rivalry. The separate calculation of four regression models and the accompanying alpha error accumulation would have resulted in a significance threshold of α = .19 (Ryffel, 2017). To account for multiple testing, a decreased significance level of α = .01 was used.

Judged narcissistic admiration (cue utilization)

A multiple regression model to test the utilization of body cues to judge narcissistic admiration was conducted. The test regarding the assumption of independence of residuals was significant (Durbin Watson value = 1.76; Durbin & Watson, 1950). However, as the Durbin Watson statistic was close to the value of 2 and lied within the range of 1 to 3 the model was accepted (Field et al., 2012). For further analyses, one outlier (*M* +/- 3 *SD*s) was removed. Results indicated that the seven predictors significantly explained 43% of the variance in participants' judgment of narcissistic admiration ($F_{7, 279} = 29.83$, $p < .001$, multiple $R^2 = .43$, $r = .65$, all results are displayed in Figure 3). Bodily attractiveness, physical strength, BMI and SHR were significantly positively associated with judged narcissistic admiration, in that individuals with more attractive bodies, higher physical strength, higher BMI and broader shoulders in relation to hips were rated as higher in narcissistic admiration, with medium to large effect sizes. Further, WHR was strongly negatively associated with judged narcissistic admiration, in that participants with a broader waist in relation to hips were judged as lower in narcissistic admiration. The positive association between BUR and judged narcissistic admiration was only significant when applying "common conventions" with a significance threshold of α = .05 (Cowles & Davis, 1982), but did not reach our predefined significance threshold of .01 accounting for multiple testing. These results support Hypothesis 1, except the effect for BMI was expected in the opposite direction. However, upper arm girth was not significantly related to judged narcissistic admiration and the effect size was very small, contrary to Hypothesis 1.

To investigate potential effects of target participants' gender, we repeated the previously reported analyses, but

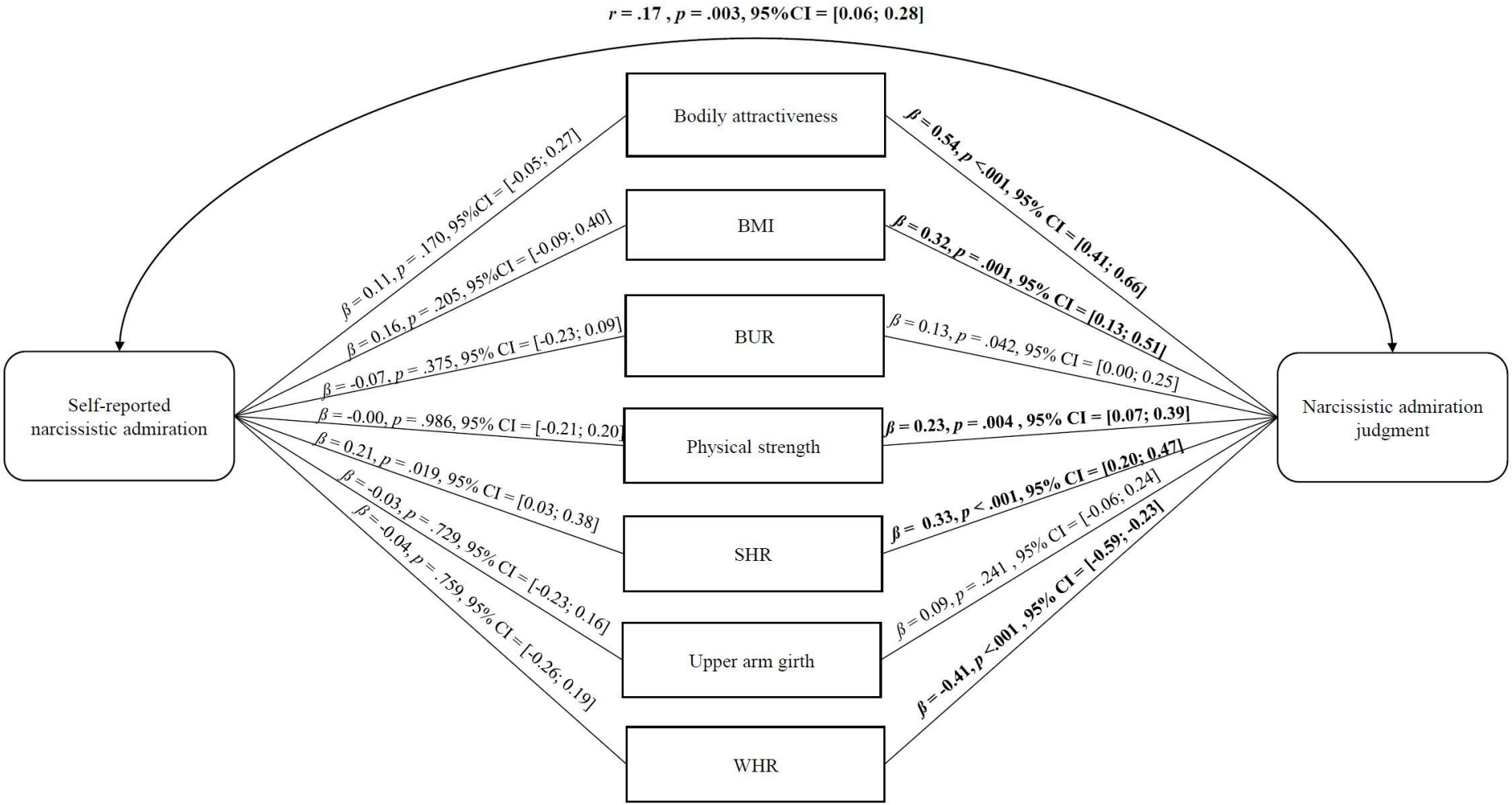

Figure 3. Lens model displaying results for self-reported (left) and judged (right) narcissistic admiration and accuracy, respectively.

Note: Standardized regression (β) and correlation (r) coefficients with significance values (p) and 95% confidence interval (95% CI). Variables significantly predicting judged narcissistic admiration (α = .01) are printed in bold. Narcissistic admiration was judged by n = 56 raters and self-reported by N = 292 targets (after the removal of one statistical outlier).

Table 3. Correlation matrix with zero-order correlation coefficients (*r*) among body cue predictors

	Bodily Attractiveness	BMI	BUR	Physical Strength	SHR	Upper Arm Girth	WHR
Bodily Attractiveness							
BMI	-0.60						
BUR	0.17	-0.19					
Physical Strength	-0.05	0.29	-0.66				
SHR	0.20	-0.25	-0.41	0.48			
Upper Arm Girth	-0.28	0.74	-0.30	0.50	-0.03		
WHR	-0.39	0.54	-0.57	0.70	0.45	0.51	

modelled an interaction effect of gender with each of the body variables. Some of the results reported above remained virtually identical, others decreased: bodily attractiveness, physical strength and SHR were positively associated with judged narcissistic admiration, whereas the positive associations between BMI and BUR with judged narcissistic admiration decreased and the negative association of WHR was not significant anymore, suggesting that participant gender had an influence on the results. However, none of the body variables significantly interacted with target participants' gender, contrary to Hypothesis 2. The model explained 46% of variance ($F_{15,\ 271}$ = 15.42, p <.001, R^2= .46, r = .68, detailed results can be found in the supplementary material Table S1).

Self-reported narcissistic admiration (cue validity)

Another multiple regression model was calculated, including the body cues as variables predicting individuals' self-reported narcissistic admiration. The test on the assumption of independence of residuals confirmed the model's independence (Durbin Watson value = 2.06). None of the variables had any outliers (M +/- 3 SDs). The regression model explained 6% variance ($F_{7,\ 280}$ = 2.37, p = .023, R^2 = .06, r = .24), with none of the body cues significantly predicting self-reported narcissistic admiration when applying our predefined significance threshold, contrary to Hypothesis 1 (all results are displayed in Figure 3). However, SHR was positively associated with self-reported narcissistic admiration when applying conventional standards (p <.05), in that participants with broader shoulders in relation to hips self-reported as higher in narcissistic admiration. Further, Fisher's z-tests suggested that the correlation coefficient between self-reported narcissistic admiration and bodily attractiveness was not significantly different from the coefficient reported in Weber and colleagues (2021; r = .10) based on full-body photographs (*Cohen's q* = .05, z = 0.62, p = .53).

