



The way they look: Phenotypic prototypicality shapes the perceived intergroup attitudes of in- and out-group members[☆]

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ABSTRACT

Even when people hold little prejudice themselves, expectations about how members of other groups perceive them may negatively influence interracial relations. In four pre-registered experiments, each using a full intergroup design with Black and White participants, we show that people infer negative meta-attitudes from out-group members whose appearance is phenotypically prototypical, which in turn leads to less favorable orientations toward intergroup contact, independent of personal attitudes. In Experiment 1, Black Americans, but not White Americans, perceived that more phenotypically prototypical out-group members held less favorable meta-attitudes, and this explained less favorable contact orientations. In Experiment 2, this pattern emerged for both groups of participants and was particularly pronounced among individuals higher in stigma consciousness. Experiment 3 replicated Experiment 2 with representative samples and demonstrated that the effect of phenotypic prototypicality was more pronounced among participants reporting greater previous rejection by the out-group. With few exceptions, participants in the experiments also perceived phenotypically prototypical in-group members as having less positive meta-attitudes and participants showed less favorable contact orientations toward these in-group targets. An internal meta-analysis supported the robustness of the findings in the first three experiments. In Experiment 4, direct evidence for the causal effect of the mediator meta-attitudes on orientations toward contact with in- and out-group members was obtained. In all studies, effects held controlling for participants' general intergroup attitudes and experiences, demonstrating the unique role of meta-attitudes in shaping intergroup relations. We discuss our results in light of previous research, highlight social implications, and suggest future directions.

To understand how people from different racial and ethnic groups relate to each other, social psychological research has traditionally investigated people's personal orientations, such as explicit and implicit prejudice (evaluations of an out-group), and stereotypes (generalized beliefs about the characteristics of an out-group; Dovidio & Gaertner, 2004; Fiske, Cuddy, Glick, & Xu, 2002; Pettigrew & Tropp, 2006). However, intergroup relations are characterized not only by biases that members of one group hold toward members of another group but also by the perception that members of other groups harbor biases toward one's own group. At this *meta-perceptual* level, meta-attitudes substantially shape intergroup relations (Frey & Tropp, 2006), including people's beliefs about how out-group members view (Kteily, Hodson, & Bruneau, 2016; Vorauer, Hunter, Main, & Roy, 2000) and evaluate them

(Lemay & Teneva, 2020). Such meta-attitudes influence intergroup relations in ways independent of the effects of actual personal intergroup attitudes (Finchilescu, 2010) or beliefs (Kteily et al., 2016), and thus potentially even among people who are not personally prejudiced toward the other group. In addition, members of socially-advantaged (Goff, Steele, & Davies, 2008) and -disadvantaged groups (e.g., Vorauer et al., 2000; Vorauer, Main, & O'Connell, 1998; Vorauer & Sasaki, 2009) both perceive that members of other groups hold negative meta-attitudes of their group. These reciprocal negative meta-attitudes can exacerbate intergroup divides and escalate conflict.

The present research extends previous work in two main ways. First, we investigated characteristics of both perceivers and targets that shape negative meta-attitudes. Our central focus was on how the racial

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phenotypicity of group members, specifically in terms of race-related facial characteristics (Maddox, 2004), affects the meta-attitudes of Black and White Americans toward each other. Second, we examined how meta-attitudes predict a key behavior in intergroup relations – favorable orientations toward intergroup contact – that can alleviate intergroup conflict and promote positive intergroup relations. In four pre-registered experiments each conducted with samples of both Black and White American participants, we tested, for the first time to our knowledge, (a) whether out-group members who have an appearance that is more phenotypically prototypical of their racial group are perceived as holding less favorable meta-attitudes; (b) whether this process explains less favorable orientations toward intergroup contact with these out-group members over and above personal attitudes that people hold toward target individuals and the out-group as a whole; and (c) whether factors relating to vigilance for, or sensitivity to, negative meta-attitudes would moderate the reliance on phenotypical prototypicality when inferring them.

We focused on racial phenotypicity because the degree to which an individual's facial appearance is more prototypical of that person's group – that is, possessing physical features that are similar to those traditionally associated with the group (Ma & Correll, 2011) – can have a profound impact on how the person is treated and on intergroup relations more generally (Kleider-Offutt, Bond, & Hegerty, 2017; Maddox, 2004; Maddox & Perry, 2017). Much of the literature on this topic has focused on how White Americans perceive Black Americans. For instance, White Americans more negatively evaluate and stereotype Black Americans who have more phenotypically prototypical (in this case, “Afrocentric”) facial features (Blair, Judd, & Fallman, 2004; Livingston & Brewer, 2002), with potentially severe consequences (Maddox & Perry, 2017). Investigations of criminal sentencing records show that the more phenotypically prototypical the appearance of Black Americans is perceived to be, the harsher punishment they receive (Blair, Judd, & Chapleau, 2004; see Chen, Fine, Norman, Frick, & Cauffman, 2021 for convergent evidence with Latinx individuals). A higher perceived prototypicality even predicts whether defendants receive the death penalty for a capital crime, controlling for a range of legally-relevant factors (Eberhardt, Davies, Purdie-Vaughns, & Johnson, 2006). The present research extends this past work on racial phenotypicity by examining the effects of racial phenotypicity on meta-attitudes and by investigating the effects of meta-attitudes over and above those of personal attitudes. To further understand the dynamics of intergroup relations, we address these issues by studying processes in responses of both Black and White Americans.

We also considered individual differences among perceivers that could moderate the impact of the racial phenotypicity of out-group members on meta-attitudes. Specifically, we focused on two individual differences that reflect people's vigilance in intergroup encounters and that direct their attention during person perception, namely stigma consciousness and rejection sensitivity. Because more phenotypically prototypical members of an out-group elicit greater threat (Wilson, Hugenberg, & Rule, 2017), people who are more aware of or are more sensitive to negative treatment by the out-group may display more negative meta-attitudes in response to out-group members who are more phenotypically prototypical. Whereas stigma consciousness represents individual differences in anticipated treatment by others, rejection sensitivity relates to the individual differences in the propensity to perceive others' actions as exclusionary; thus, they represent different but potentially complementary facets of intergroup relations and wariness. Specifically, stigma consciousness represents the extent to which an individual expects to be stigmatized by others, and people who score higher on it tend to be more attuned to perceiving potential cues of prejudice (Brown & Pinel, 2003; Pinel, 2004). Similarly, rejection sensitivity is a “defensive motivational system” (Romero-Canyas, Downey, Berenson, Ayduk, & Kang, 2010, p. 124) that makes people more readily perceive even subtle cues of threat (Berenson et al., 2009; Downey, Mougios, Ayduk, London, & Shoda, 2004; Kaiser, Vick, &

Major, 2006; Olsson, Carmona, Downey, Bolger, & Ochsner, 2013). We tested the possible moderating role of perceiver individual differences in stigma consciousness in Experiment 2, and rejection sensitivity and experiences in Experiment 3.

In addition to studying its effects on meta-attitudes, we investigated the effects of racial phenotypicity on a behavioral orientation that is consequential in intergroup relations: orientations toward contact with a member of the other group. Contact is one of the most robust factors improving intergroup relations (Paluck, Green, & Green, 2019; Pettigrew & Tropp, 2006; Pettigrew, Tropp, Wagner, & Christ, 2011; Tropp, Mazziotta, & Wright, 2017). Previous research has demonstrated that more positive intergroup attitudes, represented by the favorability of evaluation of another group and its members, predicts behavioral intentions in willingness to engage in intergroup contact (Vázquez, Yzerbyt, Dovidio, & Gómez, 2017). Intergroup contact, in turn, promotes more positive out-group attitudes (Pettigrew & Tropp, 2006). However, people are often reluctant to engage in intergroup contact because they anticipate that members of the other group will reject overtures for interaction (Shelton & Richeson, 2005), presumably because they think that members of the other group hold negative attitudes toward their group. In the first three experiments, we examined the role of phenotypic prototypicality on meta-attitudes – people's beliefs of attitudes that members of another group have about their group. We further focused on effects of prototypicality on favorable orientations toward intergroup contact, exploring, based on previous work (Shelton & Richeson, 2005), whether meta-attitudes would mediate these effects. Because of the limitations of correlational mediation, in which the mediator and the outcome are both measured, in our fourth experiment, we manipulated our hypothesized mediator, meta-attitudes, and tested its effect on favorable orientations toward intergroup contact as recommended by Spencer, Zanna, and Fong (2005).

In the first three pre-registered experiments, Black and White American participants viewed a series of pictures of racial in-group and out-group members who varied in racial phenotypicity, responded to questions about their attitudes toward the target person, the target's meta-attitudes (toward the participant's racial in-group), favorable orientations toward contact with the target, and other relevant issues. We tested the main hypothesis that phenotypically prototypical out-group members would be perceived as having less favorable (meta-)attitudes toward participants' in-group. We further examined whether this effect would explain why participants might have less favorable orientations toward contact with more phenotypically prototypical out-group members, as demonstrated in previous research (Shelton & Richeson, 2005, 2006; Vorauer et al., 1998).

To test the impact of racial phenotypicity on multiple elements of the dynamics of interracial relations in ways over and above previously documented effects in the literature, we conducted our analyses while statistically controlling for other key variables as preregistered. For example, because people may infer that targets high in racial phenotypic prototypicality are more racially identified, which elicits more negative responses to the individual (Kaiser & Pratt-Hyatt, 2009), we statistically controlled for perceptions of out-group racial identification. To control for potential differences in categorization (see Chen, 2019; Chen, Pauker, Gaither, Hamilton, & Sherman, 2018), we focused our main analyses to consider only respondents who showed a high accuracy in correctly categorizing targets in terms of their racial group. However, we also tested the effects with the full sample, as we preregistered, to assess their robustness to these exclusion criteria. To investigate the effects of out-group racial phenotypicity beyond personal orientations, we controlled for participants' own attitudes toward the target person and group (Finchilescu, 2010). Having established the predicted effects, including evidence of measured (correlational) mediation of meta-attitudes in three experiments and an internal meta-analysis, we then conducted a fourth pre-registered experiment aiming to demonstrate the causal effect of the mediator (meta-attitudes) on favorable orientations toward intergroup contact.

Beyond our primary interest in the effects of racial phenotypicity on responses to racial out-group members, we investigated the potential effects of racial phenotypicity on impressions of racial in-group members. To the extent that direct associations between phenotypic features and evaluations are “formed over time through repeated exposure to category members” (Maddox, 2004, p. 396), we expected that the racial phenotypicity of in-group members would also influence impressions. Specifically, to the extent that people expect members of their own group to have unfavorable attitudes toward another group (Judd, Park, Yzerbyt, Gordijn, & Muller, 2005), they may perceive more prototypical members of their in-group as having less favorable attitudes toward the respective racial out-group. Such a finding would suggest that people generally perceive individuals who are more phenotypically prototypical of their group to harbor less favorable intergroup attitudes, rather than such an effect solely reflecting out-group bias. We further test whether participants may also show less favorable contact orientations toward phenotypically prototypical in-group members.

Thus, collectively, the current research was designed to illuminate multiple elements in the dynamics of race relations, which may be shaped by the influence of racial phenotypicity. Specifically, it focused on the effects of personal attitudes and experiences, meta-attitudes (independent of personal attitudes), perceptions of the attitudes of other in-group members, and behavioral orientations toward racial out- and in-group members.

1. Experiment 1

The goal of this experiment was to provide an initial test of our main hypothesis that people rely on phenotypic prototypicality to infer meta-attitudes during first impressions of out-group members. We studied this process from the perspectives of White Americans (a socially advantaged group in the US) and Black Americans (a socially disadvantaged group) in terms of their responses to members of the other group. We focused on White-Black relations because they have historically been a politically and socially central form of intergroup relations in the US.

Using a mixed-model experimental design, we presented Black American and White American participants with a series of images of racial in- and out-group members (i.e., Black and White American targets) who differed on average in terms of phenotypic prototypicality but who, based on pretesting (see Supplementary Online Materials [SOM]), did not differ on a range of other traits such as perceived age, trustworthiness, and attractiveness. To test our primary hypothesis about the effects of out-group phenotypic prototypicality on inferences of meta-attitudes, we asked participants to rate the attitudes that they believed the person in each image held toward the respective racial out-group (i.e., the person's meta-attitudes). We then assessed how favorably participants felt about having social contact with each target to test our hypothesis that meta-attitudes would influence favorable orientations toward intergroup contact. Our primary prediction was that Black and White participants would perceive more racially phenotypic out-group members as holding less favorable meta-attitudes toward their group, which, in turn and independent of participants' personal intergroup attitudes and experiences, would predict less interest in engaging in intergroup contact.

1.1. Method

All procedures, hypotheses, measures, analyses and sample size estimations were pre-registered (see Open Practices section). Although not pre-registered, in the SOM we also report results for the main analyses that included participants who failed the categorization check for reasons of transparency and consistency because we pre-registered this approach for the other experiments. Results from these analyses reflected the same general pattern of results reported here in the main text. This research was approved by the institutional review board of the primary affiliation of the first author (Nr. 3709455). For this and all

remaining experiments, all measures, manipulations, and exclusions are disclosed, and a power rationale is presented.

1.1.1. Participants

Informed by effects observed in a pilot study (see SOM), a power analysis in G-Power 3.1.9.2 for a repeated-measures analysis of variance (ANOVA) was used to approximate the mixed design in the present experiment. This analysis suggested that 96 participants would provide a 90% chance to observe a small to medium within-between interaction effect ($f = 0.20$) at a 0.05 significance criterion. Given that we expected about 15% - 20% of the participants to fail the categorization check (described below), we aimed to collect 115 participants from each racial group.

Participants received \$1.50 for taking part in the experiment. In total, we recruited 118 participants identifying as White American ($M_{age} = 39.3$, $SD_{age} = 11.7$; 44.1% women) and 114 participants identifying as Black American ($M_{age} = 38.0$, $SD_{age} = 10.8$; 67.5% women). For further demographic information for this and the remaining experiments, see the SOM.

1.1.2. Procedure

Participants were informed that the study focused on the way people perceive others. The stimuli used in this study comprised (a) 10 images of relatively phenotypically prototypical Black Americans, (b) 10 images of less phenotypically prototypical Black Americans, (c) 10 images of relatively phenotypically prototypical White Americans, and (d) 10 images of less phenotypically prototypical White Americans, with an equal number of men and women within each group. The images of target individuals were selected from the Chicago Face Database (Ma, Correll, & Wittenbrink, 2015) if they were correctly categorized by Chicago Face Database raters in accordance to their self-reported race at least 60% of the times. Then, using the case-matching SPSS fuzzy macro (Peck, 2011), for each racial group we matched ten phenotypically prototypical (50% women) with ten less phenotypically prototypical individuals on a variety of traits including gender, age, attractiveness, perceived threat, trustworthiness and facial width-to-height ratio. As a result, the phenotypically prototypical and less prototypical groups of images differed only in terms of perceived prototypicality (see SOM). Please see Fig. 1 for example stimuli.

Participants were presented with each face, and then they rated it on a specific dimension, cycling through all images in randomized order. Each face was presented with 750×527 pixels. Given that the study was conducted online, other stimulus display settings (e.g., viewing angle, distance, screen resolution) were not controlled for in this or the remaining studies. We return to this limitation in the General Discussion.

The procedure for presenting faces was repeated for each of four dimensions, such that participants first rated all images on one dimension, then on the next and so on. The presentation order of these four dimensions was randomized for each participant. We assessed **perceptions of the attitudes** that participants believed the person in each image held toward Black Americans and toward White Americans on 11-point scales (0 *very cold/negative* – 100 *very warm/positive*; each unit increment: 10). Of primary interest, the perceived attitude of a racial out-group member toward the participant's racial in-group represented a **meta-attitude**. We also measured, on the same scale, participants' **own attitudes** toward each of the target images. In addition, for the measure of the **perceived social identification** of the targets, participants rated each image on a 7-point scale (1 *not at all* – 7 *very strongly*) in terms of how identified they believed the target individual was with their racial group.

Next, we assessed **favorable orientations toward intergroup contact**. Participants cycled through the faces again to indicate for each image on 7-point scales (a) how interested they would be in getting to know the individual (1 *not at all* to 7 *very much*) and how positive or negative they would be toward having the individual as neighbor (1 *very*

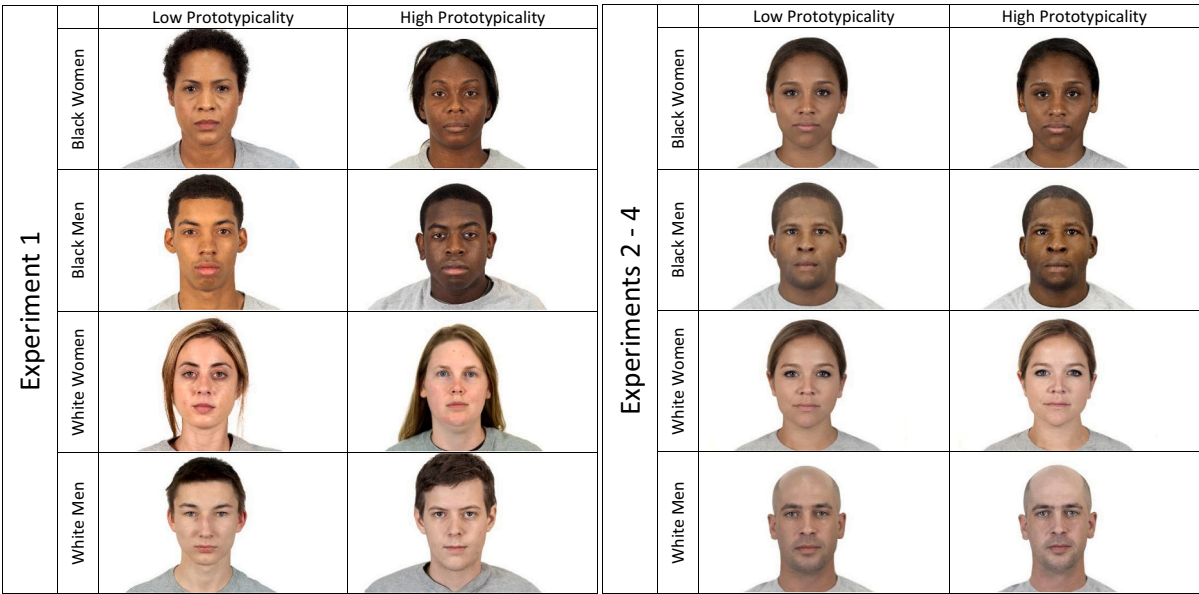


Fig. 1. Example stimuli used in the experiments.

negative to 7 very positive). Given their high correlation in a multi-level analyses (that treats the participant grouping as random effect) using the correlations package in R (Makowski, Ben-Shachar, Patil, & Lüdtke, 2020), $r(8508) = 0.63, p < .001$, we mean-scored the items as pre-registered, creating one measure reflecting favorable orientations toward intergroup contact. Finally, as a **categorization check**, participants cycled through the faces one final time and categorized each individual in terms of their racial group with the response options being (a) White/Caucasian, (b) Black/African, (c) American Indian and Alaska Native, (d) Asian, (e) Native Hawaiians and Other Pacific Islanders. To limit any effect of categorization and ensure participants' attention, to pass this check, participants had to categorize at least 90% of the images correctly. The categorization check ensured that participants made a clear distinction between in- and out-group members (in this case White and Black Americans). We also assessed participants' general feelings (1 very cold/negative – 11 very warm/positive) toward, and contact frequency (1 never – 7 very often) and quality (1 very negative – 7 very positive) with, the out-group as a whole as control variables.

In addition to these main variables of interest, we included all prototypicality-related norming data identified in Ma et al. (2018) that were available for the stimuli selection for exploratory analyses: cheekbone height, cheekbone prominence, chin length, eye height, eye shape, eyebrow height, fWHR, heartshapeness, lip fullness, midface length, nose shape, skin luminance median, and upper head length.

1.1.3. Analytic strategy

We restructured the data so that the dependent variable was the rating of the 20 out-group individuals (i.e., White individuals for Black participants, Black individuals for White participants) that differed in phenotypic prototypicality. As pre-registered, we tested the hypotheses with a parsimonious model that had two factors: a within-subjects factor (out-group phenotypic prototypicality: high vs. low) and a between-subjects factor (race of participants: Black vs. White). We employed this design analytically because it parsimoniously addresses the dynamics proposed for our main hypotheses while avoiding the analytic and interpretive complexity that would occur using a 4-factor, saturated, mixed model (i.e., a 2 within-subjects, target race: White vs. Black \times 2 within-subjects, target gender: male vs. female \times 2 within-subjects, phenotypic prototypicality of targets: high vs. low \times 2 between-subjects, race of group of participants: White vs. Black). In total, 93.2% ($n = 110$) White American and 74.6% ($n = 85$) Black American

participants passed the categorization check for this design and were included in these analyses.¹

We first estimated separate mixed models with the phenotypic prototypicality factor, the participant race factor, and their interaction as fixed effects predicting our primary variables of interest: meta-attitudes of the racial out-group members and favorable orientations toward intergroup contact with them. Each model was estimated with the lme4 and lmerTest packages (Bates, 2010; Kuznetsova, Brockhoff, & Christensen, 2016) and used the Satterthwaite and Kenward-Roger approximations. The intercepts were allowed to vary for each target and participant while the slope of the phenotypic prototypicality factor was allowed to vary across participants (Judd, Westfall, & Kenny, 2012). After that, we tested our hypothesis that meta-attitudes would mediate the relationship between phenotypic prototypicality and favorable orientations toward intergroup contact, even after controlling for personal attitudes toward the target individual and the racial group as a whole as well as perceptions of out-group racial identification of the target and general contact experiences with the out-group. In Experiment 1, as well as in Experiments 2 and 3, due to space limitations, we report in the SOM the effects of the factors tested for our main dependent variables also for our control variables (i.e., perceived identification, attitudes toward target) in separate models following the same setup.

Having established these effects, we performed exploratory analyses that were not pre-registered but encouraged during the reviews. Specifically, instead of testing the influence of the prototypicality factor, we tested the extent to which a set of facial features (extracted from the norming data of the Chicago Face Database; Ma et al., 2018) as well as skin luminance would predict meta-attitudes and contact orientations. These variables were added into the model as main effects and each model was conducted separately among White and Black participants. For interpretability, all predictors were standardized. Please note that these analyses are likely underpowered and thus should be interpreted with caution.

Finally, investigating another novel aspect of this research, we tested

¹ We tested whether correct classification differed for the experimental factors via logistic multi-level models. Faces high in prototypicality were more likely to be categorized correctly, $B = 4.04, SE = 1.20, p < .001$, and Black participants categorized more faces incorrectly, $B = -2.94, SE = 0.74, p < .001$. Both factors did not interact significantly in an extended model, $B = 1.48, SE = 1.61, p = .358$.

whether we would find effects of phenotypic prototypicality also on perceptions of in-group members, using the same analytic strategy as the one used for the out-group stimuli. These analyses were also pre-registered.

1.2. Results

1.2.1. Effect of phenotypic prototypicality on meta-attitudes of racial out-group members

We tested our main hypothesis that out-group members high in phenotypic prototypicality would be perceived as more prejudiced toward participants' in-group than out-group members low in phenotypic prototypicality using the mixed-model described earlier. There were no significant main effects of phenotypic prototypicality, $B = -0.23$, $SE = 0.14$, $t(23.59) = 1.57$, $p = .129$, or participant race, $B = -0.34$, $SE = 0.29$, $t(193.03) = 1.18$, $p = .240$. However, the Phenotypic Prototypicality \times Participant Race interaction was significant, $B = -0.22$, $SE = 0.10$, $t(193.03) = -2.06$, $p = .040$. As predicted, Black Americans perceived out-group members (i.e., White Americans) high in phenotypic prototypicality as having less favorable attitudes toward Black Americans than out-group members low in phenotypic prototypicality, $t(26.75) = -2.97$, $p = .006$, $d_r = -0.31$, see Fig. 2. Although White Americans perceived out-group members (i.e., Black Americans) high (vs. low) in phenotypic prototypicality as holding more negative attitudes toward the in-group (i.e., White Americans), this effect was not statistically significant, $t(23.59) = -1.57$, $p = .129$, $d_r = -0.16$.

1.2.2. Effect of phenotypic prototypicality on favorable orientations toward intergroup contact

In addition to affecting meta-attitudes, we hypothesized that phenotypic prototypicality would influence favorable orientations toward intergroup contact. We tested this possibility using the same mixed-model described in the Analytic Strategy section. Whereas phenotypic prototypicality had no main effect, $B = -0.09$, $SE = 0.12$, $t(20.57) = -0.75$, $p = .462$, there was a main effect of participants' race, $B = -0.42$, $SE = 0.18$, $t(192.87) = -2.36$, $p = .019$. Overall, Black American participants showed less favorable orientations toward intergroup contact, $M = 3.78$, $SE = 0.13$, 95% CI [4.07, 4.60], than did White American participants, $M = 4.34$, $SE = 0.14$, 95% CI [3.49, 4.07]. However, this effect was moderated by phenotypic prototypicality as the Phenotypic Prototypicality \times Participant Race interaction was significant, $B = -0.27$, $SE = 0.07$, $t(192.97) = -4.00$, $p < .001$. As displayed in Fig. 3, Black American participants showed less favorable contact orientations toward out-group members (i.e., White American targets) high in phenotypic prototypicality than toward out-group members low in phenotypic prototypicality, $t(22.19) = 2.92$, $p = .008$, $d_r = 0.36$. White

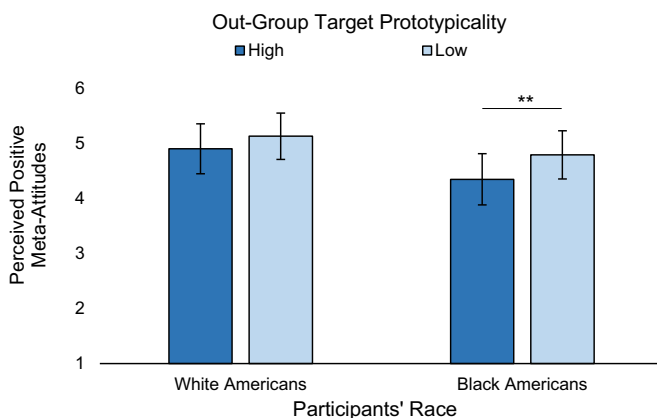


Fig. 2. Effects of phenotypic prototypicality on positive meta-attitudes in experiment 1.

Note. Means with 95% confidence intervals are displayed. $**p < .01$.

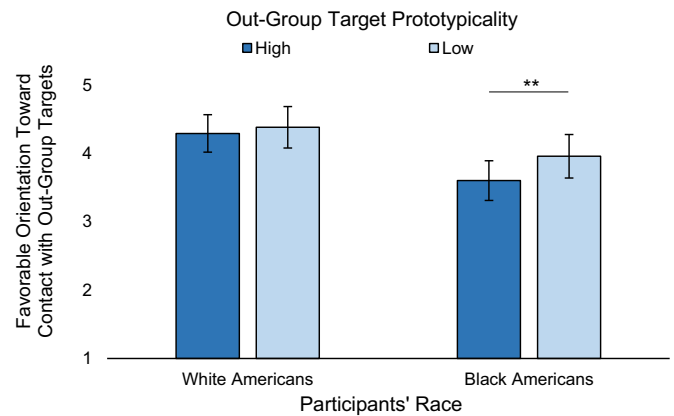


Fig. 3. Effects of phenotypic prototypicality on favorable orientations toward contact with out-group targets in experiment 1.

Note. Means with 95% confidence intervals are displayed. $**p < .01$.

American participants did not significantly differ in their contact orientations toward out-group members depending on their phenotypic prototypicality, $t(20.57) = 0.75$, $p = .462$, $d_r = 0.09$.

1.2.3. Mediation of the effect of phenotypic prototypicality on orientations toward contact

We then assessed whether meta-attitudes would correlationally mediate the effects of the phenotypic prototypicality manipulation on favorable orientations toward intergroup contact. To do so, we added the meta-attitudes variable to the mixed model predicting contact orientations. As pre-registered, we also added the control measures, participants' own attitudes toward the target, the target's perceived identification, participants general feelings toward and contact with the out-group (frequency and quality). Please note that this is the most conservative model that was pre-registered. For results from more lenient pre-registered models (i.e., with less covariates), see the SOM. The potential mediators were only added as fixed effects because allowing their slopes to be random across participants prevented the model from converging. For brevity, detailed model results can be found in the SOM whereas we focus on the most relevant results here. In the model, positive meta-attitudes predicted more favorable orientations toward intergroup contact, controlling for participants' own positive attitudes and for perceived identification (see Fig. 4).

Next, we used the macro developed by Falk and Biesanz (2016) to estimate p -values and hierarchical Bayesian confidence intervals for the indirect effects. No significant indirect effect was observed among White American participants (mediation by meta-attitudes: $B = -0.04$, 95% CI [-0.086, 0.012], $p = .125$; own attitudes: $B = -0.03$, 95% CI [-0.138, 0.078], $p = .568$; perceived identification: $B = -0.02$, 95% CI [-0.037, 0.002], $p = .069$). However, among Black American participants, meta-attitudes significantly mediated the effects of the phenotypic prototypicality manipulation on favorable orientations toward intergroup contact, $B = -0.09$, 95% CI [-0.161, -0.029], $p = .006$, while own attitudes, $B = -0.10$, 95% CI [-0.193, -0.012], $p = .028$, but not perceived identification, $B = -0.003$, 95% CI [-0.017, 0.009], $p = .534$, also emerged as additional significant mediators.

1.2.4. Effects of individual facial features

For White participants, fuller lips, $B = -0.91$, $SE = 0.37$, $t(6) = -2.48$, $p = .048$, $d_r = -0.77$, a longer midface, $B = -0.82$, $SE = 0.33$, $t(6) = -2.52$, $p = .045$, $d_r = -0.69$, and a longer upper head, $B = -0.74$, $SE = 0.25$, $t(6) = -3.00$, $p = .002$, $d_r = -0.62$, predicted less positive meta-attitudes (see SOM for the full model). A longer midface also significantly predicted less favorable contact orientations among White participants, $B = -0.74$, $SE = 0.25$, $t(6) = -3.00$, $p = .002$, $d_r = -0.89$. For Black participants, no significant effects were observed for meta-

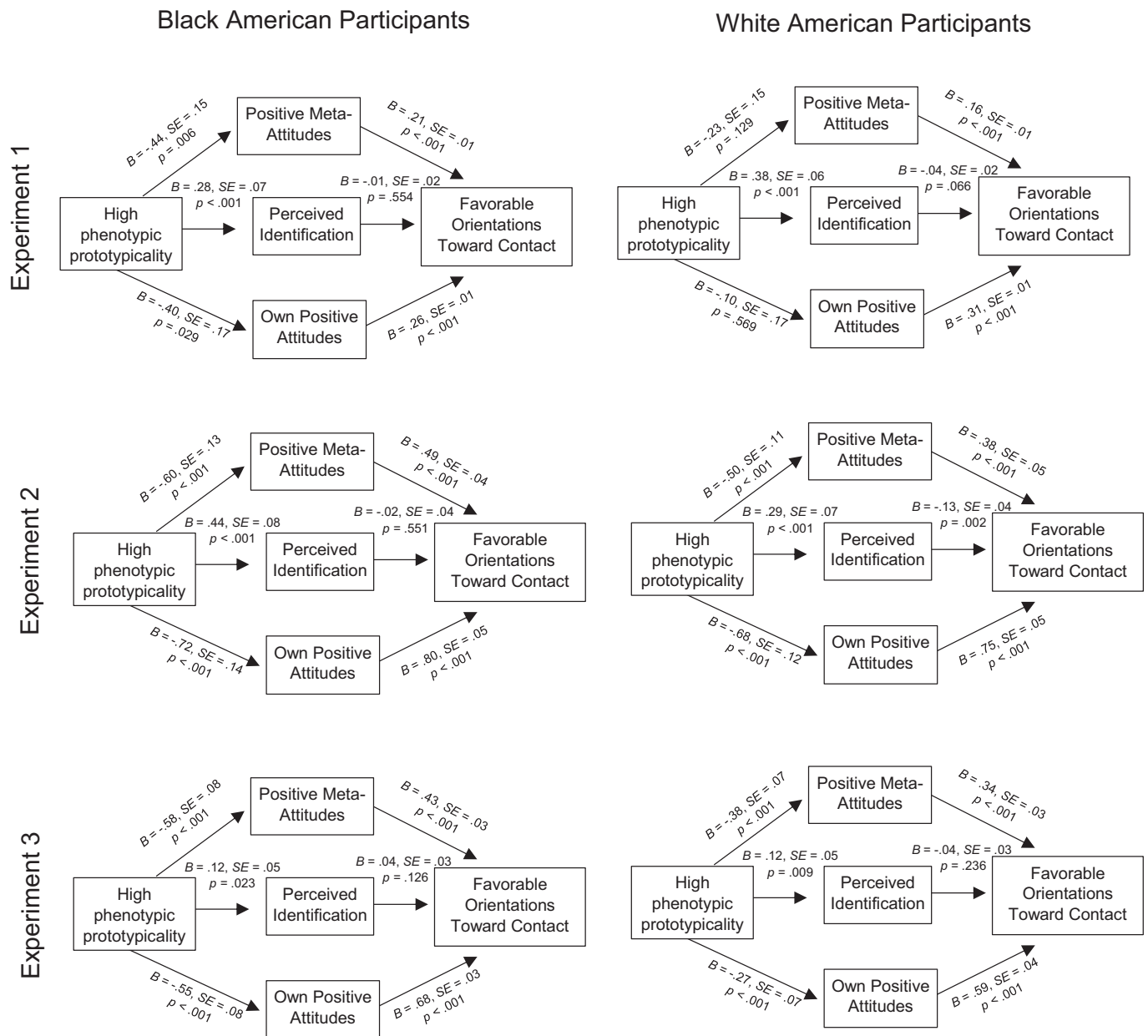


Fig. 4. Mediation models tested in experiments 1–3.