To investigate gender differences in the association between body cues and self-reported narcissistic admiration we repeated the previously reported analyses, and additionally modelled an interaction effect of gender with each of the body. The model did not explain a significant amount of variance ($F_{15,\ 272}$ = 1.62, p = .068, R^2= .08, r = .29, detailed results can be found in the supplementary material Table S2). None of the body variables were significantly associated with self-reported narcissistic rivalry, and none of the body variables significantly interacted with target participants' gender, contrary to Hypothesis 2.

Accuracy in narcissistic admiration

Finally, the accuracy between self-reported and judged narcissistic admiration was analyzed, revealing a small, but significant correlation (see Figure 3). Fisher's z-tests suggested that this accuracy correlation coefficient was not significantly different from the accuracy coefficients for extraversion (*Cohen's q* = .17, z = 1.43, p = .15) or agreeableness (*Cohen's q* = .02, z = 0.14, p = .89) reported in Borkenau and Liebler (1992; r = .33 and r = .19 for extraversion and agreeableness, respectively) based on full-body photographs.

Judged narcissistic rivalry (cue utilization)

Next, body cues were inserted in a multiple regression model predicting judged narcissistic rivalry. The data met the assumption of independence of residuals (Durbin Watson value = 1.85). For further analyses one outlier (M +/- 3 SDs) was removed. Results of the regression model indicated a significant explanation of 34% of variance in judged narcissistic rivalry ($F_{7,\ 279}$ = 20.48, p < .001, R^2 = .34, r = 0.58), all results are displayed in Figure 4. Overall, the pattern of results was comparable to results regarding judged narcissistic admiration reported above. Bodily attractiveness, BMI and SHR were significantly positively associated with judged narcissistic rivalry, in that individuals with more attractive bodies, higher BMI and broader shoulders in relation to hips were rated as higher in narcissistic rivalry, with medium to large effect sizes. Further, WHR was strongly significantly negatively associated with judged narcissistic rivalry, in that participants with a broader waist in relation to hips were judged as scoring lower on narcissistic rivalry. The positive association between physical strength and judged narcissistic rivalry was only significant when applying "common conventions" with a significance threshold of α = .05 (Cowles & Davis, 1982), but did not reach our predefined significance threshold of .01 accounting for multiple testing. BUR and upper arm girth were not significantly related to judged narcissistic rivalry and the effect sizes were very small.

Again, to investigate potential effects of target participants' gender, we repeated the previously reported analyses, but modelled an interaction effect of gender with each

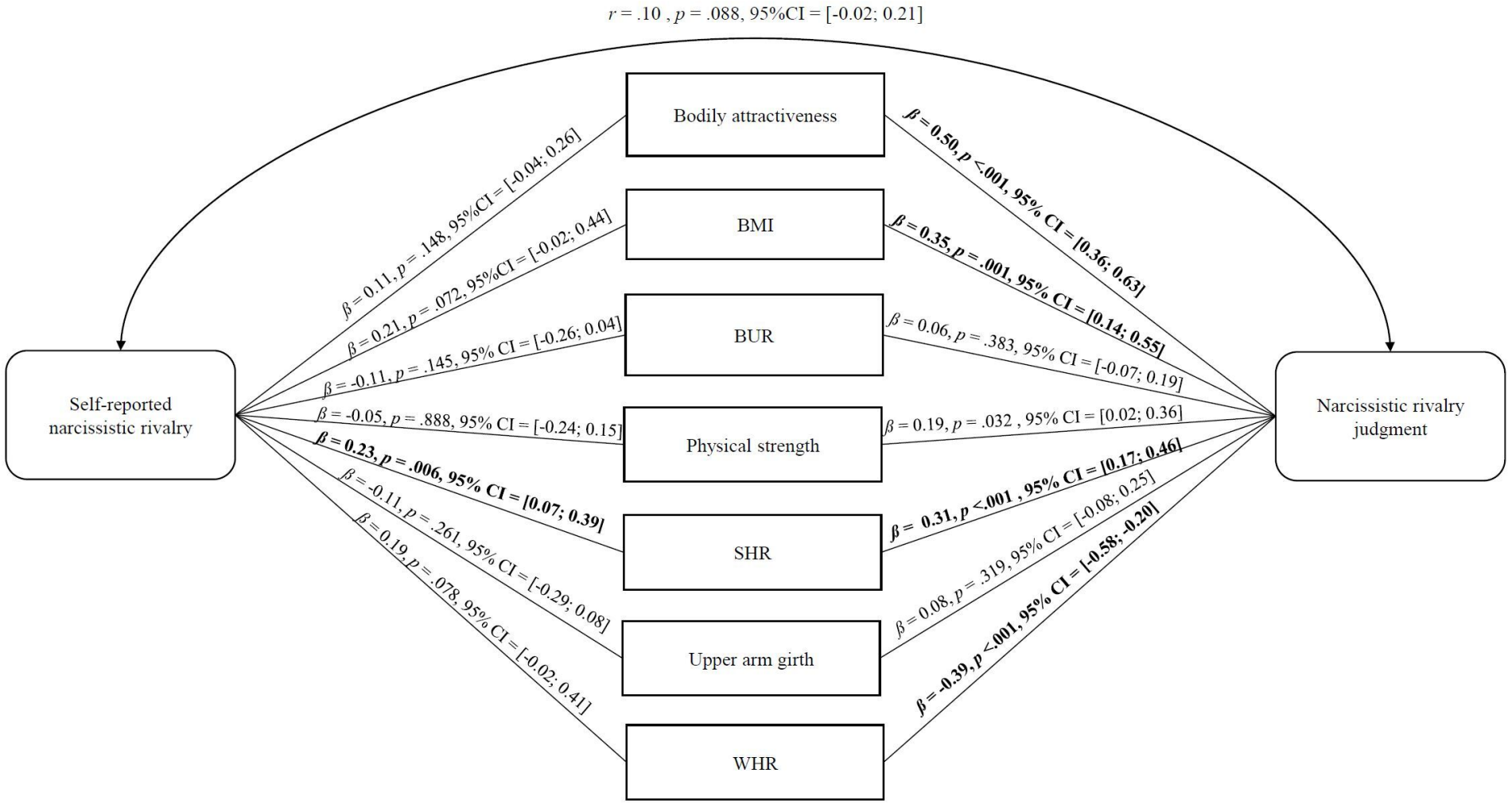

Figure 4. Lens model displaying results for self-reported (left) and judged (right) narcissistic rivalry and accuracy, respectively.

Note: Standardized regression (β) and correlation (r) coefficients with significance values (p) and 95% confidence interval (95% CI). Variables significantly predicting judged narcissistic rivalry (α = .01) are printed in bold. Narcissistic rivalry was judged by n = 54 raters and self-reported by N = 290 targets (after the removal of three statistical outliers).

of the body variables. Bodily attractiveness and SHR were still positively associated with judged narcissistic rivalry, whereas the positive associations between BMI and judged narcissistic rivalry decreased and the negative association of WHR was not significant anymore, suggesting that participants gender had an influence on the results. None of the body variables significantly interacted with target participants' gender. The model explained 35% of variance ($F_{15, 271}$ = 9.61, p <.001, R^2= .35, r = .59, detailed results can be found in the supplementary material Table S3).

Self-reported narcissistic rivalry (cue validity)

As a next step, we examined the body cues as predictors of self-reported narcissistic rivalry. The data did not violate the assumption of independence of residuals (Durbin Watson value = 2.10) but included three outliers (*M* +/- 3 *SD*s) for self-reported narcissistic rivalry, which were removed for further analyses (for details see the open analysis script). The seven predictors significantly explained 17% of the variance in participants' self-reported narcissistic rivalry ($F_{7, 278}$ = 7.94, p < .001, R^2 = .17, r = .41, all results are displayed in Figure 4). SHR was significantly associated with self-reported narcissistic rivalry, in that individuals with broader shoulders in relation to hips reported higher values of narcissistic rivalry, with a small to medium effect size. None of the other body cues revealed significant effects. A Fisher's *z*-test suggested that the correlation coefficient between self-reported narcissistic rivalry and bodily attractiveness was not significantly different from the coefficient reported in Weber and colleagues (2021; r = -.08) based on full-body photographs (*Cohen's q* = .05, z = 0.63, p = .53).

Again, to investigate potential effects of target participants' gender, we repeated the previously reported analyses, but modelled an interaction effect of gender with each of the body variables. The model explained 21% of variance ($F_{15, 270}$ = 4.76, p <.001, R^2 = .21, r = .46, detailed results can be found in the supplementary material Table S4). In short, none of the body variables significantly interacted with target participants' gender. The association of SHR and self-reported narcissistic rivalry increased regarding the effect size, but the p-value increased as well. Gender was strongly significantly negatively related to self-reported narcissistic rivalry, in that men self-reported higher levels of narcissistic rivalry as compared to women. All other results reported above remained virtually identical.

Accuracy in narcissistic rivalry

Finally, to analyze the accuracy, we investigated the association between judged and self-reported narcissistic rivalry, resulting in a non-significant bivariate association (see Figure 4). Nevertheless, the correlation coefficients between accuracy of narcissistic admiration and narcissistic rivalry ratings did not significantly differ from each other (*Cohen's q* = 0.06, z = 0.91, p = .36). Further, Fisher's *z*-tests suggested that the accuracy correlation coefficient for narcissistic rivalry was not significantly different from the accuracy coefficient for agreeableness (*Cohen's q* = .09, z = 0.79, p = .43) reported in Borkenau and Liebler (1992; r = .19) based on full-body photographs, but Borkenau and Liebler's (1992) reported accuracy coefficient for extraversion (r = .33) was significantly higher (*Cohen's q* = .24, z = 2.07, p = .04).

Discussion

The present study aimed to extend the research on narcissism perception at zero acquaintance by investigating the cue validity and cue utilization for human body morphology in grandiose narcissism. Based on the NARC (Back et al., 2013), we sought to clarify the role of both assertive and antagonistic facets of narcissism, namely narcissistic admiration and rivalry. We used lens model analyses (Brunswik, 1956; Nestler & Back, 2013) to investigate the correspondence of self-reported and perceived narcissism with bodily appearance in female and male targets.

Summary of findings

In contrast to our Hypothesis 1, our results suggest no compelling evidence that targets' self-reported narcissistic admiration is related to bodily attractiveness or most other body cues investigated in this study. SHR showed a small positive relationship with self-reported narcissistic admiration, but this effect did not reach our predefined significance threshold. However, bodily attractiveness, BMI, SHR and physical strength positively and WHR negatively predicted judged narcissistic admiration with medium to large effect sizes. These effects did not significantly interact with gender, contrary to Hypothesis 2. Further, our results suggest that self-reported narcissistic admiration can be judged somewhat accurately based on 3D body scans. While the effect size was small, it was in line with accuracy effects reported for judgments of extraversion or agreeableness based on photographs in a previous study (Borkenau & Liebler, 1992).

Narcissistic rivalry was investigated in an exploratory manner and our results indicate a medium-sized, positive association between self-reported narcissistic rivalry and SHR. However, this effect was not robust in further analyses when adding gender as a potential moderator variable. The results regarding the associations between body morphology and judged narcissistic rivalry were comparable to those of judged narcissistic admiration: bodily attractiveness, BMI, SHR and WHR were used to form judgments of narcissistic rivalry. The association between self-reported and judged narcissistic rivalry (accuracy) was small and non-significant, but still not statistically distinguishable from the significant positive association between self-reported and judged narcissistic admiration.

Cue validity in narcissism perception

Our results do not provide strong support for the assumption of self-reported narcissism being associated with perceived bodily attractiveness and objectively measured body cues. Contrary to previous results (Weber et al., 2021), we did not find compelling evidence for a positive narcissism-attractiveness link when applying a 3D body scan-design with a standardization of skin color, a lack of texture and head information. Further, studies considered in the meta-analysis by Holtzman and Strube (2010) showing a

positive association between self-reported narcissism and judged attractiveness predominantly used stimulus material that contained information going beyond sole body morphology. Studies that reported significant correlations between attractiveness and narcissism based their findings either on unstandardized *Facebook* photos (Buffardi & Campbell, 2008), waist-up 30-seconds videos of individuals responding to a question (Oltmanns et al., 2004) or full-body photos (Vazire et al., 2008). Thus, previous approaches to the narcissism-attractiveness link might rather be attributed to adjustable (i.e., clothing, facial expression), instead of fixed (i.e., stable appearance attributes, such as body measures and ratios) indicators of bodily attractiveness, as investigated in the present study. This idea is supported by the results reported by Holtzman and Strube (2013) suggesting that narcissism is more strongly related to adorned (photographs of participants how they entered the lab, β = .19) versus unadorned attractiveness (photographs of participants in a neutral state, e.g. with standardized clothing and removed make-up, β = .09).

Nevertheless, Weber and colleagues (2021) found that individuals high in narcissistic admiration possess "natural beauty" by investigating static appearance attributes: Facial and bodily attractiveness were rated by trained observers to create one overall measure for attractiveness instead of two different measures. However, this association was rather small (r = .07 and r = .10), inconsistent across studies and targets, and the effect size was not significantly different from the effect size reported in the current study (r = .05). Preceding research has reported that people predominantly use facial information to assess physical attractiveness (Currie & Little, 2009), which may account for the inconsistency of results in approaches investigating the body including head and facial information (Weber et al., 2021). In turn, this may explain why faces (Holtzman, 2011) and particularly characteristics like the distinctiveness of eyebrows (Giacomin & Rule, 2019) cue grandiose narcissism, as these are indicative of attractiveness (Cosio & Robins, 2000). Another potential explanation of differences in results might be the difference in sample sizes: the sample size used in Weber and colleagues (2021) was larger than ours, resulting in higher statistical power for detecting small effect sizes. Nevertheless, when judging attractiveness by means of bodily attractiveness and without facial information, our results, including the reported effect sizes, are rather in line with previous studies reporting that narcissistic rivalry is unrelated to bodily attractiveness and corresponding body cues (Dufner et al., 2013; Weber et al., 2021; Wurst et al., 2017). Thus, the antagonistic aspects of narcissism do not seem to be strongly reflected in the human body morphology and may rather be displayed in facial and/or dynamic cues, such as behavioral patterns (Fatfouta et al., 2015; Leckelt et al., 2015; Wurst et al., 2017).

Regarding the other investigated body variables and their associations with self-reported narcissistic admiration and rivalry, we found small positive associations of SHR with self-reported narcissistic admiration and rivalry. Given that these effects would either not remain significant when controlling for multiple testing, or were exploratory and were not robust when including participants' gender in the same model, we see a need for replication of these effects before further interpretation. If replicable, it might be possible that either people reporting higher narcissistic admiration or rivalry might engage in more sports that lead to broader shoulders relative to narrower hips or that people with broader shoulders report higher narcissistic admiration and rivalry in line with facultative calibration (e.g. Sell et al., 2009), although this effect might also transfer to other investigated variables, such as physical strength, for which we did not find significant effects. Nevertheless, none of the other investigated body cues (BMI, BUR, WHR, physical strength, upper arm girth) were significantly related to self-reported narcissistic admiration or rivalry.