Note. Effects of mediators on favorable orientations toward contact with out-group members are based on the most conservative model, controlling for the additional predictors general contact experiences and attitudes.

attitudes ($ps > 0.206$) or contact orientations ($ps > 0.330$).

1.2.5. Effect of phenotypic prototypicality on perceived attitudes of and contact orientations toward in-group members

Finally, in pre-registered secondary analyses, we also tested whether participants would perceive more phenotypically prototypical members of their own group as having less favorable attitudes toward the respective racial out-group and whether they would have less favorable contact orientations toward them. To do so, we restructured the data, such that the perceived attitudes of the 20 in-group target individuals toward their racial out-group formed the dependent variable. Here, 84.7% of the White American and 83.3% of the Black American participants passed the categorization check and were retained for analyses.

For perceptions of the meta-attitudes of the racial in-group members toward the racial out-group, the main effects were non-significant: phenotypic prototypicality, $B = -.24, SE = 0.13, t(40.02) = -1.79,$

$p = .080$, and participant race, $B = -0.34, SE = 0.24, t(193.00) = -1.42, p = .157$. However, there was a significant Phenotypic Prototypicality \times Participant Race interaction, $B = -0.36, SE = 0.13, t(193.05) = -2.70, p = .008$. Black American participants perceived in-group members high in phenotypic prototypicality as having less favorable attitudes toward White Americans, $M = 4.72, SE = 0.18, 95\% \text{ CI } [4.37, 5.08]$, than in-group members low in phenotypic prototypicality, $M = 5.32, SE = 0.18, 95\% \text{ CI } [4.97, 5.67], t(41.85) = 4.42, p < .001, d_r = 0.39$. No significant difference was observed for White American participants' meta-attitude perception of in-group members high, $M = 5.41, SE = 0.20, 95\% \text{ CI } [5.02, 5.81]$, or low in phenotypic prototypicality, $M = 5.66, SE = 0.18, 95\% \text{ CI } [5.30, 6.02], t(40.02) = 1.79, p = .081, d_r = 0.15$, although results trended in the same direction.

In terms of favorable orientations toward intergroup contact with in-group members, no significant effects of phenotypic prototypicality, $B = 0.07, SE = 0.14, t(20.51) = 0.48, p = .640$, participant race, $B = -0.16,$

$SE = 0.15$, $t(192.95) = -1.06$, $p = .292$, or the interaction between both factors, $B = -0.13$, $SE = 0.07$, $t(192.54) = -1.83$, $p = .068$, were observed.

1.2.6. Summary of supplementary analyses with the complete sample

The results reported in this and the remaining experiments were robust to pre-registered analyses that included all participants (see SOM for the complete analyses). Of primary interest, the interaction between participant race and phenotypic prototypicality on meta-attitudes was significant, $B = -0.19$, $SE = 0.09$, $t(230.19) = -2.03$, $p = .044$. Black American participants perceived prototypical out-group members to have less favorable meta-attitudes, $M = 4.58$, $SE = 0.21$, 95% CI [4.17, 4.99], than less prototypical out-group members, $M = 4.98$, $SE = 0.20$, 95% CI [4.58, 5.38], $t(23.08) = 2.65$, $p = .015$, $d_r = 0.28$. No difference was observed among White American participants, $t(22.76) = 1.39$, $p = .177$, $d_r = 0.15$. Similarly, the interaction between participant race and phenotypic prototypicality on favorable orientations toward contact was significant, $B = -0.22$, $SE = 0.06$, $t(231.74) = -3.56$, $p < .001$. Black American participants showed less favorable orientations toward contact with prototypical out-group members, $M = 3.81$, $SE = 0.14$, 95% CI [3.54, 4.09], than less prototypical out-group members, $M = 4.11$, $SE = 0.13$, 95% CI [3.85, 4.37], $t(20.48) = 2.32$, $p = .031$, $d_r = 0.30$. No such difference was observed among White American participants, $t(20.31) = 0.62$, $p = .541$, $d_r = 0.08$.

1.3. Discussion

Experiment 1 extended previous research on meta-perceptions in several ways. It revealed the systematic role that phenotypic prototypicality can have on beliefs about the attitudes that a member of another group holds toward one's own group (meta-attitudes) as well as perceptions of the attitudes that in-group members have toward the outgroup. However, the results of this first experiment that offered support for our key predictions were statistically significant only among Black participants, not among White participants. In line with our expectations, Black Americans perceived phenotypically prototypical White out-group members as holding less favorable attitudes toward Black Americans. This tendency statistically predicted why they showed less favorable orientations toward contact with White individuals high in phenotypic prototypicality than with those low in phenotypic prototypicality. We caution that in the design of Experiment 1 (as well as of Experiments 2 and 3), the proposed mediator and the outcome were assessed in close temporal proximity. Thus, while our significant mediational results are consistent with our predictions, they cannot establish causal mediation, and other statistical models might also be significant (Fiedler, Harris, & Schott, 2018). We return to an experimental manipulation of the mediator in Experiment 4. In terms of the results concerning responses to in-group members, Black Americans also perceived phenotypically prototypical in-group members to have less favorable attitudes toward the White out-group.

One reason why Black participants may have been more responsive to phenotypic prototypicality than White participants involves the traditionally lower power positions that Black Americans occupy relative to White Americans. According to work on the oppression hypothesis (LaFrance & Henley, 1994), members of groups lower in social power tend to be more aware of social stigma. They are, therefore, often thought to be more sensitive to nonverbal cues to better cope and adapt to the actions of others, particularly signals of bias from members of higher power groups. Consistent with this hypothesis, members of minority groups, which historically also tend to be lower in social power, are more vigilant for cues of potential bias than are members of majority groups (Vorauer, 2006). Relatedly, members of lower power groups tend to see members of higher power groups in a relatively individuated way, whereas members of higher power groups tend to perceive members of lower power groups in a less differentiated way (Fiske, 1993). Indeed, research on what has been termed the "skin color paradox" suggests that

the intergroup attitudes and social identification of African Americans vary little in terms of skin tone variations (Hochschild & Weaver, 2007). Provided that White Americans' experiences and perceptions may correspond to this phenomenon, they may perceive Black Americans as more entitative, thereby paying less attention to cues signaling within-group differences.

Although this perspective helps account for the weaker effects of phenotypic prototypicality for White than for Black Americans in the present study, we acknowledge that there is evidence in the literature that White Americans, at least in some contexts, do respond differently to Black Americans as a function of their phenotypic prototypicality. However, the context for judgments in Experiment 1 was less directly related to Whites' stereotypic associations of Blacks than in some previous studies (e.g., in the context of crime) showing strong phenotypic effects for White American participants (Blair, Judd, & Chapleau, 2004; Eberhardt et al., 2006). It is thus possible that there may be contextual or individual difference factors, particularly those relating to perceptions of potential out-group threat, that systematically affect the degree to which White Americans' meta-attitudes may be influenced by the phenotypic prototypicality of Black individuals.

The next experiment therefore tested the hypotheses developed for Experiment 1 while also measuring stigma consciousness, an individual difference variable related to how people think that members of another group view them. Experiment 2 also tested the generalizability of the effects found in Experiment 1 using a different and more controlled set of target stimuli.

2. Experiment 2

This experiment aimed to conceptually replicate the findings from the previous experiment while also testing whether stigma consciousness would help explain the more pronounced effect of phenotypic prototypicality for Black compared to White Americans in the previous experiment. Stigma consciousness refers to the extent to which individuals believe that they are stereotyped by others (Pinel, 1999). As a result, individuals scoring higher in stigma consciousness are more inclined to interpret subtle cues as reflections of bias (Wang, Stroebe, & Dovidio, 2012). Thus, they may believe that racial out-group members higher in phenotypic prototypicality hold more biased views of their in-group, represented by more negative meta-attitudes. Because Black Americans are aware of the traditionally more negative cultural stereotypes of Black Americans than of White Americans (Steele, 2011), the effects of the phenotypic prototypicality of a racial out-group member may be stronger for Black American than for White American participants.

To test the generalizability of the effects we observed in Experiment 1, we used a different set of stimuli in Experiment 2. Modelled after Skinner and Nicolas (2015), instead of preselecting images of target individuals high and low in phenotypic prototypicality, we altered the phenotypic prototypicality of the target individuals by morphing the original images to 4/14 degrees (or 28.57%) with matched individuals from the respective out-group. This procedure allows us to test the effects of comparable faces, representing different versions of the same base face. Indeed, the relatively low morphing degree was chosen to ensure that the morphed version still looked broadly like the original version (see Fig. 1). This methodological approach had the advantage that participants rated the target individuals whose images were derived from the same base face rather than images of different individuals who differed also in other traits than prototypicality. A pilot study (see SOM) confirmed that the morphed individuals were still perceived as members of their racial groups, which was key to minimize any effect of the prototypicality manipulation on categorization (Ho, Sidanius, Levin, & Banaji, 2011). Importantly, a morphing approach was chosen instead of using software such as FaceGen to generate faces varying in phenotypic prototypicality, as the latter have shown to be differently perceived than real images (such as those used to create the morphs in this experiment;

Gaither, Chen, Pauker, & Sommers, 2019). Indeed, one of the main reasons for using morphing is that resulting images look very natural (Sutherland, Rhodes, & Young, 2017).

In Experiment 2, for each target individual, participants rated either the original, phenotypically prototypical or the morphed, less phenotypically prototypical version on the same dimensions as in Experiment 1. In addition, we assessed participants' stigma consciousness. As in the previous experiment, we predicted that the phenotypically prototypical versions of the out-group members would be perceived as having less favorable attitudes toward participants' in-group. We further tested whether this tendency would be especially pronounced among individuals high in stigma consciousness, possibly explaining the racial group differences observed in the first experiment. Again, we tested whether the hypothesized differences in meta-attitudes would relate to differences in favorable orientations toward intergroup contact with phenotypically prototypical and less prototypical targets, and we also examined whether similar processes would be observed for in-group members.

2.1. Method

As in Experiment 1, all procedures, hypotheses, measures, analyses and sample size estimations were pre-registered (see Open Practices section).

2.1.1. Participants

Given the new design and subsequent absence of pilot data for simulation, we based our sample size estimation on the previous experiment, although we note that the operationalization of our hypotheses was slightly different in both studies, given the use of different stimuli. In the previous study, 195 participants were sufficient to observe a two-way interaction between the phenotypic prototypicality manipulation and participant race. The present experiment used a more controlled design but also relied on fewer trials and aimed to test for a potential three-way interaction (with stigma consciousness). Hence, we increased our target sample size to 150 participants per racial group. Because we expected about 10–30% of the participants to fail the categorization check (described in the instrument section), we aimed to recruit about 195 participants per racial group.

In total, 195 self-identified White Americans ($M_{age} = 38.5$, $SD_{age} = 11.2$; 57.4% women) and 193 self-identified Black Americans ($M_{age} = 35.7$, $SD_{age} = 10.9$; 64.8% women) were recruited using Amazon MTurk and compensated with \$1.

2.1.2. Stimuli selection

To ensure high experimental control, we created phenotypically prototypical and non-prototypical versions of comparable target individuals using morphing with the Morpheus Photo Morpher 3.17 software. We used the following procedure to create the images: First, we selected a set of images that had been correctly classified as members of their self-identified racial group by at least 95% of the raters in the Chicago Face Database (Ma et al., 2015), indicating relatively high prototypicality. Next, from these images, we paired each White individual with a Black individual matched in terms of age (± 5 years), facial width-to-height ratio (± 0.05), attractiveness (± 0.5), gender, and facial expression (neutral). This matching was done to minimize the possibility that morphing each pair of faces would lead to changes on these dimensions. For each individual in these matched pairs, we created a less phenotypically prototypical version by morphing the individual (to 4/14 degrees or 28.57%) with the matched out-group member. Finally, to validate the resulting images, an independent sample of 44 Black Americans and 48 White Americans rated the original images selected to be high in phenotypic prototypicality and the morphed images designed to be low in phenotypic prototypicality. The sample size for this rating task was determined in G-Power 3.1.9.2, showing that 44 participants would give 90% chance to observe a

medium effect ($d_z = 0.5$) in paired-samples t -tests. Raters were recruited through Amazon MTurk. They rated the images in terms of how phenotypically prototypical the portrayed individuals looked of their racial group (1 = *less typical looking* to 5 = *very typical looking*) and categorized them in terms of their race: (a) White/Caucasian, (b) Black/Black, (c) American Indian and Alaska Native, (d) Asian, and (e) Native Hawaiians and Other Pacific Islanders. Based on the ratings and categorizations of the Black target individuals by White American raters and of the White target individuals by Black American raters, we selected six pairs of images (i.e., each pair consisting of the original and morphed version of an image) from each racial group that were correctly racially categorized by at least 70% of the raters and that differed significantly in terms of phenotypic prototypicality ratings (see SOM for additional details). Thus, the final set of images presented to participants included six Black and six White faces.

In the final selection of this set of twelve faces, our primary criterion was having stimuli for each racial and gender group that was correctly racially categorized at least 70% of the time. To achieve this criterion, we used faces from the set of highly prototypical Black and White faces, six of which were morphed with others from this same set and six that were morphed with an entirely separate set of prototypical Black or White faces.

As indicated in the SOM, matched face-pairs, prior to morphing, did not differ systematically on other perceived age, attractiveness, trustworthiness, and threat. After the morphing procedure, there were no differences for perceived age, attractiveness, and trustworthiness. However, female faces were perceived as less threatening than male faces. White faces had a slightly lower fWHR than Black faces. We note, however, that hypotheses in Studies 2 and 3 focused on tests between versions of the same target that were compared to each other (rather than to different individuals as in Study 1).

2.1.3. Procedure

As in Experiment 1, participants were told that the experiment concerned the way people perceive others. At the beginning of the session, participants completed the race-based stigma consciousness questionnaire (Pinel, 1999), indicating their agreement with ten items on 7-point Likert scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). An example item (in this case framed for White American participants) is, "When interacting with Black Americans, I feel like they interpret all my behaviors in terms of the fact that I am White American." The wording of the items was reversed accordingly for Black American participants. For both groups, the scale showed satisfactory reliability (White Americans: $\alpha = 0.84$; Black Americans: $\alpha = 0.86$). Next, participants completed non-political and non-race related demographic questions (i.e., age, gender, education, living place, income).

Participants then separately viewed each of the twelve images (i.e., of six in-group members and six out-group members) that were selected following the procedure described earlier. For each image, participants were randomly assigned to see either the phenotypically prototypical version or the less-prototypical version, presented in a 750×525 pixels format. Participants in this experiment (and in the third experiment) only saw one of the versions for each target. Following the procedures of Experiment 1, participants cycled through the images in a randomized order and completed the same **meta-attitudes** and contact measures. Due to the high correlation between the two contact items in a multi-level correlation analyses controlling for the nested data structure, $r(3663) = 0.73$, $p < .001$, we mean-scored them as pre-registered, creating one **favorable orientation toward intergroup contact** measure. As in the previous experiment, we also assessed perceived social identification of the targets, participants' own attitudes, and participants' past contact experiences (frequency and valence) to serve as pre-registered control variables in the mediation analyses. As **categorization check**, participants categorized each image in terms of their race at the end of the study. As pre-registered, to pass this categorization check, participants had to categorize at least 5 of 6 images (out-group members

for the main hypothesis; in-group members for secondary analyses) correctly. This ensured that participants indeed perceived the target individuals as members of the specific in- or out-group (rather than for instance seeing phenotypically non-prototypical out-group members as members of other racial groups; see Nicolas, Skinner, & Dickter, 2018).