An increasing amount of research suggests that specific facets of narcissism correspond systematically with the individual body perception: Agentic and antagonistic narcissism (as assessed by the NARQ) seem to come along with a positive body image, high body satisfaction, lower levels of body shame and less weight discrepancy, regardless of gender, sexual orientation, and BMI (J. Brown & Graham, 2008; Carrotte & Anderson, 2019; Jackson et al., 1992). Interestingly, when applying a trifurcated structure of narcissism, which additionally includes the facet of *neurotic narcissism*, the body-related pattern appears to change drastically: Females high in neurotic narcissism, which is characterized by hypersensitivity, insecurity, and a fragile self-esteem as well as shame (Back & Morf, 2018; Mota et al., 2020), report higher levels of weight discrepancy, body image concerns, and body shame (Carrotte & Anderson, 2019; Hater et al., 2021; Swami et al., 2015). Whether neurotic narcissism-specific findings also arise among males is yet understudied. Our application of the two-dimensional conceptualization of narcissism with its agentic (narcissistic admiration) and antagonistic (narcissistic rivalry) pathways may explain why we did not detect any strong significant relationships between body morphology and self-reported narcissistic admiration and rivalry. In this sense, individuals high in narcissistic admiration and rivalry show less body dissatisfaction compared to individuals high in neurotic narcissism (J. Brown & Graham, 2008; Carrotte & Anderson, 2019; Hater et al., 2021; Jackson et al., 1992) and might rather not engage in adornment of body morphology through workouts and gym-activity (which may lead to differences in cues investigated in this study, such as WHR or physical strength) in the same manner as they do regarding their clothing or hairstyle.

However, we cannot conclude null results. Most reported effects, although being non-significant, suggest that effect sizes (and their confidence intervals) might still be in line with small effects that are in a range of a smallest effect size of interest (SESOI; e.g. Lakens, 2017). Just to give one example, in our a priori power analysis, we expected a medium sized effect. If we define a medium sized effect as r = .20 (Funder & Ozer, 2019), we cannot reject that there might be a medium sized association for the accuracy of narcissistic rivalry judgments, as the confidence interval includes r = .20. Importantly, all reported confidence intervals include small effect sizes (β = .10), which means that we cannot accept the null hypothesis either if we consider small effect sizes as potentially relevant. Hence, we urge for replication studies with larger sample sizes to increase test power and, preregistering a smallest effect size of interest.

Cue utilization in narcissism perception

We report evidence that bodily attractiveness, BMI, SHR, WHR and physical strength are utilized to judge narcissistic admiration as well as rivalry. More precisely, all of these variables were positively related to judged narcissistic admiration and rivalry, with medium to strong effect sizes, except for WHR, which was negatively related to narcissism judgments, but this effect was not robust in further analyses. These results suggest bodily attractiveness, BMI, SHR and physical strength to be body cues utilized by perceivers, although these body cues appear not to be valid in terms of being associated with targets' self-reported narcissism (except for SHR which has to be investigated further). Interestingly, the utilization of invalid body cues discloses erroneous inferences and judgments of others, which may underlie perceptual biases and heuristics (Chaiken & Trope, 1999; Kahneman et al., 1982). More bodily attractive, physically strong targets with a higher BMI might have been perceived as scoring higher in narcissistic admiration and rivalry because of raters' implicit biases and heuristics as well. For example, as more muscular people (that might be stronger but potentially also have a higher BMI) are also discerned as more formidable (Sell et al., 2009), perceivers may expect them to rather pursue antagonistic strategies, such as reacting annoyed when another person steals the show from them and responding to criticism in an annoyed manner. Further, the present results suggest that most physical characteristics associated with perceptions of narcissistic admiration and rivalry are in line with ideals of beauty, and potentially with the idea that men and women may try to adorn themselves by e.g. doing sports to enhance their bodily attractiveness, SHR and physical strength in order to achieve and maintain their grandiose self. This assumption is in line with perceptions of attractive celebrities as being narcissistic (as described by Weber et al., 2021).

In other narcissism perception studies, however, some specific appearance-based cues have been identified in order to detect narcissistic people at zero acquaintance: Individuals high in narcissism aim to influence their physical appearance through self-enhancing strategies (Grijalva & Zhang, 2016), which allows them to invest much in an attractive physical façade (Davis et al., 2001; Holtzman & Strube, 2013). Correspondingly, previous studies demonstrated that narcissism is related to fashionable, stylish, and expensive clothing as well as an organized and neat appearance (Back et al., 2010; Sedikides et al., 2007; Vazire et al., 2008). Moreover, individuals high in narcissism tend to stage themselves by means of humorous verbal expressions and self-assured body movements (Back et al., 2010; Campbell, 1999; Paulhus, 1998). In this regard, narcissism appears to be rather related to dynamic cues (expressive behaviors) and static cues which promote social relevance (face and clothing), to convey their attractiveness and grandiose self, as a wide range of their self-portrayal effort occurs on the social stage (Morf & Rhodewalt, 2001). All of these dynamic cues have been absent in the current study.

Accuracy in narcissism perception

In general, perceivers were able to judge self-reported narcissistic admiration somewhat accurately (r = .17, see Figure 3). Self-reported narcissistic rivalry was judged slightly less accurately and the effect was non-significant (r = .10, see Figure 4), although the effect size was not significantly different from the accuracy effect size of narcissistic admiration. With respect to narcissistic rivalry in both female and male targets, the theoretical conceptualization (Back et al., 2013) and empirical evidence (Leckelt et al., 2015; Paulhus, 1998; Wurst et al., 2017) suggests that the antagonistic effects of grandiose narcissism (e.g. narcissistic rivalry) are most visible and evident as the level of acquaintance increases. In the present investigation, judgments were made upon zero acquaintance, so that the shift from initial popularity and charmingness qua narcissistic admiration to subsequent unpopularity and aggressiveness qua narcissistic rivalry was not observable. As a result, perceivers might have found it particularly challenging to evaluate targets' narcissistic rivalry precisely, which potentially explains the descriptively lower accuracy. That the acquaintance length plays a crucial role in the accuracy of personality judgments is further supported by the so-called *acquaintanceship effect* (Biesanz et al., 2007; Letzring et al., 2006). The accuracy of personality judgments increases with the acquaintance length due to a rising level of information available to perceivers. According to the Realistic Accuracy Model (RAM, Funder, 1995, 2012), correct personality judgements are obtained through a multi-step process in which the target person should disclose characteristics that are relevant to the trait being assessed. Subsequently, these relevant traits should be made available to perceivers and then correctly detected by them. In a final step, the relevant, available and detected information should be correctly used to form an accurate judgement. As stated in the sequential process of the RAM (Funder, 1995, 2012), the step which might have interfered the accurate judgment of targets' narcissism might already have been the first step, namely the trait relevance of the characteristics displayed. In this regard, morphology reveals little to no information for perceivers to accurately judge narcissistic traits. In general, judgments were based on highly standardized 3D stimuli, so that relatively little information on targets was available, resulting in comparatively thin slices. Previous research demonstrated that the consensus of personality judgments based on photographs is lowest compared to personality judgments based on other "thicker sliced" conditions (e.g. videos) at zero acquaintance (Back et al., 2010; Borkenau & Liebler, 1992, 1995; Naumann et al., 2009).

Nevertheless, as perceivers were capable of accurately judging at least narcissistic admiration in targets by their mere body morphology in a manner that was comparable to e.g. judgments of extraversion and agreeableness based on photographs in previous studies (Borkenau & Liebler, 1992), although the body cues investigated in the present study were rather unrelated to targets' self-reported narcissistic admiration (and rivalry). This implies that perceivers must have utilized body cues, which were left unconsidered in the present manuscript, as the accuracy increases with the perceivers' utilization of observable cues, which in fact

correspond to targets' self-reported narcissism (Nestler & Back, 2013). Therefore, we propose to contemplate other cues of body morphology, such as body height, in future narcissism perception research.