2.1.4. Analytic strategy

As pre-registered, we restructured the data so that the dependent variable was the rating of the six out-group individuals (i.e., White target individuals for Black American participants, Black target individuals for White American participants) that differed in their phenotypic prototypicality. As pre-registered, we tested the hypotheses with a parsimonious model that had two factors: a within-subjects factor (out-group phenotypic prototypicality: high vs. low) and a between-subjects factor (race of participants: Black vs. White). The models used the same combination of fixed and random effects and were estimated the same way as in Experiment 1. For these analyses, 90.8% ($n = 177$) of the White American and 67.4% ($n = 130$) of the Black American participants passed the categorization check and were included in the main analyses.² As pre-registered, analyses that used the whole sample and reproduced the same pattern of results reported here can be found in the SOM, except for the stigma consciousness moderation that is reported in the main text, as described.

2.2. Results

2.2.1. Effect of phenotypic prototypicality on meta-attitudes of racial out-group members

We tested our main hypothesis that out-group members high in phenotypic prototypicality would be perceived as more prejudiced toward participants' in-group than out-group members low in phenotypic prototypicality using the mixed-model described previously. In contrast to Experiment 1, we now found main effects of phenotypic prototypicality $B = -0.54$, $SE = 0.08$, $t(303.70) = -6.49$, $p < .001$, and participant race, $B = -0.56$, $SE = 0.22$, $t(306.49) = -2.56$, $p = .011$, whereas there was no evidence that these two factors interacted in an extended model, $B = -0.10$, $SE = 0.17$, $t(300.66) = -0.62$, $p = .538$. As predicted, participants across racial groups perceived out-group members high in phenotypic prototypicality as having less favorable attitudes toward participants' in-group, $M = 4.77$, $SE = 0.20$, 95% CI [4.34, 5.19], compared to less-prototypical out-group members, $M = 5.31$, $SE = 0.19$, 95% CI [4.89, 5.73], $d_r = -0.38$. In light of the group differences observed in Experiment 1, even though the effects were not moderated by participant race in Experiment 2, for transparency we also tested the effects separately for Black American, $t(290) = 4.69$, $p < .001$, $d_r = 0.42$, and White American participants, $t(297) = 4.50$, $p < .001$, $d_r = 0.35$, who both perceived phenotypically prototypical out-group members as having less favorable attitudes (see Fig. 5 for marginal means broken down by race). Further, on average, Black Americans perceived out-group members (i.e., White targets) to have less favorable meta-attitudes, $M = 4.76$, $SE = 0.23$, 95% CI [4.29, 5.23], than White American participants did, $M = 5.32$, $SE = 0.21$, 95% CI [4.88, 5.76], $d_r = -0.40$.

Next, as planned, we tested extended models that included stigma consciousness as an additional moderator of the effect of phenotypic prototypicality. The Stigma Consciousness \times Outgroup Phenotypic

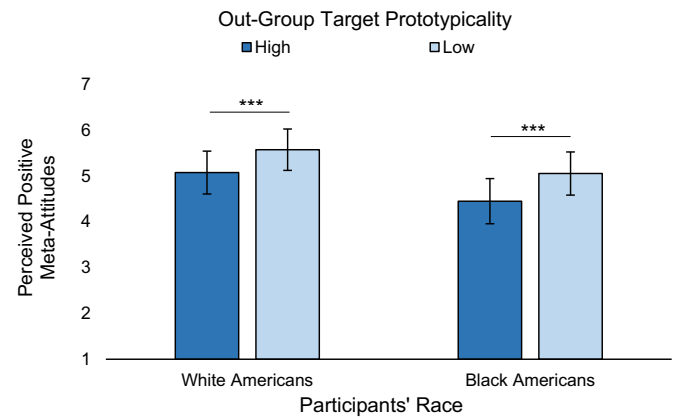


Fig. 5. Effects of phenotypic prototypicality on positive meta-attitudes in experiment 2.

Note. Means with 95% confidence intervals are displayed. *** $p < .001$.

Prototypicality interaction ($p = .101$) and the Stigma Consciousness \times Outgroup Phenotypic Prototypicality \times Participant Race interaction ($p = .296$) were non-significant (see SOM for all model details).

2.2.2. Effect of phenotypic prototypicality on favorable orientation toward intergroup contact

In addition to affecting meta-attitudes, we also hypothesized that phenotypic prototypicality would influence orientations toward intergroup contact. We tested this possibility using the same mixed-model described previously. We found main effects of phenotypic prototypicality, $B = -0.50$, $SE = 0.06$, $t(302.44) = -8.33$, $p < .001$, and participant race, $B = -0.70$, $SE = 0.14$, $t(305.69) = -4.91$, $p < .001$, but no evidence for an interaction between these two factors in an extended model, $B = -0.19$, $SE = 0.12$, $t(299.55) = -1.58$, $p = .115$. Participants expressed less favorable orientations toward intergroup contact with more phenotypically prototypical, $M = 4.14$, $SE = 0.18$, 95% CI [3.72, 4.57], than less prototypical out-group members, $M = 4.65$, $SE = 0.18$, 95% CI [4.23, 5.07], $t(296) = 8.32$, $p < .001$, $d_r = 0.51$. Again, for transparency and given the group differences in Experiment 1, we also estimated the effects separately for Black American participants, $t(292) = 6.64$, $p < .001$, $d_r = 0.61$, and White American participants, $t(297) = 5.30$, $p < .001$, $d_r = 0.42$, who both showed less favorable orientations toward intergroup contact with phenotypically prototypical out-group members (see Fig. 6 for marginal means broken down by participant race). In addition, and mirroring the previous results, Black Americans were overall lower in contact orientation toward the out-group, $M =$

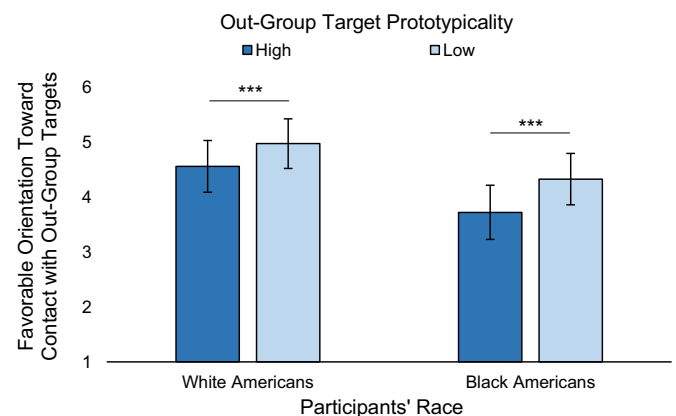


Fig. 6. Effects of phenotypic prototypicality on favorable orientations toward contact with out-group targets in experiment 2.

Note. Means with 95% confidence intervals are displayed. *** $p < .001$.

² In logistic multi-level models, faces high in prototypicality were more likely to be categorized correctly, $B = 7.96$, $SE = 0.93$, $p < .001$, and Black participants categorized fewer faces correctly, $B = -6.57$, $SE = 0.83$, $p < .001$. Both factors interacted significantly in an extended model, $B = -6.57$, $SE = 0.83$, $p < .001$. Whereas White participants showed a similar accuracy for low and high prototypicality faces (91.0% vs 96.9%, $p = .858$), Black participants showed a significantly lower accuracy for low as compared to high prototypicality faces (68.6% vs 94.6%, $p < .001$).

4.05, $SE = 0.20$, 95% CI [3.62, 4.48], than White Americans, $M = 4.75$, $SE = 0.19$, 95% CI [4.33, 5.17], $t(305) = 4.89$, $p < .001$, $d_r = 0.71$.

Next, as planned, we tested extended models that included stigma consciousness as an additional moderator of the effect of phenotypic prototypicality (two-way interaction: $p = .069$) and the interaction effect of prototypicality and participant race (three-way interaction: $p = .053$), but these interactions were non-significant (see SOM for model details).

2.2.3. Mediation of the effect of phenotypic prototypicality on orientations toward contact

Next, we tested whether meta-attitudes (and the control variables own attitudes and perceived identification) would mediate the effects of phenotypic prototypicality on contact orientations. To test for this, we added meta-attitudes, alongside the control variables (participants' own attitudes toward the target, perceived identification of the target, general attitudes toward the out-group and contact experiences with it), to the contact orientation model using the same model parameters as in Experiment 1. To achieve model convergence, we standardized the three mediators before estimating the model. The mediation paths are presented in Fig. 4. As in Experiment 1, we used the macro developed by Falk and Biesanz (2016) to estimate p -values and confidence intervals for the indirect effects of the phenotypic prototypicality manipulation on favorable orientations toward intergroup contact. Because the effects on the mediators were not significantly moderated by participants race, indirect effects were calculated across racial groups. The prototypicality manipulation indirectly predicted a less favorable orientation toward intergroup contact as mediated by meta-attitudes, $B = -0.24$, 95% CI [-0.327, -0.164], $p < .001$, participants' own attitudes, $B = -0.54$, 95% CI [-0.69, -0.40], $p < .001$, and perceived identification, $B = -0.02$, 95% CI [-0.044, -0.005], $p = .011$.

2.2.4. Effect of phenotypic prototypicality on perceived attitudes of and contact orientations toward in-group members

As in the previous experiment, in pre-registered secondary analyses, we tested whether phenotypically prototypical in-group members were perceived as having less favorable attitudes toward the out-group as compared to less prototypical in-group members. For this purpose, we restructured the data such that the dependent variable was the ratings of the six in-group members. For this set of analyses, 81.5% ($n = 159$) of the White American and 75.6% ($n = 130$) of the Black American participants passed the categorization check and were included in the analyses.

As in Experiment 1, we estimated a 2 (within subjects, in-group phenotypic prototypicality: high vs. low) \times 2 (between-subjects, race of participants: Black vs. White) model. Results showed that the phenotypic prototypicality factor was significant, $B = -0.45$, $SE = 0.12$, $t(298.63) = -3.72$, $p < .001$, indicating that in-group targets high in phenotypic prototypicality were perceived as having less favorable attitudes toward the out-group than in-group targets low in phenotypic prototypicality. Whereas the main effect of the participant race factor was non-significant, $B = -0.36$, $SE = 0.23$, $t(299.50) = -1.55$, $p = .122$, the interaction with the prototypicality factor was significant, $B = -0.36$, $SE = 0.17$, $t(299.77) = -2.06$, $p = .040$. Following up on the interaction effect, the marginal means showed that White Americans, $t(289) = 3.72$, $p < .001$, $d_r = 0.30$, but especially Black Americans, $t(292) = 6.42$, $p < .001$, $d_r = 0.54$, perceived phenotypically prototypical in-group members as having less favorable attitudes toward the respective out-group, see Fig. 7.

In terms of contact orientations, results indicated that the phenotypic prototypicality factor had a significant effect, $B = -0.41$, $SE = 0.08$, $t(295.72) = -5.38$, $p < .001$, with participants showing a less favorable orientation toward contact with in-group members high in phenotypic prototypicality. Whereas the main effect of the participant race factor was non-significant, $B = 0.15$, $SE = 0.13$, $t(287.51) = 1.14$, $p = .255$, its interaction with the prototypicality factor was significant, $B = 0.22$, SE

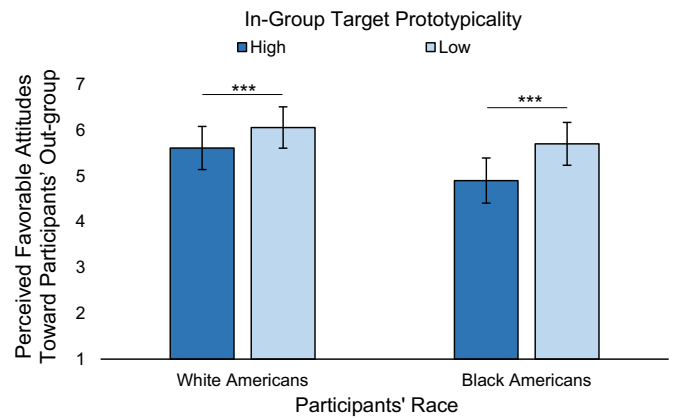


Fig. 7. Effects of phenotypic prototypicality on perceived attitudes of in-group members toward their out-group in Experiment 2.

Note. Means with 95% confidence intervals are displayed. *** $p < .001$.

$= 0.11$, $t(297.52) = 2.02$, $p = .045$. An estimation of the marginal means (see Fig. 8) showed that especially White American, $d_r = -0.38$, but less so, Black American participants, $d_r = -0.18$, showed less favorable orientations toward intergroup contact with phenotypically prototypical in-group members.

2.2.5. Summary of supplementary analyses with the complete sample

As for Experiment 1, all significant effects were robust to pre-registered analyses that included all participants. See SOM for the complete analyses. Of particular interest, in terms of meta-attitudes, the prototypicality factor, $B = -0.60$, $SE = 0.08$, $t(387.79) = -7.55$, $p < .001$, and the participant race factor, $B = -0.47$, $SE = 0.19$, $t(386.13) = -2.52$, $p = .012$, had main effects, whereas the interaction between both factors was non-significant in an extended model, $B = -0.24$, $SE = 0.16$, $t(386.55) = -1.52$, $p = .128$. Prototypical out-group members were perceived as having less favorable meta-attitudes, $M = 4.80$, $SE = 0.18$, 95% CI [4.39, 5.22], than less prototypical out-group members, $M = 5.41$, $SE = 0.18$, 95% CI [5.00, 5.81], $d_r = -0.39$. Also, in terms of favorable orientations toward contact, both the main effect of the prototypicality factor, $B = -0.49$, $SE = 0.06$, $t(379.96) = -8.93$, $p < .001$, and the participant race factor, $B = -0.55$, $SE = 0.13$, $t(386.23) = -4.33$, $p < .001$, but not their interaction in an extended model, $B = -0.13$, $SE = 0.11$, $t(378.44) = -1.14$, $p = .254$, were significant. Participants showed less favorable orientations toward contact with prototypical, $M = 4.25$, $SE = 0.17$, 95% CI [3.83, 4.67], than less prototypical out-group members, $M = 4.74$, $SE = 0.17$, 95% CI [4.33,

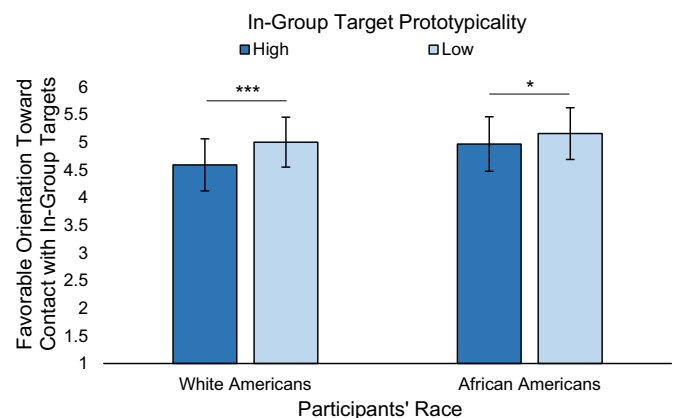


Fig. 8. Effects of phenotypic prototypicality on favorable orientations toward contact with in-group members in Experiment 2.

Note. Means and 95% confidence intervals are displayed. *** $p < .001$. * $p < .05$.

5.15], $d_r = -0.49$.

Of note, the stigma consciousness moderation that was not statistically significant in the primary analyses (conducted only with participants who passed the categorization check) reached significance when all participants were included (see Table 1). Fig. 9 presents the effect of phenotypic prototypicality on meta-attitudes across the full range of the z-scored moderator stigma consciousness created with the interplot package (Solt, Hu, & Kenkel, 2021). This presentation maximizes insights into the data that are lost when focusing on a limited section of the moderator. The graph shows that, for participants scoring on the lower end of stigma consciousness, the effect of phenotypic prototypicality on meta-attitudes is close to zero and its confidence intervals includes zero. However, as the degree of stigma consciousness increases, the effect of phenotypic prototypicality on meta-attitudes becomes increasingly negative and significant.

When re-running the moderation analyses including all participants, stigma consciousness also significantly moderated the effect of the prototypicality manipulation on favorable orientations toward contact (see Table 2). As displayed in Fig. 10, in this analysis, phenotypic prototypicality had a negative effect on favorable contact orientations especially among participants with high stigma consciousness.

2.3. Discussion

The results of the second experiment supported our predictions, this time for both groups of participants: Black and White Americans alike perceived phenotypically prototypical out-group members as having less favorable meta-attitudes than less prototypical out-group members. This effect was mediated, correlationally, by their less favorable orientations toward intergroup contact with out-group targets, controlling for alternative mediators and predictors. Although comparisons across studies using different designs need to be made with caution, the main procedural difference between Experiments 1 and 2 – the generation of the facial stimuli – likely accounted for, at least to some degree, the primary divergence of results between the two experiments. In Experiment 1, participant race moderated the effect of the phenotypic prototypicality of out-group members on meta-attitudes, with Black American participants showing the expected effect but not White American participants. In Experiment 2, although White American participants seemed to display a somewhat weaker effect than Black American participants, participant race was not a significant moderator.