Additionally, the standardization of target stimuli appears to have an impact on the accuracy of personality judgements: multiple personality traits can be judged accurately when targets pose in a natural pose (no given instructions how to pose), allowing them a free adoption of pose and expression. On the contrary, the amount of accurately judged personality traits declines when observers rate the target's personality on basis of a standardized photograph only (Naumann et al., 2009). Similarly, there is evidence that personality judgments become more accurate as soon as targets personalize situations through unstructured face-to-face interactions, compared to standardized, neutral photographs (Satchell, 2019). The present findings may indicate that the perception of narcissism rather depends on appearance-based cues, which allow the influence of targets' individual characteristics to be detected accurately by laypersons. Since the targets in our sample were deprived of any kind of individualization of perceptible cues (through the standardized posture, underwear, and color as well as lack of facial information), perceivers might have found it particularly challenging to evaluate targets' narcissistic admiration and rivalry precisely.

Limitations and recommendations for future research

We would like to note several limitations of the current study that directly result in implications for future research. There are constraints on generality (Simons et al., 2017). The sample of raters consisted mostly of female participants (80%) and most of the raters were students (95%) with the majority studying psychology (79%), which can be explained by course credit serving as the main incentive for participating. Targets as well as raters were mostly highly educated young adults of European origin. Further, our study was conducted in a WEIRD country and might thus not be generalizable to other countries and cultures (Henrich et al., 2010). For example, the relationship between bodily attractiveness evaluations and BMI seems to vary cross-culturally (e.g. Boothroyd et al., 2016), thus, we have good reasons to believe that person perception of other variables (e.g. narcissism) based on body morphology may vary cross-culturally as well. Our results may be reproducible with students from similar subject pools as the one we used, but we lack evidence that our results will generalize to situations outside the lab. We have no reason to believe that results depend on other characteristics of the participants, materials, or context.

Moreover, as rater characteristics did not show enough variance (e.g. in gender or age), we were not able to test whether rater characteristics moderate our key results or whether results change when e.g. controlling for rater gender. We recommend future studies to collect a larger, more diverse sample to be able to test for confounding or moderating effects of rater characteristics as, for example, women and men may put different weight on body characteristics when judging an opposite-sex body (which may also depend on mating interest; Confer et al., 2010). Furthermore, the assessment of targets' narcissistic admiration and rivalry was based on targets' self-reports and, thus, may be biased by socially desirable responding, or by relying on thoughts and feelings rather than behavior, which can harm the accuracy of self-reports for more interpersonal manifestations of narcissism (Vazire, 2010). Future investigations should follow a multi-method approach employing both self-reports and peer-reports or observer-ratings to examine whether results differ when using different sources of information regarding targets levels of narcissism . Another limitation is that we used 3D body scans as stimuli to augment external validity in the judgment of narcissistic admiration and rivalry. The standardization of skin color, the lack of texture (and body hair) and head information was applied to account for confounding variables. As a downside, however, these body scans might also have looked overly artificial. Instead, actual photos of bodies rather than 3D body scans may be used as target stimuli, which should be investigated in further experimental designs under careful consideration of potentially limited internal validity. Moreover, the physical appearance of narcissistic people at zero acquaintance can be addressed more precisely and coherently across different stimulus materials by including natural body-, face-, and dressed body-photos as well as short video clips of the same target persons.

Further, we used two different versions of the NARQ to assess narcissism in men and women, reducing comparability and resulting in rather low reliability for the narcissistic rivalry dimension of the short version of the NARQ. To render analyses for men and women more comparable, we analyzed the same items of the NARQ for women and men (as the short scale version is part of the long scale version). In addition, even though our study had appropriate test power to detect medium effect sizes, some medium sized effects were non-significant. Some small, but potentially meaningful effect sizes were non-significant as well, suggesting that future studies should rather increase their sample size. Finally, our study was not preregistered before conducting it, which further highlights the need for replication of the current results. While we share our data and analysis script, a preregistration would have decreased researcher degrees of freedom, increased transparency and contributed to the goal of preregistration being the new norm. We encourage future research to conduct preregistered replication or registered reports of our work.

Conclusion

In summary, we conclude that bodily attractiveness, BMI, SHR and physical strength appear to be used as cues when judging narcissistic admiration and rivalry. Most of the investigated body cues were not significantly related to self-reported narcissistic admiration and rivalry and we did not find compelling gender differences. In terms of the accuracy of judgments narcissistic admiration was evaluated accurately, whereas no significant accuracies resulted for female and male narcissistic rivalry, although both effect sizes were not significantly different from each other. The present results may imply that static appearance-based cues disclose social information (i.e., via face and clothing)

at zero acquaintance. However, naïve perceivers may be prone to perceptual biases and heuristics in their narcissistic admiration and rivalry judgment. Though highly standardized and controlled, the present study has some limitations that should be addressed in future investigations to provide further evidence on the exact relationship between grandiose narcissism and body morphology. For this purpose, preferably pre-registered studies with good methodological standards, also to reach sufficient interrater reliabilities and high statistical power, are required.

Contributions

Contributed to conception and design: TR, JS
Acquisition of data: Target participants (bodies): TLK, JS.
Rating data: TR under supervision of JS
Analysis and interpretation of data: TR under supervision of JS
Drafted or revised the article: TR, TLK, JS
Approved the submitted version for publication: TR, TLK, JS

Competing interests

The authors declare that they have no conflicts of interest.

Data accessibility statement

Data and analysis script are publicly available at the Open Science Framework (https://osf.io/gynx9/).

Submitted: June 24, 2021 PDT, Accepted: July 14, 2022 PDT

References

Albright, L., Kenny, D. A., & Malloy, T. E. (1988). Consensus in personality judgments at zero acquaintance. *Journal of Personality and Social Psychology*, *55*(3), 387–395. https://doi.org/10.1037/0022-3514.55.3.387

Andrews, T. M., Lukaszewski, A. W., Simmons, Z. L., & Bleske-Rechek, A. (2017). Cue-based estimates of reproductive value explain women's body attractiveness. *Evolution and Human Behavior*, *38*(4), 461–467. https://doi.org/10.1016/j.evolhumbehav.2017.04.002

Back, M. D., Küfner, A. C. P., Dufner, M., Gerlach, T. M., Rauthmann, J. F., & Denissen, J. J. A. (2013). Narcissistic admiration and rivalry: Disentangling the bright and dark sides of narcissism. *Journal of Personality and Social Psychology*, *105*(6), 1013–1037. https://doi.org/10.1037/a0034431

Back, M. D., & Morf, C. C. (2018). Narcissism. In V. Zeigler-Hill & T. K. Shackelford (Eds.), *Encyclopedia of Personality and Individual Differences*. Springer. https://doi.org/10.1007/978-3-319-28099-8_704-1

Back, M. D., Schmukle, S. C., & Egloff, B. (2010). Why are narcissists so charming at first sight? Decoding the narcissism–popularity link at zero acquaintance. *Journal of Personality and Social Psychology*, *98*(1), 132–145. https://doi.org/10.1037/a0016338

Biesanz, J. C., West, S. G., & Millevoi, A. (2007). What do you learn about someone over time? The relationship between length of acquaintance and consensus and self-other agreement in judgments of personality. *Journal of Personality and Social Psychology*, *92*(1), 119–135. https://doi.org/10.1037/0022-3514.92.1.119

Boothroyd, L. G., Jucker, J.-L., Thornborrow, T., Jamieson, M. A., Burt, D. M., Barton, R. A., Evans, E. H., & Tovee, M. J. (2016). Television exposure predicts body size ideals in rural Nicaragua. *British Journal of Psychology*, *107*(4), 752–767. https://doi.org/10.1111/bjop.12184

Borkenau, P., & Liebler, A. (1992). Trait inferences: Sources of validity at zero acquaintance. *Journal of Personality and Social Psychology*, *62*(4), 645–657. https://doi.org/10.1037/0022-3514.62.4.645

Borkenau, P., & Liebler, A. (1995). Observable attributes as manifestations and cues of personality and intelligence. *Journal of Personality*, *63*(1), 1–25. https://doi.org/10.1111/j.1467-6494.1995.tb00799.x

Bowerman, B. L., & O'Connell, R. T. (1990). *Linear statistical models: An applied approach* (2nd ed.). Duxbury Press.