Although we matched prototypical with less prototypical targets on various dimensions in Experiment 1, additional, unmeasured variables (i.e., which we did not have ratings for) that may differ across individuals may have had an influence. Such potential extraneous variance can be substantially reduced by comparing ratings of prototypical and less prototypical versions created with the same base image, rather than images of different individuals who differ in prototypicality but possible also on other unmeasured dimensions. Hence, in Experiment 2, to increase experimental control, instead we systematically altered the same target's phenotypic prototypicality rather than comparing responses to different target individuals who also differed in unmeasured

Table 1

Results from mixed effects model with meta-attitudes as dependent variable when including all participants in Experiment 2.

Variable	B	SE	df	t	p
Prototypicality Manipulation ¹	−0.60	0.08	388.72	−7.63	< 0.001
Participants' Racial Group ²	0.38	0.18	384.46	2.09	0.037
Stigma Consciousness	−0.92	0.10	385.78	−9.56	< 0.001
Prototypicality Manipulation × Stigma Consciousness	−0.24	0.08	384.38	−3.13	0.002

Note. ¹0 = high, 1 = low. ²0 = White American, 1 = Black American. Stigma consciousness was standardized before analysis.

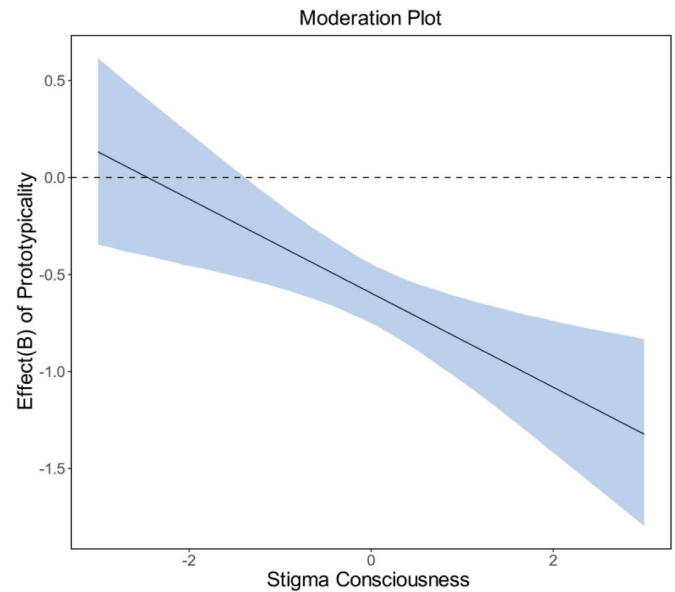


Fig. 9. Effects of the prototypicality manipulation on meta-attitudes at different levels of stigma consciousness in Experiment 2.

Note. Units on the moderator (x-axis) represent standard deviations. Ribbons represent 95% confidence intervals.

Table 2

Results from mixed effects model with favorable orientation toward intergroup contact when including all participants in Experiment 2.

Variable	B	SE	df	t	p
Prototypicality Manipulation ¹	−0.49	0.05	379.26	−8.99	< 0.001
Participants' Racial Group ²	−0.14	0.13	385.29	−1.06	0.289
Stigma Consciousness	−0.43	0.07	388.72	−6.23	<0.001
Prototypicality Manipulation × Stigma Consciousness	−0.16	0.05	374.47	−3.00	0.003

Note. ¹0 = high, 1 = low. ²0 = White American, 1 = Black American. Stigma consciousness was standardized before analysis.

traits other than prototypicality. Previous research has revealed that whereas Black and White Americans both readily respond to unambiguous signals of bias, Black Americans respond more strongly to more ambiguous cues, with Whites often not detecting them (Salvatore & Shelton, 2007). In the current research, judging by effect sizes, the out-group phenotypic prototypicality effects on meta-attitudes and favorable orientations toward intergroup contact were stronger in Experiment 2 than in Experiment 1 for both Black American and White American participants. This observation suggests that the facial cues were more prominent in Experiment 2. A greater prominence may have reduced ambiguity in the differences among target stimuli, facilitating recognition of participants generally, but particularly so for White American participants. In both groups, results also showed that phenotypically prototypical in-group members were perceived as having less favorable out-group attitudes.

While the second experiment provided consistent support for our general predictions, it had two main limitations. First, as with Experiment 1, Experiment 2 used non-representative samples, restricting generalization to the population. Second, it provided only partial support for the functional argument that people higher in stigma consciousness would rely more on targets' phenotypic prototypicality when inferring meta-attitudes. Analyses conducted only with the subset of participants in Experiment 2 who passed the categorization check did not support moderation by stigma consciousness. However, pre-registered complementary analyses including all participants indicated

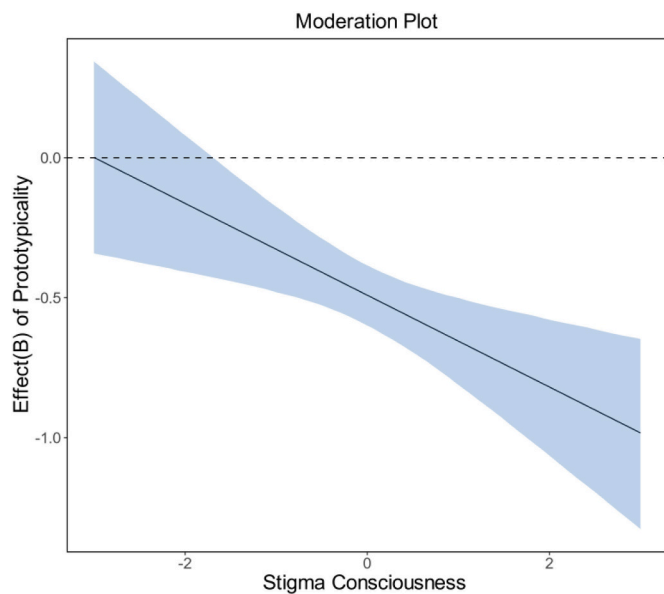


Fig. 10. Effects of the prototypicality manipulation on favorable orientations toward contact at different levels of stigma consciousness in Experiment 2. *Note.* Units on the moderator (x-axis) represent standard deviations. Ribbons represent 95% confidence intervals.

that especially people with high stigma consciousness (in both racial groups of participants) perceived phenotypically prototypical out-group members as having less favorable meta-attitudes.

Although stigma consciousness was not a robust moderator, these findings do suggest that individual differences in the ways people orient themselves toward out-group members are a potentially important factor to consider for a comprehensive understanding of intergroup relations. One direction that future research might pursue would be to focus more on the processes through which stigma consciousness might influence people's meta-attitudes of out-group members. The finding that the effects were not significant for the subset of participants who passed the categorization check but was significant for the entire sample suggests that while those higher in stigma consciousness expect that others will be more biased against them, such expectations may not be driven primarily by the groups to which others belong. People high in stigma consciousness may be using other cues. Previous research reveals that one way racial phenotypicity can influence perceptions is through a category-based route – by facilitating social categorization of an individual as a member of a different racial group (Fiske & Neuberg, 1990; Maddox, 2004). However, another way that racial phenotypicity affects responses is through a feature-based route, reflecting “direct associations between phenotypic features and stereotypic traits (Blair et al., 2002) or race-based evaluations (Livingston & Brewer, 2002) formed over time through repeated exposure to category members” (Maddox, 2004, p. 396). It is thus possible that people higher in stigma consciousness may be more attuned to these features. Our research design cannot disentangle how much the impact of category-based or feature-based influences are determining the effects of racial phenotypicity generally for participants or differentially for those varying in stigma consciousness. Distinguishing these different routes may offer more conceptual and practical insights into the dynamics of intergroup relations.

3. Experiment 3

This experiment attempted to directly replicate the main findings from Experiment 2, using the same experimental procedure and stimuli, with representative samples of Black and White Americans. We also tested three potential moderators of responsiveness to out-group

members' phenotypic prototypicality. Kaiser et al. (2006) found that prejudice expectations increase attention to cues of threats to one's social identity, and we hypothesized that out-group phenotypic prototypicality is one such cue. Thus, factors that attune people to aspects of individuals or their behavior that signal potential mistreatment may orient attention to phenotypic prototypicality and thereby moderate the effects of exposure to out-group members varying in racial phenotypicity. This attunement may be based on (a) past social identity-related rejection experiences and (b) individual differences in race-based rejection sensitivity. Both Black Americans and White Americans generally anticipate rejection from members of the other group (Shelton & Richeson, 2005). Moreover, past experiences with racial discrimination predicts stronger prejudice expectations in new intergroup encounters (Penner et al., 2009). The Rejection Sensitivity-Race Scale is a stable individual difference measure representing the extent to which people anticipate race-based rejection by members of another group (Downey et al., 2004; Mendoza-Denton, Downey, Purdie, Davis, & Pietrzak, 2002). Thus, participants who experienced more race-based rejection in the past and those higher in rejection sensitivity may more readily infer negative attitudes from superficial cues such as racial phenotypic prototypicality (Major, Quinton, & McCoy, 2002).

Another potential moderator of the effect of outgroup phenotypic prototypicality on meta-attitudes is the degree to which participants identify with their racial in-group. On the one hand, previous research shows that high-identifiers are most likely to perceive prejudice (Major et al., 2002), and it is thus possible that people with strong racial identification also rely particularly on phenotypic prototypicality when inferring meta-attitudes. On the other hand, high-identifiers have been shown to perceive and categorize out-group members with varying physical appearance more similarly (Castano, Yzerbyt, Bourguignon, & Seron, 2002). Thus, effects may be less pronounced among participants with strong racial identification.

In Experiment 3, which employed representative samples, we hypothesized as in the first two experiments that more phenotypically prototypical out-group members would be perceived as having less favorable meta-attitudes. Also, as in the two previous studies, we expected that these meta-perceptions would mediate the effects of phenotypic prototypicality on favorable orientations toward intergroup contact controlling for a range of established factors. New for Experiment 3, we tested whether effects would be especially pronounced among participants with negative rejection experiences, rejection sensitivity and, potentially, strong racial identification. Again, we also explored whether effects would extend to perceptions of in-group members.

3.1. Method

As for the previous studies, all procedures, hypotheses, measures, analyses and sample size estimations were pre-registered (see Open Practices section).

3.1.1. Participants

Because one aim of the present experiment was to generalize across the participant populations so far investigated via Amazon MTurk, we had the goal to collect each one sample that was representative of Black Americans and one that was representative of White Americans using Qualtrics Panels. We ordered samples of 350 participants, which, taking into account exclusion rates from the second experiment that used the same design, would provide estimates with a margin of error of about 5% at a 95% confidence interval.

Qualtrics Panels provided samples of 367 Black Americans ($M_{age} = 42.85$, $SD_{age} = 16.5$; 53.7% women) and 381 White Americans ($M_{age} = 48.2$, $SD_{age} = 17.2$; 51.7% women; responses beyond 350 were provided free of charge). Both samples were representative of their populations in

terms of age, gender, political affiliation, education and income (see SOM).

3.1.2. Procedure

The present experiment used the exact same stimuli, experimental setup, exclusion criteria and measures as in Experiment 2, with the difference that it instead of stigma consciousness assessed three alternative, potential moderators presented in randomized order at the beginning of the questionnaire. Specifically, we assessed participants' rejection experiences and rejection sensitivity, and their racial identification. **Rejection experiences** were assessed with 14 items from [Stephan et al. \(2002\)](#). On 5-point scales ranging from 1 (*never*) to 5 (*frequently*), participants indicated how often they had experienced different types of negative treatment (e.g., "been rejected", "been made to feel unwanted") from the respective out-group (i.e., Black Americans for White participants, White Americans for Black participants). The reliability for the scale was satisfactory (White Americans: $\alpha = 0.98$; Black Americans: $\alpha = 0.97$). Black American participants scored higher on the scale, $M = 2.22$, $SE = 0.05$, 95% CI [2.12, 2.32], than White American participants, $M = 1.94$, $SE = 0.05$, 95% CI [1.84, 2.04], but this difference was small, $t(746) = -3.89$, $p < .001$, $d = 0.28$.

Next, the race-based **rejection sensitivity scale** ([Mendoza-Denton et al., 2002](#)) was administered. Participants completed a short-form of the scale used by [Page-Gould, Mendoza-Denton, and Tropp \(2008\)](#). Specifically, they were asked to imagine six different scenarios (e.g., "Imagine that you and your friends are in a restaurant, trying to get the attention of your waitress. A lot of other people are trying to get her attention as well.") and then for each scenario rated (a) how concerned/anxious they would be to be rejected based on their race/ethnicity (e.g., "How concerned/anxious would you be that she might not attend you right away because of your race/ethnicity?"; 1 *very unconcerned* – 7 *very concerned*) and (b) how much they expected to be rejected (e.g., "I would expect that she might not attend to me right away because of my race/ethnicity"; 1 *very unlikely* – 7 *very likely*). In accordance with the original scoring instruction of the scale, for each scenario, we multiplied the two scores before creating a mean score across the scenarios that showed satisfactory reliability (White Americans: $\alpha = 0.98$; Black Americans: $\alpha = 0.91$). Black American participants showed substantially higher rejection sensitivity, $M = 16.34$, $SE = 0.50$, 95% CI [15.35, 17.33], than White American participants, $M = 6.36$, $SE = 0.42$, 95% CI [5.53, 7.19], $t(719.79) = -15.18$, $p < .001$, $d = 1.11$.

Third, participants' **racial identification** was assessed using a scale developed by [Ellemers, Kortekaas, and Ouwerkerk \(1999\)](#). On 7-point Likert scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), participants completed three items such as "My racial group is an important reflection of who I am". The mean scale had satisfactory reliability (White Americans: $\alpha = 0.88$; Black Americans: $\alpha = 0.84$). Black American participants showed a higher racial identification, $M = 5.04$, $SE = 0.08$, 95% CI [4.88, 5.20], than White American participants, $M = 4.55$, $SE = 0.08$, 95% CI [4.39, 4.70], but this difference was small, $t(746) = -4.34$, $p < .001$, $d = 0.32$.

3.1.3. Analytic procedure

The same analytic procedure as in Experiment 2 was used to test the main hypotheses. In total, 83.7% ($n = 319$) of the White American and 65.4% ($n = 240$) of the Black American participants passed the categorization check and were included in the main analyses.³

³ Logistic multi-level models showed that faces high in prototypicality were more likely to be categorized correctly, $B = 5.30$, $SE = 0.80$, $p < .001$, and Black participants categorized fewer faces correctly, $B = -1.21$, $SE = 0.22$, $p < .001$. Both factors did not interact significantly in an extended model, $B = -0.21$, $SE = 0.53$, $p = .701$.

3.2. Results

3.2.1. Effect of phenotypic prototypicality on meta-attitudes of racial out-group members

As in Experiment 2, a mixed model was used to test our hypothesis that out-group members high in phenotypic prototypicality would be perceived as more prejudiced toward participants' in-group than out-group members low in phenotypic prototypicality. In this model, the phenotypic prototypicality factor, $B = -0.37$, $SE = 0.07$, $t(538.59) = -5.40$, $p < .001$, the participant race factor, $B = -0.46$, $SE = 0.19$, $t(551.10) = -2.45$, $p = .015$, and the interaction between both factors, $B = -0.21$, $SE = 0.11$, $t(540.12) = -1.99$, $p = .047$, reached significance. As displayed in [Fig. 11](#), both Black American participants, $t(530) = 7.33$, $p < .001$, $d_r = 0.44$, and White American participants, $t(529) = 5.40$, $p < .001$, $d_r = 0.28$, perceived phenotypically prototypical out-group members as having less favorable attitudes toward the participants' respective in-group. However, as indicated by the significant interaction, the effect was somewhat more pronounced among Black participants.

As pre-registered, we next tested whether participants' rejection experience, rejection sensitivity and racial identification moderated the effects of the prototypicality manipulation. Rejection experiences were correlated moderately with rejection sensitivity, $r(380) = 0.41$, $p < .001$, and weakly with racial identification, $r(380) = 0.18$, $p < .001$. Rejection sensitivity was weakly correlated with racial identification, $r(380) = 0.23$, $p < .001$. As no multi-collinearity was observed, all three moderators were tested in the same model, see [Table 3](#). The moderation by rejection experiences was significant. As displayed in [Fig. 12](#), the more rejection participants had experienced in the past, the more negative was the effect of the prototypicality manipulation on the perceived meta-attitudes. As pre-registered, we also tested whether this moderation would differ depending on participants' racial group in extended models, but all three-way interactions remained non-significant ($ps > 0.228$).

3.2.2. Effect of phenotypic prototypicality on favorable orientation toward intergroup contact

As in Experiment 2, we tested whether phenotypic prototypicality would also influence favorable orientations toward intergroup contact in a mixed model. The contact items were strongly correlated in a multi-level correlation controlling for the nested data structure, $r(8961) = 0.66$, $p < .001$, and therefore mean-scored as in the previous experiments and as pre-registered. The phenotypic prototypicality factor, $B = -0.26$, $SE = 0.04$, $t(540.04) = -6.13$, $p < .001$, the participant race factor, $B = -0.33$, $SE = 0.11$, $t(559.54) = -2.89$, $p = .004$, and the interaction between both factors, $B = -0.15$, $SE = 0.06$, $t(541.75) =$

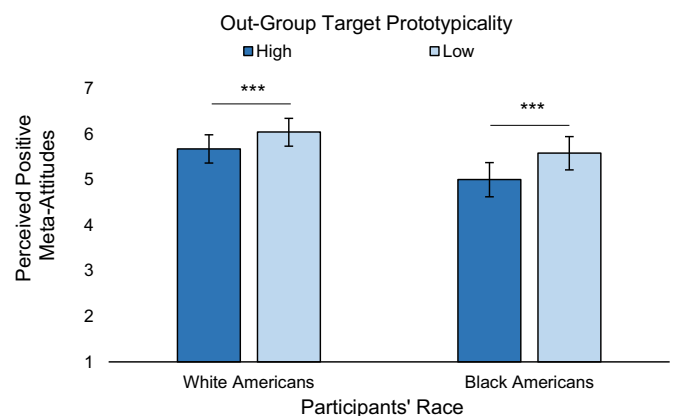


Fig. 11. Effects of phenotypic prototypicality on positive meta-attitudes in Experiment 3.

Note. Means with 95% confidence intervals are displayed. *** $p < .001$.

Table 3

Results from moderated mixed effects model with meta-attitudes as dependent variable in Experiment 3.

Variable	B	SE	df	t	p
Prototypicality Manipulation ¹	−0.47	0.05	535.83	−8.99	<0.001
Participants' Racial Group ²	−0.38	0.22	552.42	−1.76	0.080
Rejection Experiences	−0.08	0.10	547.88	−0.83	0.408
Rejection Sensitivity	−0.20	0.12	559.32	−1.62	0.107
Participants' Racial Identification	0.38	0.10	552.55	3.91	<0.001
Prototypicality Manipulation × Rejection Experiences	−0.13	0.06	552.10	−2.18	0.030
Prototypicality Manipulation × Rejection Sensitivity	−0.04	0.06	546.30	−0.60	0.548
Prototypicality Manipulation × Participants' Racial Identification	−0.05	0.05	533.35	−1.00	0.320

Note. ¹0 = high, 1 = low. ²0 = White American, 1 = Black American. The continuous moderators were standardized before analysis.

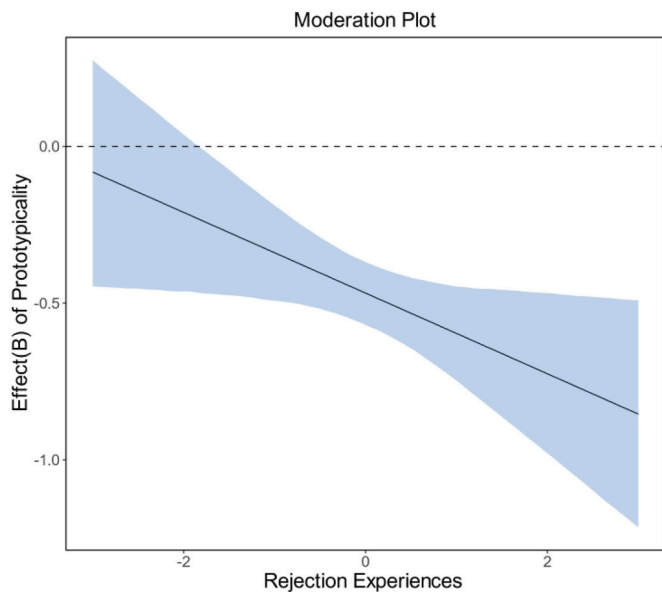


Fig. 12. Effects of the prototypicality manipulation on meta-attitudes at different levels of rejection experiences in experiment 3.
Note. Units on the moderator (x-axis) represent standard deviations. Ribbons represent 95% confidence intervals.

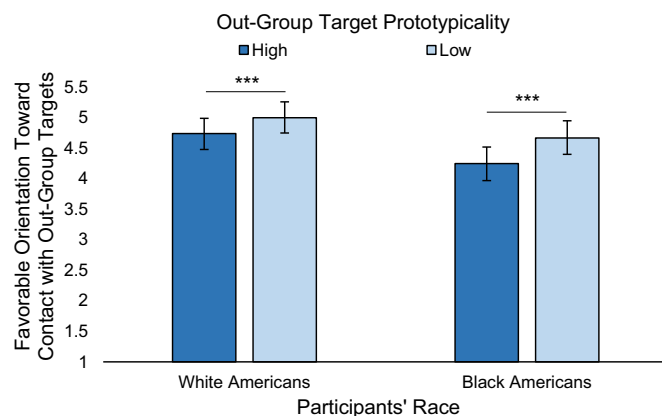


Fig. 13. Effects of phenotypic prototypicality on favorable orientations toward contact with out-group targets in Experiment 3.
Note. Means and 95% confidence intervals are displayed. *** $p < .001$.

−2.33, $p = .020$, reached significance in this model. As displayed in Fig. 13, White American participants, $t(530) = 6.12$, $p < .001$, $d_r = 0.33$, and especially Black American participants, $t(532) = 8.41$, $p < .001$, $d_r = 0.52$, showed less favorable orientations toward intergroup contact with phenotypically prototypical out-group members as compared to less prototypical out-group members.

Testing for indirect effects showed that, among White American participants (mediation by meta-attitudes: $B = -0.13$, 95% CI [−0.181, −0.076], $p < .001$; own attitudes: $B = -0.16$, 95% CI [−0.249, −0.078], $p < .001$; perceived identification: $B = -0.004$, 95% CI [−0.014, 0.003], $p = .187$) and especially, among Black American participants (mediation by meta-attitudes: $B = -0.25$, 95% CI [−0.325, −0.176], $p < .001$; own attitudes, $B = -0.38$, 95% CI [−0.491, −0.263], $p < .001$; perceived identification, $B = 0.005$, 95% CI [−0.001, 0.015], $p = .105$), meta-attitudes and own attitudes significantly mediated the effects of the phenotypic prototypicality manipulation on favorable orientations toward intergroup contact. Perceived identification did not significantly mediate the effects.

As pre-registered, for orientations toward contact, we also tested for moderation of the experimental effect by participants' rejection experiences, rejection sensitivity and racial identification. Here, the interaction between the prototypicality manipulation and rejection sensitivity was significant (see Table 4). As displayed in Fig. 14, the more rejection sensitivity the participants showed, the more negative was the effect of the prototypicality manipulation on favorable orientations toward intergroup contact.

3.2.3. Effect of phenotypic prototypicality on perceived attitudes of and contact orientation toward in-group members

We next performed additional pre-registered analyses to test whether we could replicate the effects from Experiment 2, showing that phenotypically prototypical in-group members were seen as having less favorable attitudes toward the out-group. We restructured the data accordingly as in the previous experiment. In total, 69.6% ($n = 265$) of the White American participants and 80.1% ($n = 294$) of the Black American participants passed the categorization check and were retained for analyses. Here, the phenotypic prototypicality factor, $B = -0.38$, $SE = 0.05$, $t(523.20) = -7.61$, $p < .001$, and the participant racial group factor, $B = -0.49$, $SE = 0.18$, $t(556.78) = -2.75$, $p = .006$, were significant. In an extended model, the interaction between both factors was non-significant, $B = 0.14$, $SE = 0.10$, $t(519.71) = 1.42$, $p = .155$. Results showed that the phenotypically prototypical in-group members, $M = 5.72$, $SE = 0.15$, 95% CI [5.38, 6.05], were perceived as having less favorable out-group attitudes than less prototypical in-group members, $M = 6.10$, $SE = 0.15$, 95% CI [5.77, 6.43], $d_r = 0.30$. In addition, African Americans perceived in-group members as having less favorable out-group attitudes, $M = 5.66$, $SE = 0.18$, 95% CI [5.29,

Table 4

Results from moderated mixed effects model with favorable orientations toward contact as dependent variable in Experiment 3.

Variable	B	SE	df	t	p
Prototypicality Manipulation ¹	−0.32	0.03	536.92	−10.23	<0.001
Participants' Racial Group ²	−0.45	0.13	554.86	−3.37	<0.001
Rejection Experiences	−0.14	0.06	553.99	−2.19	0.029
Rejection Sensitivity	0.09	0.07	563.62	1.15	0.251
Participants' Racial Identification	0.17	0.06	559.54	2.78	0.005
Prototypicality Manipulation × Rejection Experiences	−0.02	0.04	548.92	−0.54	0.591
Prototypicality Manipulation × Rejection Sensitivity	−0.08	0.04	546.58	−2.31	0.021
Prototypicality Manipulation × Participants' Racial Identification	−0.04	0.03	535.32	−1.18	0.237

Note. ¹0 = high, 1 = low. ²0 = White American, 1 = Black American. The three moderators were standardized before analyses.

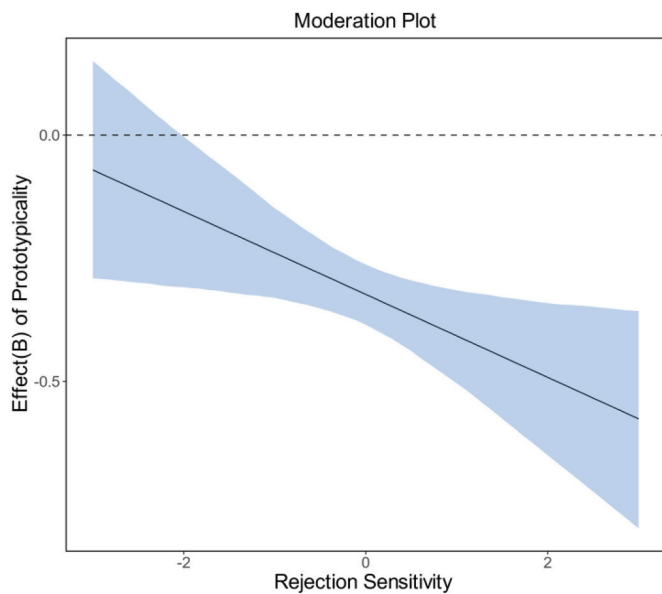


Fig. 14. Effects of the prototypicality manipulation on favorable orientations toward intergroup contact at different levels of rejection sensitivity in Experiment 3.

Note. Units on the moderator (x-axis) represent standard deviations. Ribbons represent 95% confidence intervals.

6.04], compared to how White Americans perceived their in-group members' out-group attitudes $M = 6.15$, $SE = 0.17$, 95% CI [5.80, 6.51], $d_r = 0.38$.

We also tested the effects of the predictors of primary interest on favorable orientations toward contact with in-group members. The phenotypic prototypicality factor had a significant effect, $B = -0.31$, $SE = 0.05$, $t(535.33) = -6.00$, $p < .001$, but the participant racial group factor was non-significant, $B = 0.05$, $SE = 0.11$, $t(555.39) = 0.50$, $p = .619$. The interaction between both factors was statistically significant, $B = 0.17$, $SE = 0.07$, $t(536.14) = 2.36$, $p = .019$. As displayed in Fig. 15, Black American, $d_r = -0.17$, but especially White American participants, $d_r = -0.38$, showed less favorable orientations toward contact with phenotypically prototypical in-group members.

3.2.4. Summary of supplementary analyses with the complete sample

Pre-registered analyses including all participants replicated the main prototypicality effects, whereas different responses to prototypicality

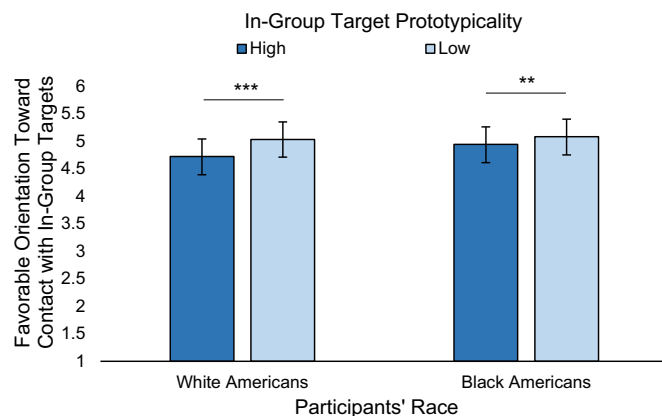


Fig. 15. Effects of the prototypicality manipulation on favorable orientations toward contact with in-group members in experiment 3.

Note. Means and 95% confidence intervals are displayed. ** $p < .01$, *** $p < .001$.

based on participant race (and rejection experiences for meta-attitudes only) became less pronounced. See SOM for complete analyses. Of primary interest, the prototypicality factor, $B = -0.46$, $SE = 0.05$, $t(716.32) = -9.50$, $p < .001$, and the participant race factor, $B = -0.51$, $SE = 0.16$, $t(745.33) = -3.19$, $p = .001$, had main effects on meta-attitudes. But in an extended model, the interaction between both factors did not reach significance, $B = -0.14$, $SE = 0.10$, $t(714.92) = -1.40$, $p = .161$. Prototypical out-group members were perceived as having less favorable meta-attitudes, $M = 5.41$, $SE = 0.14$, 95% CI [5.10, 5.72], than less prototypical out-group members, $M = 5.87$, $SE = 0.14$, 95% CI [5.57, 6.18], $d_r = -0.33$. Next, for favorable orientations toward contact, the phenotypic prototypicality factor, $B = -0.32$, $SE = 0.03$, $t(729.63) = -10.87$, $p < .001$, and the participant race factor had significant effects, $B = -0.35$, $SE = 0.10$, $t(750.03) = -3.65$, $p < .001$, but not the interaction between both factors in an extended model, $B = -0.11$, $SE = 0.06$, $t(728.06) = -1.90$, $p = .058$. Contact orientations were less favorable toward phenotypically prototypical, $M = 4.53$, $SE = 0.12$, 95% CI [4.26, 4.80], than less phenotypically prototypical out-group members, $M = 4.85$, $SE = 0.11$, 95% CI [4.59, 5.12], $d_r = -0.39$.

3.3. Discussion

The third experiment replicated the main results from Experiment 2. Both groups of participants perceived phenotypically prototypical out-group members as having less favorable meta-attitudes and had less favorable contact orientations toward these targets. In terms of moderation, participants with high prior rejection experiences perceived phenotypically prototypical out-group members as having less favorable meta-attitudes, and this was irrespective of participants' race. This finding lends some support for the functional argument that one reason for why people infer meta-attitudes from physical cues is that they try to anticipate threat or future adverse contact experiences (Wilson et al., 2017). Yet notably, rejection sensitivity, and not prior rejection experiences per se, moderated the influence of prototypicality on favorable orientations toward intergroup contact. Phenotypic prototypicality had a more negative effect among rejection-sensitive participants. Rejection sensitivity was measured specifically using hypothetical contact scenarios, which may have aligned with orientations toward contact and explain why rejection sensitivity and not rejection experiences moderated effects on favorable orientations toward intergroup contact. By contrast, rejection experiences captured past events of potentially traumatic nature (i.e., being humiliated, harassed, verbally abused, and physically harmed), which may have made participants especially vigilant to signals of rejection when assessing the meta-attitudes of out-group targets. But overall, race-based rejection, either in the form of prior experiences or sensitivity, exacerbated negative effects on meta-attitudes and favorable orientations toward intergroup contact.

In contrast to rejection experiences and rejection sensitivity, there was no evidence for moderation by participants' racial identification. As pre-registered, we had an exploratory approach when it came to this variable, given that some evidence suggests that high-identifiers perceive more prejudice (Major et al., 2002) but at the same time also pay less attention to phenotypic variations among out-group members (Castano et al., 2002). On the one hand, the lack of moderation is in line with research suggesting that social judgments based on phenotypicity are less of a product of categorization processes (Livingston & Brewer, 2002). On the other hand, it is also possible that because high identifiers tend to perceive out-groups to be more prejudiced but also pay less attention to their phenotypic variation, these two processes may have cancelled each other out in the present research.

Finally, as in the previous studies, phenotypic prototypicality also influenced perceptions of in-group members' attitudes and contact orientations toward in-group members. Again, more phenotypically prototypical in-group members were seen as having less favorable attitudes toward the out-group. In contrast to Experiment 2, this effect was not moderated by participant race. However, consistent with Experiment 2,

orientations toward intergroup contact were less favorable toward phenotypically prototypical in-group members especially among White Americans. Hence, it seems as if Black and White Americans equally link the more phenotypically prototypical appearance of in-group members to less favorable out-group attitudes, but that especially White Americans sanction these individuals socially. One reason for this difference may be that a White American with less favorable out-group attitudes matches participants' idea of a racist individual more than a Black American with similarly negative out-group attitudes (Inman & Baron, 1996; Inman, Huerta, & Oh, 1998), and most Americans sanction racism.