Brooks, R. C., Shelly, J. P., Jordan, L. A., & Dixson, B. (2015). The multivariate evolution of female body shape in an artificial digital ecosystem. *Evolution and Human Behavior*, *36*(5), 351–358. https://doi.org/10.1016/j.evolhumbehav.2015.02.001

Brown, J., & Graham, D. (2008). Body satisfaction in gym-active males: An exploration of sexuality, gender, and narcissism. *Sex Roles*, *59*(1–2), 94–106. https://doi.org/10.1007/s11199-008-9416-4

Brown, R. P., Budzek, K., & Tamborski, M. (2009). On the meaning and measure of narcissism. *Personality and Social Psychology Bulletin*, *35*(7), 951–964. https://doi.org/10.1177/0146167209335461

Brunswik, E. (1956). *Perception and the representative design of psychological experiments* (2nd ed.). University of California Press. https://doi.org/10.1525/9780520350519

Buffardi, L. E., & Campbell, W. K. (2008). Narcissism and social networking web sites. *Personality and Social Psychology Bulletin*, *34*(10), 1303–1314. https://doi.org/10.1177/0146167208320061

Buunk, B. P., & Dijkstra, P. (2005). A narrow waist versus broad shoulders: Sex and age differences in the jealousy-evoking characteristics of a rival's body build. *Personality and Individual Differences*, *39*(2), 379–389. https://doi.org/10.1016/j.paid.2005.01.020

Campbell, W. K. (1999). Narcissism and romantic attraction. *Journal of Personality and Social Psychology*, *77*(6), 1254–1270. https://doi.org/10.1037/0022-3514.77.6.1254

Carney, D. R., Colvin, C. R., & Hall, J. A. (2007). A thin slice perspective on the accuracy of first impressions. *Journal of Research in Personality*, *41*(5), 1054–1072. https://doi.org/10.1016/j.jrp.2007.01.004

Carrotte, E., & Anderson, J. (2019). Risk factor or protective feature? The roles of grandiose and hypersensitive narcissism in explaining the relationship between self-objectification and body image concerns. *Sex Roles*, *80*(7–8), 458–468. https://doi.org/10.1007/s11199-018-0948-y

Chaiken, S., & Trope, Y. (1999). *Dual-process theories in socialpsychology*. Guilford Press.

Cloud, J. M., & Perilloux, C. (2015). "Drawing" conclusions about perceptions of ideal male and female body shapes. *Evolutionary Psychological Science*, *1*(3), 163–171. https://doi.org/10.1007/s40806-015-0020-x

Confer, J. C., Perilloux, C., & Buss, D. M. (2010). More than just a pretty face: Men's priority shifts toward bodily attractiveness in short-term versus long-term mating contexts. *Evolution and Human Behavior*, *31*(5), 348–353. https://doi.org/10.1016/j.evolhumbehav.2010.04.002

Cosio, R., & Robins, C. (2000). *The eyebrow*. HarperCollins.

Cowles, M., & Davis, C. (1982). On the origins of the .05 level of statistical significance. *American Psychologist*, *37*(5), 553–558. https://doi.org/10.1037/0003-066x.37.5.553

Currie, T. E., & Little, A. C. (2009). The relative importance of the face and body in judgments of human physical attractiveness. *Evolution and Human Behavior*, *30*(6), 409–416. https://doi.org/10.1016/j.evolhumbehav.2009.06.005

Davis, C., Dionne, M., & Shuster, B. (2001). Physical and psychological correlates of appearance orientation. *Personality and Individual Differences*, *30*(1), 21–30. https://doi.org/10.1016/s0191-8869(00)00006-4

Dixson, B. J., Dixson, A. F., Bishop, P. J., & Parish, A. (2010). Human physique and sexual attractiveness in men and women: A New Zealand-U.S. comparative study. *Archives of Sexual Behavior*, *39*(3), 798–806. https://doi.org/10.1007/s10508-008-9441-y

Dixson, B. J., Duncan, M., & Dixson, A. F. (2015). The role of breast size and areolar pigmentation in perceptions of women's sexual attractiveness, reproductive health, sexual maturity, maternal nurturing abilities, and age. *Archives of Sexual Behavior*, *44*(6), 1685–1695. https://doi.org/10.1007/s10508-015-0516-2

Dufner, M., Rauthmann, J. F., Czarna, A. Z., & Denissen, J. J. A. (2013). Are narcissists sexy? Zeroing in on the effect of narcissism on short-term mate appeal. *Personality and Social Psychology Bulletin*, *39*(7), 870–882. https://doi.org/10.1177/0146167213483580

Durbin, J., & Watson, G. S. (1950). Testing for Serial Correlation in Least Squares Regression: I. *Biometrika*, *37*(3/4), 409–428. https://doi.org/10.2307/2332391

Eastwick, P. W., Finkel, E. J., & Eagly, A. H. (2011). When and why do ideal partner preferences affect the process of initiating and maintaining romantic relationships? *Journal of Personality and Social Psychology*, *101*(5), 1012–1032. https://doi.org/10.1037/a0024062

Fan, J., Dai, W., Liu, F., & Wu, J. (2005). Visual perception of male body attractiveness. *Proceedings of the Royal Society B: Biological Sciences*, *272*(1560), 219–226. https://doi.org/10.1098/rspb.2004.2922

Fatfouta, R., Gerlach, T. M., Schröder-Abé, M., & Merkl, A. (2015). Narcissism and lack of interpersonal forgiveness: The mediating role of state anger, state rumination, and state empathy. *Personality and Individual Differences*, *75*, 36–40. https://doi.org/10.1016/j.paid.2014.10.051

Field, A., Miles, J., & Field, Z. (2012). *Discovering statistics using R*. SAGE Publications Ltd.

Fisher, M. L., & Voracek, M. (2006). The shape of beauty: Determinants of female physical attractiveness. *Journal of Cosmetic Dermatology*, *5*(2), 190–194. https://doi.org/10.1111/j.1473-2165.2006.00249.x

Fisher, R. A. (1915). Frequency distribution of the values of the correlation coefficient in samples from an indefinitely large population. *Biometrika*, *10*(4), 507–521. https://doi.org/10.2307/2331838

Fletcher, T. D. (2012). *QuantPsyc: Quantitative psychology tools*. https://cran.r-project.org/package=QuantPsyc

Fox, J., & Weisberg, S. (2019). *Car: Companion to applied regression*. https://cran.r-project.org/web/packages/car/index.html

Franzoi, S. L., & Herzog, M. E. (1987). Judging physical attractiveness: What body aspects do we use? *Personality and Social Psychology Bulletin*, *13*(1), 19–33. https://doi.org/10.1177/0146167287131002

Funder, D. C. (1995). On the accuracy of personality judgment: a realistic approach. *Psychological Review*, *102*(4), 652–670. https://doi.org/10.1037/0033-295x.102.4.652

Funder, D. C. (2012). Accurate personality judgment. *Current Directions in Psychological Science*, *21*(3), 177–182. https://doi.org/10.1177/0963721412445309

Funder, D. C., & Ozer, D. J. (2019). Evaluating effect size in psychological research: Sense and nonsense. *Advances in Methods and Practices in Psychological Science*, *2*(2), 156–168. https://doi.org/10.1177/2515245919847202

Giacomin, M., & Rule, N. O. (2019). Eyebrows cue grandiose narcissism. *Journal of Personality*, *87*(2), 373–385. https://doi.org/10.1111/jopy.12396

Gould, S. J. (1981). *The mismeasure of man*. Norton.

Grijalva, E., & Zhang, L. (2016). Narcissism and self-insight: A review and meta-analysis of narcissists' self-enhancement tendencies. *Personality and Social Psychology Bulletin*, *42*(1), 3–24. https://doi.org/10.1177/0146167215611636

Grillot, R. L., Simmons, Z. L., Lukaszewski, A. W., & Roney, J. R. (2014). Hormonal and morphological predictors of women's body attractiveness. *Evolution and Human Behavior*, *35*(3), 176–183. https://doi.org/10.1016/j.evolhumbehav.2014.01.001

Hall, J. A., Andrzejewski, S. A., Murphy, N. A., Mast, M. S., & Feinstein, B. A. (2008). Accuracy of judging others' traits and states: Comparing mean levels across tests. *Journal of Research in Personality*, *42*(6), 1476–1489. https://doi.org/10.1016/j.jrp.2008.06.013

Harris, M. J., & Garris, C. P. (2008). You never get a second chance to make a first impression: Behavioral consequences of first impressions. In N. Ambady & J. J. Skowronski (Eds.), *First impressions* (pp. 147–168). Guilford Publications.

Haselton, M. G., & Funder, D. C. (2006). The evolution of accuracy and bias in social judgment. In M. Schaller, J. A. Simpson, & D. T. Kenrick (Eds.), *Evolution and social psychology* (pp. 15–37). https://doi.org/10.4324/9780203782965

Hater, L., Schulte, J., Geukes, K., Buhlmann, U., & Back, M. D. (2021). Disentangling the contributions of agentic, antagonistic, and neurotic narcissism to drive for thinness and drive for muscularity. *PLOS ONE*, *16*(6), e0253187. https://doi.org/10.1371/journal.pone.0253187

Havlíc ˇ ek, J., Třebický, V., Valentova, J. V., Kleisner, K., Akoko, R. M., Fialová, J., Jash, R., Kočnar, T., Pereira, K. J., Štěrbová, Z., Varella, M. A. C., Vokurková, J., Vunan, E., & Roberts, S. C. (2017). Men's preferences for women's breast size and shape in four cultures. *Evolution and Human Behavior*, *38*(2), 217–226. https://doi.org/10.1016/j.evolhumbehav.2016.10.002

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). Most people are not WEIRD. *Nature*, *466*(7302), 29–29. https://doi.org/10.1038/466029a

Hirschmüller, S., Schmukle, S. C., Krause, S., Back, M. D., & Egloff, B. (2018). Accuracy of self-esteem judgments at zero acquaintance. *Journal of Personality*, *86*(2), 308–319. https://doi.org/10.1111/jopy.12316

Holtzman, N. S. (2011). Facing a psychopath: Detecting the dark triad from emotionally-neutral faces, using prototypes from the Personality Faceaurus. *Journal of Research in Personality*, *45*(6), 648–654. https://doi.org/10.1016/j.jrp.2011.09.002

Holtzman, N. S., & Strube, M. J. (2010). Narcissism and attractiveness. *Journal of Research in Personality*, *44*(1), 133–136. https://doi.org/10.1016/j.jrp.2009.10.004

Holtzman, N. S., & Strube, M. J. (2013). People with dark personalities tend to create a physically attractive veneer. *Social Psychological and Personality Science*, *4*(4), 461–467. https://doi.org/10.1177/1948550612461284

Jackson, L. A., Ervin, K. S., & Hodge, C. N. (1992). Narcissism and body image. *Journal of Research in Personality*, *26*(4), 357–370. https://doi.org/10.1016/0092-6566(92)90065-c

Jünger, J., Kordsmeyer, T. L., Gerlach, T. M., & Penke, L. (2018). Fertile women evaluate male bodies as more attractive, regardless of masculinity. *Evolution and Human Behavior*, *39*(4), 412–423. https://doi.org/10.1016/j.evolhumbehav.2018.03.007

Kahneman, D., Slovic, P., & Tversky, A. (Eds.). (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge University Press. https://doi.org/10.1017/cbo9780511809477

Kenny, D. A., Horner, C., Kashy, D. A., & Chu, L. (1992). Consensus at zero acquaintance: Replication, behavioral cues, and stability. *Journal of Personality and Social Psychology*, *62*(1), 88–97. https://doi.org/10.1037/0022-3514.62.1.88

Kordsmeyer, T. L., Freund, D., Vugt, M. V., & Penke, L. (2019). Honest signals of status: Facial and bodily dominance are related to success in physical but not nonphysical competition. *Evolutionary Psychology*, *17*(3), 1474704919863164. https://doi.org/10.1177/1474704919863164

Kordsmeyer, T. L., Hunt, J., Puts, D. A., Ostner, J., & Penke, L. (2018). The relative importance of intra- and intersexual selection on human male sexually dimorphic traits. *Evolution and Human Behavior*, *39*(4), 424–436. https://doi.org/10.1016/j.evolhumbehav.2018.03.008

Kordsmeyer, T. L., & Penke, L. (2019). Effects of male testosterone and its interaction with cortisol on self- and observer-rated personality states in a competitive mating context. *Journal of Research in Personality*, *78*, 76–92. https://doi.org/10.1016/j.jrp.2018.11.001

Kordsmeyer, T. L., Stern, J., & Penke, L. (2019). 3D anthropometric assessment and perception of male body morphology in relation to physical strength. *American Journal of Human Biology*, *31*(5), e23276. https://doi.org/10.1002/ajhb.23276

Lakens, D. (2017). Equivalence tests: A practical primer for t tests, correlations, and meta-analyses. *Social Psychological and Personality Science*, *8*(4), 355–362. https://doi.org/10.1177/1948550617697177

Leckelt, M., Küfner, A. C. P., Nestler, S., & Back, M. D. (2015). Behavioral processes underlying the decline of narcissists' popularity over time. *Journal of Personality and Social Psychology*, *109*(5), 856–871. https://doi.org/10.1037/pspp0000057

Leckelt, M., Wetzel, E., Gerlach, T. M., Ackerman, R. A., Miller, J. D., Chopik, W. J., Penke, L., Geukes, K., Küfner, A. C. P., Hutteman, R., Richter, D., Renner, K.-H., Allroggen, M., Brecheen, C., Campbell, W. K., Grossmann, I., & Back, M. D. (2017). Validation of the narcissistic admiration and rivalry questionnaire short scale (NARQ-S) in convenience and representative samples. *Psychological Assessment*, *30*(1), 86–96. https://doi.org/10.1037/pas0000433

Letzring, T. D., Wells, S. M., & Funder, D. C. (2006). Information quantity and quality affect the realistic accuracy of personality judgment. *Journal of Personality and Social Psychology*, *91*(1), 111–123. https://doi.org/10.1037/0022-3514.91.1.111

Lönnqvist, J. E., Ilmarinen, V.-J., & Verkasalo, M. (2020). Who likes whom? The interaction between perceiver personality and target look. *Journal of Research in Personality*, *90*, 104044. https://doi.org/10.1016/j.jrp.2020.104044

Lüdecke, D. (2018). sjPlot: Data visualization for statistics in social science. *R package version*, *2*(1). https://doi.org/10.5281/ZENODO.2400856

Maisey, D. S., Vale, E. L. E., Cornelissen, P. L., & Tovée, M. J. (1999). Characteristics of male attractiveness for women. *The Lancet*, *353*(9163), 1500. https://doi.org/10.1016/s0140-6736(99)00438-9

Menard, S. (1995). *Applied logistic regression analysis*. SAGE Publications Ltd.