4. Internal meta-analyses of experiments 1–3

Given the inconsistent racial group differences, we conducted an internal meta-analysis of the effects of the phenotypic prototypicality manipulation on meta-attitudes and on favorable orientations toward intergroup contact. We first converted Cohen's d_r to Hedges g_r to obtain unbiased effect size estimates (Cumming, 2012). Next, we estimated the sampling variance following Borenstein, Hedges, Higgins, and Rothstein (2009), and then estimated random effects models with the Metafor package in R (Viechtbauer, 2010). Because we tested the effects for out-group and in-group targets in the same model (to be able to statistically compare their strength), the robust estimates that controlled for clustering by study were calculated.

The overall effect of the phenotypic prototypicality manipulation on meta-attitudes was $g_r = -0.31$, 95% CI $[-0.39, -0.23]$, $p < .001$, and the heterogeneity of the effects was moderate, $I^2 = 41.53\%$. In an extended model, neither participants' race (0 = White, 1 = Black), $g_r = 0.08$, 95% CI $[-0.15, 0.32]$, $p = .323$, nor target group (0 = in-group, 1 = out-group), $g_r = -0.02$, 95% CI $[-0.27, 0.23]$, $p = .628$, significantly moderated the effects and heterogeneity remained similar, $I^2 = 46.57\%$. Also, in a further extended model, the interaction between participants' race and the target group failed to reach significance, $g_r = 0.13$, 95% CI $[-0.50, 0.75]$, $p = .472$.

The overall effect of the phenotypic prototypicality manipulation on contact orientations was $g_r = -0.27$, 95% CI $[-0.44, -0.11]$, $p = .007$, and the heterogeneity of the effects was high, $I^2 = 87.00\%$. Neither the participants' race, $g_r = 0.05$, 95% CI $[-0.43, 0.54]$, $p = .746$, nor target group, $g_r = -0.16$, 95% CI $[-0.56, 0.23]$, $p = .277$, significantly moderated the effects and the heterogeneity remained similar, $I^2 = 85.26\%$. In a further extended model, the interaction between participants' race and the target group failed to reach significance, $g_r = 0.33$, 95% CI $[-0.08, 0.73]$, $p = .075$.

4.1. Discussion

The meta-analyses demonstrated the robustness of the effect of phenotypic prototypicality on meta-attitudes and favorable orientations toward intergroup contact across the different experiments. The effects were not moderated by whether responses toward out- or in-group members were considered or whether White or Black Americans were the participants. This supports the generality of the observed effects, suggesting that phenotypic prototypicality has a similar effect in different racial groups. Moreover, the results suggest that these effects do not simply reflect out-group bias but rather a general tendency to infer attitudes from others' phenotypic appearance.

The three experiments so far suggest that phenotypic prototypicality negatively influences favorable orientations toward intergroup contact by leading to less favorable meta-attitudes. However, the causality of these mediation models was purely based on previous studies, thereby limiting their evidential value (Bullock, Green, & Ha, 2010; MacKinnon, Fairchild, & Fritz, 2007). Specifically, these mediation models were based on previous work showing that meta-perceptions of being perceived as prejudiced (Shelton & Richeson, 2005, 2006) and generally to be stereotyped (Vorauer et al., 1998) negatively influence intergroup

contact at the interpersonal level, as well as research showing that perceiving prejudice and other forms of bias against one's group leads to retaliatory reactions at the group level (Kteily et al., 2016; Obaidi, Thomsen, & Bergh, 2018). Even considering this existing evidence, empirical support for whether meta-attitudes conceptualized as perceived warm versus cold feelings influences favorable orientations toward intergroup contact is still needed. To address this, in the next experiment we directly manipulated the mediator, meta-attitudes, to test for causal effects on orientations toward intergroup contact.

5. Experiment 4

To establish the hypothesized causal link between our mediator, meta-attitudes, and our dependent variable, favorable orientations toward intergroup contact, we conducted a final pre-registered experiment. Black and White participants completed a series of trials that each displayed an in- or out-group target who was described as either having cold, neutral or warm feelings toward the respective out-group. Given the focus on the second leg of our mediation model (i.e., from meta-attitudes to favorable orientations toward intergroup contact), we did not manipulate phenotypic prototypicality in this experiment. Importantly, as in the previous studies we also assessed participants' general feelings toward the respective out-group as well as previous contact experiences (frequency and valence). Controlling for these variables allowed us to demonstrate unique effects of meta-attitudes on favorable orientations toward intergroup contact over and above pre-existing intergroup attitudes.

The correlational mediation results from the previous studies showed that positive meta-attitudes were positively related to contact orientations. Thus, we tested the main hypothesis that participants would have less favorable orientations toward intergroup contact with targets who held negative meta-attitudes but more favorable orientations toward intergroup contact with those who held positive meta-attitudes. Moreover, we tested whether this tendency would be especially pronounced toward out-group members as compared to in-group members.

5.1. Method

The procedures, hypotheses, measures, analyses and sample size estimations were pre-registered (see Open Practices section). One additional analysis (i.e., moderation by participant race) is reported and defined as "exploratory."

5.1.1. Participants

Power simulations with SIMR (Green & MacLeod, 2016) using generated data that mirrors the structure of the data to be collected for this experiment indicated that collecting 50 Black and 50 White American participants would provide more than 90% chance to observe a small effect ($d_r = 0.20$). Accordingly, we recruited 50 Black American ($M_{age} = 34.04$, $SD_{age} = 9.69$; 64.0% women) and 50 White American participants ($M_{age} = 43.14$, $SD_{age} = 13.11$; 60.0% women) via Amazon MTurk. Participants were compensated with \$0.4 for this three-minutes study.

5.1.2. Procedure

As for the other experiments, the participants were asked to take part in a study dealing with how people perceive others. At the beginning, participants completed the feeling thermometer from the previous studies, assessing how cold/negative or warm/positive they perceived the respective out-group. In addition, they completed the same two items as in the previous studies, assessing their frequency of contact experiences with the out-group and the valence of this contact. Having completed these questions, participants were told that they would see twelve images of different individuals who had been surveyed about their social attitudes, be asked to read some information about each of them and complete some question. These images were the original, non-

morphed images from Experiments 2 and 3. For each trial, participants saw the image of one target individual (presented as 750×527 pixel images) and a description of the meta-attitudes of this target. Importantly, for each trial we randomized whether the target had cold, neutral or positive feelings toward the respective out-group (i.e., for White targets, “This individual has [cold/neutral/warm] feelings toward Black Americans”). Participants for each trial first completed the contact item from the previous studies that asked them to indicate how interested they would be to get to know this individual. Second, they for each trial completed the question from the previous studies asking how they would feel about having the target individual as a neighbor. The order of the images was randomized for each contact item. Both contact items were highly correlated in a multi-level correlation controlling for the nested data structure, $r(1197) = 0.77$, $p < .001$, and therefore mean-scored into a measure of favorable orientations toward intergroup contact as pre-registered.

5.2. Results

As in the previous studies, mixed models were estimated to test the hypotheses. Random intercepts were added for both stimuli and participants, and the slope of the meta-attitudes and target-group factor was set to random. We first estimated a model testing whether meta-attitudes (cold, neutral, warm) would have an effect on favorable orientations toward intergroup contact, controlling for target-group (whether targets belonged to participants’ racial in- or out-group), general feelings, general contact frequency, and general experienced contact valence. The general feelings and contact experience measures were standardized to achieve model convergence. As displayed in Table 5, compared to the neutral meta-attitudes condition, $M = 4.14$, $SE = 0.12$, 95% CI [3.90, 4.38], participants showed less favorable orientations toward intergroup contact in the cold meta-attitudes condition, $M = 2.52$, $SE = 0.15$, 95% CI [2.23, 2.82], $d_r = -2.43$, and more favorable orientations toward intergroup contact in the warm meta-attitudes condition, $M = 5.08$, $SE = 0.12$, 95% CI [4.84, 5.33], $d_r = 1.42$.

When we extended this model to test for moderation by target-group. Both interactions with the cold and warm meta-attitudes conditions were significant (see Table 5). As visualized in Fig. 16, participants showed a tendency to report less favorable orientations toward contact with out-group members especially (as compared to in-group member) in the cold meta-attitudes condition, $d_r = -0.92$.

We explored whether the Meta-attitudes \times Target group interaction would be further moderated by participants’ racial group. Indeed, in this model that in full is reported in the SOM, the three-way interaction

involving the warm meta-attitudes condition, target group and participants’ racial group was significant, $B = 0.85$, $SE = 0.20$, $t(943.68) = 4.18$, $p < .001$. The corresponding three-way interaction with the cold meta-attitudes condition failed to reach significance, $B = -0.35$, $SE = 0.21$, $t(953.85) = -1.71$, $p = .089$. As visualized in Fig. 16, the difference between contact orientations toward in-group members in the neutral versus warm meta-attitude conditions was more marked among White participants, $d_r = 1.92$, than among Black participants, $d_r = 0.68$. In addition, Black participants in the cold meta-attitudes condition showed significantly less favorable orientations toward contact with out-group members than with in-group members, $d_r = -1.96$. Moreover, they also showed less favorable orientations toward contact with in-group members than out-group members in the neutral meta-attitudes condition, but this effect was less pronounced than in the cold meta-attitudes condition, $d_r = -1.06$.

5.3. Discussion

This last experiment offered support for the mediation model hypothesized in the previous experiments, showing that meta-attitudes in the form of cold versus warm feelings causally influenced favorable orientations toward intergroup contact in the predicted directions. Importantly, demonstrating the crucial and unique role of meta-perceptions for interracial interactions generally, these effects were strong and observed controlling for general intergroup orientations and contact experiences. Hence, supporting our general argument, meta-attitudes may reinforce and negatively shape intergroup relations independent of people’s own attitudes.

Black American participants seemed to socially sanction in-group members who held negative attitudes less than out-group members, whereas no such difference was observed among White Americans. Arguably this finding suggests that negative attitudes held by White Americans (i.e., the socially advantaged high-power group) toward the out-group might be perceived as a sign of racism and justification for social sanctioning more readily than negative attitudes held by Black Americans (Inman et al., 1998; Inman & Baron, 1996).

6. General discussion

Collectively, the results of our four experiments demonstrate the critical role that meta-perceptions—how people perceive that others think and feel about the perceiver’s group—play in intergroup relations, over and above people’s own experiences and attitudes toward the other group. Whereas previous work has established the important role that

Table 5

Results from mixed effects model for favorable orientations toward contact with out-group targets as dependent variable in Experiment 4.

Variable	<i>B</i>	<i>SE</i>	<i>df</i>	<i>t</i>	<i>p</i>
Model 1					
Cold Meta-Attitudes Condition ¹	−1.62	0.13	96.67	−12.30	<0.001
Warm Meta-Attitudes Condition ¹	0.95	0.13	98.94	7.45	<0.001
Target Group ²	−0.21	0.07	90.47	−2.80	0.007
General Attitudes Toward Out-Group ³	0.33	0.12	95.60	2.83	0.006
Contact Experiences with Out-Group (frequency)	0.04	0.08	96.43	0.48	0.634
Contact Experiences with Out-Group (valence) ³	0.13	0.11	94.64	1.16	0.250
Model 2					
Cold Meta-Attitudes Condition ¹	−1.39	0.16	84.75	−8.89	<0.001
Warm Meta-Attitudes Condition ¹	0.81	0.13	165.94	6.31	<0.001
Target Group ²	−0.18	0.10	205.72	−1.83	0.068
General Attitudes Toward Out-Group ³	0.37	0.12	84.16	3.05	0.003
Contact Experiences with Out-Group (frequency)	0.03	0.08	84.92	0.37	0.712
Contact Experiences with Out-Group (valence) ³	0.13	0.12	83.35	1.08	0.283
Cold Meta-Attitudes Condition \times Target Group	−0.41	0.11	962.60	−3.87	<0.001
Warm Meta-Attitudes Condition \times Target Group	0.32	0.10	955.29	3.06	0.002

Note. ¹The neutral condition was the comparison group. ²0 = In-Group, 1 = Out-Group. ³0 = White American, 1 = Black American. ³higher values indicate more positive attitudes.

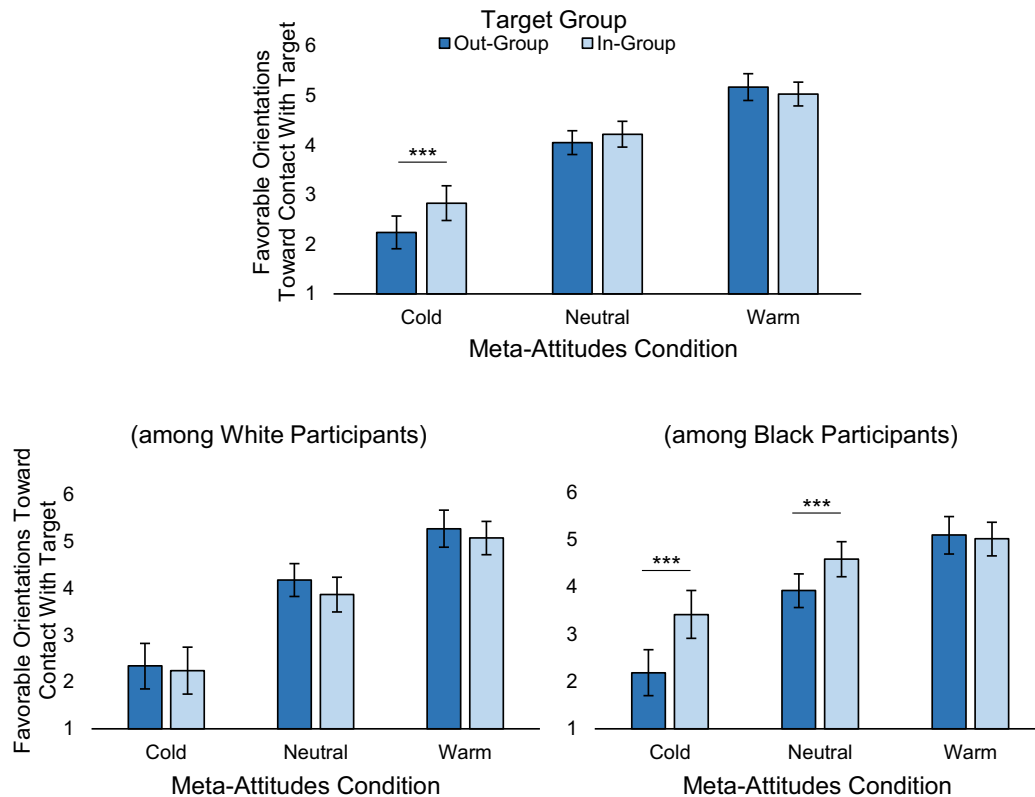


Fig. 16. The effect of the meta-attitudes manipulation on favorable orientations toward contact with out- and in-group members across all participants (top panel), and for each participant group (lower panels) in Experiment 4.

Note. Error bars represent 95% confidence intervals. All differences between the meta-attitude conditions were significant. *** $p < .001$.

racial phenotypicity has on perceptions and treatment—particularly those of White people toward Black people—we considered multiple elements in the dynamics of relations between White and Black Americans. While our research does not definitively disentangle whether or the degree to which effects are operating through category- or feature-based processes (Fiske & Neuberg, 1990; Maddox, 2004), we do consistently demonstrate that racial phenotypicity does exert an influence on multiple facets of intergroup relations. The facets include meta-attitudes, attitudes, and behavioral orientations; the role of individual differences in bias-related experiences, expectations, and sensitivity; and the perspectives of both White and Black Americans.

The robust literature on racial phenotypicity has illuminated important processes leading to bias, but understanding intergroup relations more generally requires a recognition of the independent and interrelated role of the different factors. For example, supportive of a main objective of the present research, we demonstrated how racial phenotypicity relates to meta-attitudes and showed how meta-attitudes relate, over and above personal attitudes, to interest in intergroup contact. Practically, this latter finding reveals that even when people are not personally prejudiced, their beliefs that members of another group are biased against them (in our work, based on the racial phenotypicity of group members) may be a critical barrier to productive and harmonious intergroup relations. Even when intergroup attitudes between members of groups with a history of conflict have improved (e.g., as reflected in more frequent interracial marriage, Gallup, 2013), tensions can still be reinforced during exchanges by meta-perceptions of how individuals from the other group views oneself and one's in-group (Shelton & Richeson, 2005, 2006).