Miller, J. D., Lynam, D. R., Hyatt, C. S., & Campbell, W. K. (2017). Controversies in narcissism. *Annual Review of Clinical Psychology*, *13*(1), 291–315. https://doi.org/10.1146/annurev-clinpsy-032816-045244

Morf, C. C., & Rhodewalt, F. (2001). Unraveling the paradoxes of narcissism: A dynamic self-regulatory processing model. *Psychological Inquiry*, *12*(4), 177–196. https://doi.org/10.1207/s15327965pli1204_1

Mota, S., Humberg, S., Krause, S., Fatfouta, R., Geukes, K., Schröder-Abé, M., & Back, M. D. (2020). Unmasking Narcissus: A competitive test of existing hypotheses on (agentic, antagonistic, neurotic, and communal) narcissism and (explicit and implicit) self-esteem across 18 samples. *Self and Identity*, *19*(4), 435–455. https://doi.org/10.1080/15298868.2019.1620012

Naumann, L. P., Vazire, S., Rentfrow, P. J., & Gosling, S. D. (2009). Personality judgments based on physical appearance. *Personality and Social Psychology Bulletin*, *35*(12), 1661–1671. https://doi.org/10.1177/0146167209346309

Nestler, S., & Back, M. D. (2013). Applications and extensions of the lens model to understand interpersonal judgments at zero acquaintance. *Current Directions in Psychological Science*, *22*(5), 374–379. https://doi.org/10.1177/0963721413486148

Norman, W. T., & Goldberg, L. R. (1966). Raters, ratees, and randomness in personality structure. *Journal of Personality and Social Psychology*, *4*(6), 681–691. https://doi.org/10.1037/h0024002

Oltmanns, T. F., Friedman, J. N. W., Fiedler, E. R., & Turkheimer, E. (2004). Perceptions of people with personality disorders based on thin slices of behavior. *Journal of Research in Personality*, *38*(3), 216–229. https://doi.org/10.1016/s0092-6566(03)00066-7

Paulhus, D. L. (1998). Interpersonal and intrapsychic adaptiveness of trait self-enhancement: A mixed blessing? *Journal of Personality and Social Psychology*, *74*(5), 1197–1208. https://doi.org/10.1037/0022-3514.74.5.1197

Pazhoohi, F., Garza, R., Doyle, J. F., Macedo, A. F., & Arantes, J. (2019). Sex differences for preferences of shoulder to hip ratio in men and women: An eye tracking study. *Evolutionary Psychological Science*, *6*(1), 94–95. https://doi.org/10.1007/s40806-019-00204-1

Python Software Foundation. (2016). *Python language reference* (Version 2.7.11). http://www.python.org/

R Core Team. (2021). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. https://www.r-project.org/

Revelle, W. (2017). *Psych: Procedures for personality and psychological research*. https://cran.r-project.org/package=psych

Rogoza, R., Wyszyńska, P., Maćkiewicz, M., & Cieciuch, J. (2016). Differentiation of the two narcissistic faces in their relations to personality traits and basic values. *Personality and Individual Differences*, *95*, 85–88. https://doi.org/10.1016/j.paid.2016.02.038

Ryffel, F. A. (2017). Alpha and beta error (accumulation). *The International Encyclopedia of Communication Research Methods*, 1–5. https://doi.org/10.1002/9781118901731.iecrm0002

Satchell, L. P. (2019). From photograph to face-to-face: Brief interactions change person and personality judgments. *Journal of Experimental Social Psychology*, *82*, 266–276. https://doi.org/10.1016/j.jesp.2019.02.010

Schauberger, P., Walker, A., & Braglia, L. (2019). *Openxlsx: Read, write and edit xlsx files*. https://cran.r-project.org/web/packages/openxlsx/index.html

Sedikides, C., Gregg, A., Cisek, S., & Hart, C. (2007). The I that buys: Narcissists as consumers. *Journal of Consumer Psychology*, *17*(4), 254–257. https://doi.org/10.1016/s1057-7408(07)70035-9

Sell, A., Cosmides, L., Tooby, J., Sznycer, D., Von Rueden, C., & Gurven, M. (2009). Human adaptations for the visual assessment of strength and fighting ability from the body and face. *Proceedings of the Royal Society B: Biological Sciences*, *276*(1656), 575–584. https://doi.org/10.1098/rspb.2008.1177

Sell, A., Lukazsweski, A. W., & Townsley, M. (2017). Cues of upper body strength account for most of the variance in men's bodily attractiveness. *Proceedings of the Royal Society B: Biological Sciences*, *284*(1869), 20171819. https://doi.org/10.1098/rspb.2017.1819

Sheldon, W. H. (1940). *The varieties of human physique*. Harper.

Simons, D. J., Shoda, Y., & Lindsay, D. S. (2017). Constraints on generality (COG): A proposed addition to all empirical papers. *Perspectives on Psychological Science*, *12*(6), 1123–1128. https://doi.org/10.1177/1745691617708630

Singh, D. (1993). Adaptive significance of female physical attractiveness: Role of waist-to-hip ratio. *Journal of Personality and Social Psychology*, *65*(2), 293–307. https://doi.org/10.1037/0022-3514.65.2.293

Singh, D., & Young, R. K. (1995). Body weight, waist-to-hip ratio, breasts, and hips: Role in judgments of female attractiveness and desirability for relationships. *Ethology and Sociobiology*, *16*(6), 483–507. https://doi.org/10.1016/0162-3095(95)00074-7

Sorokowski, P., Sorokowska, A., Oleszkiewicz, A., Frackowiak, T., Huk, A., & Pisanski, K. (2015). Selfie posting behaviors are associated with narcissism among men. *Personality and Individual Differences*, *85*, 123–127. https://doi.org/10.1016/j.paid.2015.05.004

Stern, J., Kordsmeyer, T. L., & Penke, L. (2021). A longitudinal evaluation of ovulatory cycle shifts in women's mate attraction and preferences. *Hormones and Behavior*, *128*, 104916. https://doi.org/10.1016/j.yhbeh.2020.104916

Swami, V., Cass, L., Waseem, M., & Furham, A. (2015). What is the relationship between facets of narcissism and women's body image? *Personality and Individual Differences*, *87*, 185–189. https://doi.org/10.1016/j.paid.2015.08.006

Treffenstädt, C., & Wiemann, P. (2018). *Alfred - A library for rapid experiment development*. https://doi.org/10.5281/ZENODO.1437220

Vazire, S. (2010). Who knows what about a person? The self–other knowledge asymmetry (SOKA) model. *Journal of Personality and Social Psychology*, *98*(2), 281–300. https://doi.org/10.1037/a0017908

Vazire, S., Naumann, L. P., Rentfrow, P. J., & Gosling, S. D. (2008). Portrait of a narcissist: Manifestations of narcissism in physical appearance. *Journal of Research in Personality*, *42*(6), 1439–1447. https://doi.org/10.1016/j.jrp.2008.06.007

von Borell, C. J., Kordsmeyer, T. L., Gerlach, T. M., & Penke, L. (2019). An integrative study of facultative personality calibration. *Evolution and Human Behavior*, *40*(2), 235–248. https://doi.org/10.1016/j.evolhumbehav.2019.01.002

Weber, S., Geukes, K., Leckelt, M., & Back, M. D. (2021). The attractiveness of narcissists: Hard work or natural beauty? *Self and Identity*, *20*(2), 235–267. https://doi.org/10.1080/15298868.2019.1575899

Wickham, H. (2011). ggplot2. *Wiley Interdisciplinary Reviews: Computational Statistics*, *3*(2), 180–185. https://doi.org/10.1002/wics.147

Wurst, S. N., Gerlach, T. M., Dufner, M., Rauthmann, J. F., Grosz, M. P., Küfner, A. C. P., Denissen, J. J. A., & Back, M. D. (2017). Narcissism and romantic relationships: The differential impact of narcissistic admiration and rivalry. *Journal of Personality and Social Psychology*, *112*(2), 280–306. https://doi.org/10.1037/pspp0000113

Yeagley, E., Morling, B., & Nelson, M. (2007). Nonverbal zero-acquaintance accuracy of self-esteem, social dominance orientation, and satisfaction with life. *Journal of Research in Personality*, *41*(5), 1099–1106. https://doi.org/10.1016/j.jrp.2006.12.002

Zelazniewicz, A. M., & Pawlowski, B. (2011). Female breast size attractiveness for men as a function of sociosexual orientation (restricted vs. unrestricted). *Archives of Sexual Behavior*, *40*(6), 1129–1135. https://doi.org/10.1007/s10508-011-9850-1

Supplementary Materials

Peer Review History

Download: https://collabra.scholasticahq.com/article/37150-the-relationship-between-body-morphology-and-narcissism-at-zero-acquaintance/attachment/94594.docx?auth_token=mwKCaaGl_ORNEL8cW8vk

Supplemental Material

Download: https://collabra.scholasticahq.com/article/37150-the-relationship-between-body-morphology-and-narcissism-at-zero-acquaintance/attachment/94595.docx?auth_token=mwKCaaGl_ORNEL8cW8vk