Overall, the present research illuminates how incidental cues of limited control (facial appearance) can independently activate both attitudes and meta-attitudes. According to Zebrowitz and Montepare

(2008), facial appearance, which is processed at the earliest stages of person perception (He, Johnson, Dovidio, & McCarthy, 2009), is a powerful social cue because “faces provide adaptive information about the social interactions they afford ... [and] are so useful in guiding adaptive behavior that even a trace of those qualities can elicit a response” (p. 1498). In addition to conveying information about vulnerability (e.g., through “baby-facedness”) or poor health (e.g., through facial asymmetry), facial appearance spontaneously cues perceptions of identity (Zebrowitz & Montepare, 2008). In turn, perceptions that an out-group member identifies more strongly with a racial out-group can elicit greater prejudice toward the individual (Kaiser & Pratt-Hyatt, 2009; Wilkins, Kaiser, & Rieck, 2010), although we find less evidence for this in the present research. At the same time, it is important to note that how phenotypically prototypical an individual is perceived to be can also depend on the perceiver. For instance, White Americans under negative circumstances involving rejection or economic scarcity show a tendency to perceive Black Americans as more phenotypically prototypical (Krosch & Amodio, 2014; Sacco, Wirth, Hugenberg, Chen, & Williams, 2011) (but see Hannon, Keith, DeFina, & Campbell, 2020). Similarly, in a recent study (Krosch, Park, Walker, & Lisner, 2022), when primed with demographic shifts, White Americans were more likely to categorize racially ambiguous faces as part of racial out-groups. Thus, both higher-order and cue-level influences likely have main and interactive effects.

Complementing prior work on how the phenotypic prototypicality of racial out-group members affects attitudes toward them (e.g., Maddox & Perry, 2017), our research demonstrates, for the first time to our knowledge, how it also influences meta-attitudes with respect to racial out-group members. Moreover, our results supported the proposition that racial phenotypicity can elicit systematic effects on impressions through a direct feature-based route in addition to changing how targets

are categorized (Livingston & Brewer, 2002; Maddox, 2004). That is, we observed the predicted effects in preregistered analyses not only considering participants who categorized targets by race with a high degree of accuracy but also across all participants (detailed analyses reported in SOM). These findings extend previous work on phenotypic prototypicality by identifying its impact on meta-attitudes as well as personal attitudes. They offer new and more comprehensive insights into the complex dynamics of intergroup relations by elucidating the multiple pathways through which biases in attitudes and perceptions may operate and relate to behavioral orientations that can shape these relations into the future.

Additional research might further consider in more detail the dynamics of these processes directly in intergroup interactions. Meta-attitudes are often shaped by projecting one's racial biases on others and/or assuming that one's attitudes toward an out-group are reciprocated (see Lemay & Teneva, 2020). We further found that phenotypic prototypicality affected meta-attitudes in ways independent of the relationship between attitudes and meta-attitudes. From the perspective of the ecological theory of face perception (Zebrowitz & Montepare, 2008), facial appearance reliably communicates information about the attributes and internal states of another person. These attributes and states elicit beliefs about how the other person will think, feel, and act that then shape behavioral orientations toward these individuals (e.g., favorable contact orientations in our studies). From both the perspectives of Lemay and Teneva (2020) and of Zebrowitz and Montepare (2008), it is possible that in instances of actual intergroup interactions, meta-attitudes cued by an out-group member's phenotypic prototypicality may systematically relate to that person's actual attitudes. That is, to the extent that phenotypically prototypical out-group members experience more biased treatment by members of the perceiver's group, meta-attitudes based on an out-group member's facial appearance may be somewhat accurate. Future work might, for example, apply the truth and bias analysis model (West & Kenny, 2011) to interracial interactions (see also Lemay & Teneva, 2020) to examine how phenotypic prototypicality of each of the interactants affects the attitudes and meta-attitudes of the dyad and thereby has consequences for the interaction and relations.

Concerning intergroup contact, the current research both replicates and extends previous research showing that people with more prejudiced attitudes and who perceive more negative meta-attitudes are oriented less favorably toward intergroup contact (e.g., Shelton & Richeson, 2005). It did so by demonstrating the role of out-group phenotypic prototypicality in this process in correlational mediation models. The current research then supplemented this correlational evidence with an experimental manipulation that indicates the causal role of meta-attitudes. Specifically, we found in Experiments 1–3 an indirect effect of out-group racial prototypicality on intergroup contact orientations through meta-attitudes, in ways independent of personal intergroup attitudes. Moreover, providing direct evidence of the proposed causal mediating role of meta-attitudes (as recommended by Spencer et al., 2005), in Experiment 4 we directly manipulated the hypothesized mediator by varying information of the attitudes that out-group members held toward the participant's in-group. Taken together, these results converge to support our hypothesized process by which out-group phenotypic prototypicality activates not only negative attitudes but also, independently, negative meta-attitudes. As we show, this process, in turn, leads to less favorable behavioral orientations toward contact with out-group members. Our research thus builds upon and extends research showing how reciprocal meta-perceptions can spiral, leading to extreme phenomena such as mutual dehumanization and intergroup violence (Kteily et al., 2016; Obaidi et al., 2018). Hence, understanding the specific cues—in this case, phenotypic prototypicality—that determine the extent to which people infer out-group members' meta-attitudes when forming first impressions and the intergroup consequences of this process is of both theoretical and practical importance.

The present research also provided some insights into the functional

mechanisms behind the observed effects. In Experiment 2, some support was obtained for the prediction that the tendency to infer less favorable intergroup attitudes from the phenotypic prototypicality of out-group members and to have less favorable contact orientations is especially pronounced among individuals high in stigma consciousness (Pine, 1999). However, moderation by stigma consciousness reached significance only in the pre-registered analyses that included all participants in the study, not in the analyses that were restricted to participants who showed a high degree of accuracy in the racial categorization of target individuals. In Experiment 3, participants who had greater previous experiences with intergroup rejection reported more negative meta-attitudes and those higher in rejection sensitivity had less favorable intergroup contact orientations for out-group individuals who were higher in phenotypic prototypicality.

Taken together, these findings are generally in line with the notion that previous adverse intergroup experiences and the anticipation of being the target of stigma or rejection may make people more observant of potential cues of future prejudice and devaluation (Major et al., 2002; Vorauer, 2006). As has been argued, such a tendency may reflect a defensive motivational system, intended to foresee and avert negative intergroup encounters (Downey et al., 2004; Romero-Canyas et al., 2010). Future research may attempt to address this issue experimentally by varying information about the likelihood of experiencing bias from out-group members in specific contexts. For example, studies may inform participants that the out-group targets were individuals who identified with a common group identity to a high or low degree, such as a local shared region (e.g., New Yorkers) or an inclusive civic national identity (e.g., built on a common history of immigration; Kunst, Thomsen, Sam, & Berry, 2015). People anticipate less bias and exclusion from others who share such common identities (Gaertner, Dovidio, Guerra, Hehman, & Saguy, 2016). Thus, common group identities may offset some of the effects observed in this study.

Likely because people generally assume that in-group members have negative attitudes toward out-groups (Judd et al., 2005), the tendency to infer less favorable intergroup attitudes from phenotypic prototypicality applied also when participants rated in-group members in the current research. That is, participants perceived phenotypically prototypical in-group members as showing less favorable attitudes toward the respective out-group and participants also showed less favorable contact orientations toward these in-group members. Strikingly, the internal meta-analysis revealed that the effects for out- and in-group members were of comparable strength. This finding indicates that the association between phenotypic prototypicality, meta-perceptions, and contact orientations cannot be explained by out-group bias alone; it also potentially suggests that phenotypic prototypicality generally signals the compliance of individuals to their group's perceived standards.

The present research focused on intergroup relations between two groups with a history of prejudice, discrimination and conflict. It did so by using samples of Black and White Americans in four studies with the goal to capture both minority and majority perspectives. Study 3 replicated the findings, which used online convenience samples, with representative samples of Black and White American participants, which further establishes the replicability of the effects we observed and enhances the generalizability of the work. We focused on this particular contextual instantiation of intergroup relations because of the historical and contemporary social, political, economic, and psychological importance of Black-White relations in the US. Moreover, we did so to draw on the large body of empirical work in psychology on the dynamics of interracial relations in the US. However, we acknowledge that, while traditionally representing a central instantiation of intergroup relations within the psychological literature, Black-White relations have unique elements historically (e.g., in slavery) and politically (e.g., the Civil Rights Movement of the 1960s) that distinguish these dynamics from those of other forms of intergroup relations in the US, as well as other types of intergroup relations outside of the US. To test the generalizability of the findings of the current research, future studies could

examine other majority-minority relations (such as White-Asian and White/Anglo-Latinx) in the US, as well as relevant majority-minority relations in other cultural or national contexts. Intergroup relations share many similar dynamics psychologically but are also shaped by distinctive historical, cultural, and political forces. Thus, future research might productively test the effects of phenotypic prototypicality on meta-attitudes considering groups in historical or contemporary conflict or tension in other national contexts. Moreover, because not all intergroup relations are characterized by conflict, additional research might also consider how the nature of intergroup relations may moderate the effects we observed. For example such research could test the effects in the context of groups that have more neutral relations or are perceived as allies (Alexander, Brewer, & Livingston, 2005). We would expect generally attenuated effects when intergroup relations are neutral. Because people project their perceptions onto others with whom they have positive relations (Mullen, Dovidio, Johnson, & Copper, 1992), it is possible that phenotypically prototypical members from allied out-groups may be seen as having more *positive* meta-attitudes (cf., Kunst, Thomsen, & Dovidio, 2019).

Future research may also focus further on two potential prototypicality mechanisms – appearing less out-group prototypical or appearing more in-group prototypical – that may explain the effects observed in the present study. Although our categorization check ensured that the morphs used in Experiments 2 and 3 were still categorized as out-group members, these morphs were created by mixing racial in- and out-group faces. As such, the approach we used cannot disentangle the potential impact of target faces appearing less out-group prototypical from the impact of appearing more in-group prototypical. One, the other, or both may have contributed to the results we observed. To answer this question, future research could, for instance, compare whether racial majority-group members' (e.g., White Americans') meta-attitudes are more positive toward targets that were created by morphing in- and out-group faces (e.g., Black with White faces) versus morphing faces from different racial out-groups (e.g., Black with Latinx or Asian faces). Comparable results for these two sets of stimuli would suggest that our results are caused, at least in part, by making the faces appear less prototypical of the out-group. Another, related direction for future research would be to focus on the perceptions of racial minority-group members, testing whether minority-group members would show a heightened sensitivity to the prototypicality not only of racial majority-group members but also of members of other racial minority groups and, importantly, what meta-attitudes this elicits. If in-group prototypicality is a significant mechanism, racial minority-group members (e.g., Black Americans) would be expected to perceive faces of racial out-group members (e.g., Asian Americans) who were created by morphing in- and out-group faces (e.g., Asian and Black Americans) more positively than faces created by morphing members of two racial out-groups (e.g., Asian and Latinx Americans).

Generally, investigating the processes observed in this research with a variety of different groups will also allow researchers to establish whether prototypicality is cued differently in faces from different racial groups. Although our meta-analyses showed that effects were similar across the different racial groups when all experiments were considered, we found some differences in the individual experiments. Such group differences may reflect group-specific manifestations of prototypicality or, alternatively, be explained by the intergroup setting in question. Future research could, as in Ma et al. (2018), investigate the relative influence of various markers of facial physiognomy as well as skin tone on perceived prototypicality, thereby addressing open questions in the field (Stepanova & Strube, 2012; Strom, Zebrowitz, Zhang, Bronstad, & Lee, 2012). Our research was not adequately powered to provide more than preliminary insights in this regard, and future research would need to extend our study with a markedly larger set of target images.

Another related avenue for future research may be to test whether our effects extend to other domains of intergroup relations such as gender. For instance, it would be interesting to test whether men

perceive different meta-attitudes from phenotypically prototypical than non-prototypical women. Yet, given the association of prototypical women with traditional gender attitudes that often favor the gender hegemony (Glick & Fiske, 1996), especially non-prototypical women who may be seen as having non-traditional gender views may be perceived to have negative meta-attitudes toward men.

It is important to acknowledge that, although we carefully matched the stimuli used in the experiments, it is possible that some uncontrolled dimensions exerted additional influences on evaluations of the targets. For instance, Experiment 1 used real images that were matched on various dimensions (such as trustworthiness, threat, facial width-to-height ratio and attractiveness) but differed in prototypicality. Yet, only a selection of rating dimensions was available in the Chicago Face Database and the more traits one attempts to control for, the less likely one is to find closely matching pairs of targets. Morphing, which was used in Experiments 2 and 3, may allow for a higher level of control in this respect but potentially at the expense of ecological validity. Although morphed images are generally perceived as highly realistic (Sutherland et al., 2017), it is possible that, for instance, morphing of two equally attractive individuals produces an even more attractive morph. While we believe that such an attractiveness effect, in line with an attractiveness-positivity heuristic, would likely be accounted for by the own attitudes of participants that we controlled for, future research may find ways to more strictly control for dimensions such as perceived attractiveness and realism of the images.

Generally, and consistent with existing research (Kteily et al., 2016; Shelton & Richeson, 2005; Vorauer et al., 1998), our findings suggest that, when attempting to reduce intergroup bias, attention needs to be paid at the meta-perceptual level. Extending previous work, we argue that a focus on the influence of phenotypic prototypicality is especially needed when attempting to improve intergroup contact. Although our experiments did not involve real interracial encounters, they suggest that mere contact between groups, and especially between individuals who are phenotypically prototypical of their group, may backfire because they can reinforce mutual negative meta-perceptions. This raises the key question of how the effect observed in the present study may be attenuated. Future studies could test whether educating people about this perceptual bias might in itself be enough to offset the negative effects observed here (Maddox & Perry, 2017). Developing such interventions are important because they may reduce the social marginalization that phenotypically prototypical individuals (and especially those belonging to low-status and low-power groups) may experience (Hebl, Williams, Sundermann, Kell, & Davies, 2012).

It is important to note that, although we found some evidence for the role of moderators such as stigma consciousness and rejection experiences, we did not provide a direct test of the attentional biases that may underlie this effect. Thus, future studies could profitably test whether people high and low on such moderators differently perceive faces using eye trackers or other methods. This would also offer insights into the specific facial areas that attract attention and have an influence on perceived meta-attitudes. Similarly, the activation of a defensive motivational system may be assessed through skin conductance measurements or other physiological indicators of arousal and threat (see Scheepers, Saguy, Dovidio, & Gaertner, 2014). Such studies may also use different approaches than morphing to test for the independent effects of skin tone and facial physiognomy (Gitter & Satow, 1969; Stepanova & Strube, 2009). In Studies 2 and 3, we tested versions of comparable target individuals, morphed to a limited degree from the same base face. We chose a low morphing percentage to ensure that both versions of the face had a very similar overall appearance. Nevertheless, we acknowledge that, while the different versions of the faces strongly resembled each other, they were not exactly the same target individuals. Prototypicality manipulations that alter the overall appearance by definition prevents such a direct comparison, and manipulations that only alter the skin tone of a face may be more suited if the goal is to compare the same individuals (Maddox & Gray, 2002).

In addition, such conceptual replications may be conducted in the more uniform controlled conditions of a laboratory or by otherwise ensuring that display settings are better standardized than in the present research. Although we observed effects across all participants and repeatedly across studies, we cannot exclude the possibility that parameters such as the display resolution of participants' screen or how they were seated relative to the stimuli could also have effects.

In conclusion, meta-perceptions can exert a negative influence on how people relate to each other and intergroup relations more broadly that is largely independent of people's own intergroup attitudes. Yet, little is known about the visual cues that activate meta-attitudes during first impression formation. By integrating research on phenotypic prototypicality and meta-perceptions, the present work shows that people use the racial appearance of out-group and in-group members to infer their intergroup attitudes. As the results suggested, these meta-perceptions may have negative consequences for intergroup contact independent of other established processes.

7. Open practices

Pre-registrations are available at the following locations.

Experiment 1: https://osf.io/2y4q8/?view_only=d9014384b697432bbf59ea3d9a4e5877

Experiment 2: https://osf.io/qmyzw/?view_only=43a6e3697d3d4f28bccaf04bbe106a65

Experiment 3: https://osf.io/ngpuz/?view_only=a6096d7ddb684cb0a0e3a433f861f7df

Experiment 4: https://osf.io/6epkr/?view_only=a964bb73dc684166828269c47733a355

All data and code are available at https://osf.io/pcvsq/?view_only=7900c9e8305947ddb3651bb747fd5785. Stimuli are available on request as the Chicago Face Database does not allow for redistribution of images.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jesp.2022.104303>.

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