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Formidable Male Facial Structures Influence Postconflict Reconciliation Judgments

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Individuals utilize male facial structures to make inferences regarding men's formidability, with a high facial width-to-height ratio (fWHR) being associated with greater perceived male formidability. Although such men would additionally be perceived as interpersonally threatening and prompt general aversion, ingratiation following conflict could prove advantageous to prevent future conflict. Defeated men typically ingratiate themselves heavily with other men following physical conflict through postconflict reconciliation, which could serve to strengthen coalitional bonds. We conducted two studies to identify how men expect postconflict reconciliation to occur based on the presence of facial structures connoting formidability. Men indicated their expectations of displaying and receiving respect toward high- and low-fWHR men following hypothetical wins and losses in physical fights with them; Study 1 (N = 238) only considered White opponents, and Study 2 (N = 303) compared Black and White opponents. Participants expected to *display* similar levels of respect toward high- and low-fWHR opponents but expected to *receive* less respect from high-fWHR targets (Studies 1 and 2), particularly if they were Black (Study 2). The findings provide initial evidence for how facial structures connoting formidability shape post-conflict reconciliation judgments.

Public Significance Statement
Humans utilize others' facial features to infer their formidability, particularly men's, which could lead individuals to form relationships with men they deem threatening following conflict. In two studies, we asked men to indicate their perceptions of how reconciliation would likely occur following a fight with men whose facial structures are associated with greater (or less) formidability. Participants expected formidable men to be less ingratiating after a fight compared with those who appeared less formidable.

Keywords: facial width-to-height ratio, postconflict reconciliation, formidability, evolutionary psychology, combat

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Humans possess perceptual acuity toward physical features connoting aggression, particularly facial features, as a means of identifying those most likely to inflict physical harm (Neuberg et al., 2011). This acuity toward aggressive facial features is most apparent in male faces (Sell et al., 2012), which is consistent with human sexual dimorphism that has resulted in men's greater size and more frequent engagement in physical conflict (Sell, Tooby, et al, 2009). Heightened sensitivity to formidability cues would be advantageous in identifying threatening individuals whom one should avoid to prevent physical harm in future

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conflicts. Because physical conflict may sometimes be unavoidable, however, it is incumbent upon individuals to employ strategies to mitigate further exploitation and harm from repeated aggression following initial conflicts with conspecifics. Strategic ingratiation could prove advantageous in reducing the likelihood of immediate harm and fostering alliances with former opponents to address adjacent outgroup threats. Sensitivity to formidability cues could facilitate identifying opponents toward whom one expects to be ingratiating.

Men's formidability is inferred multimodally, with inferences being rooted largely in bodily features connoting upper body strength (e.g., Lukaszewski et al., 2016; Sell, Tooby, et al., 2009). However, the historical reliance on face-to-face communication in human sociality has seen the emergence of formidability inferences via facial cues. From an affordance-management framework, individuals could have evolved perceptual acuity toward facial features that would putatively connote others' intentions (Zebrowitz & Montepare, 2006). These perceptions would facilitate perceivers' judgments of whether conspecifics' goals would conflict with their own. Judging conspecifics as having goals congruent to one's own would likely facilitate the expectation of benevolent intentions from the conspecific that would elicit an approach motivation from the perceiver. Conversely, perceptions of goal incongruity between the perceiver and conspecific could elicit judgments that the latter is exploitative and would therefore elicit avoidance motivations.

One discrete facial characteristic from which individuals can infer formidability in a manner that could facilitate expectations of another's propensity to inflict harm is *facial width-to-height ratio* (fWHR), the ratio of bizygomatic width to upper face height. High-fWHR men are both more aggressive and perceived as interpersonally threatening (Carré et al., 2009; Geniole et al., 2015), yet they are perceived as especially valuable in representing groups in physical conflicts (Hehman, Leitner, et al., 2015). Although formidable men may pose a threat to physical safety with their proclivity toward aggression, their inclusion could afford group men access to coalitional allies to address outgroup threats while reducing the likelihood of continued aggression toward a former opponent (Brown et al., 2017; McDonald et al., 2012; Sacco et al., 2015). Nonetheless, postconflict reconciliations following physical conflict could emerge that strengthen social bonds between combatants for friendships or coalitional alliances (Barbaro et al., 2018; Benenson & Wrangham, 2016; Pham et al., 2017). The current research sought to demonstrate how the perceived formidability through male fWHR can be utilized to infer men's social affordances and how fWHRs ultimately inform men's expectations and decisions regarding post-conflict reconciliation.

Masculine Facial Features Connoting Formidability

Across species, formidability is signaled in various capacities. For example, chimpanzees raise their bodies to appear large and dominant to facilitate access to resources (de Waal, 1989; Lorenz, 1966). Human males similarly display erect postures (Weisfeld & Beresford, 1982), tilt their heads back (Toscano et al., 2018), and grow facial hair (Dixson et al., 2018). However, such strategies to appear formidable may not be veridical and only create an intimidating veneer to prevent physical conflict. Given the difficulty in altering their appearance, facial structures could provide more honest information about one's formidability, an inference especially apparent in male faces (Sell, Tooby, et al., 2009). The masculinization male faces typically undergo appears to be related to organizational effects of androgens during fetal development that are further activated through pubertal androgen surges, resulting in broad middle faces, prominent jawlines, and lowered foreheads (Adams et al., 2015; Whitehouse et al., 2015; Windhager et al., 2011).

The widening of men's faces through this masculinization during development would consequently become a component of their fWHRs. Although fWHR is neither sexually dimorphic nor associated with testosterone itself (Bird et al., 2016; Kramer et al., 2012; Lefevre et al., 2012; Özener, 2012; Welker et al. 2016); various studies nonetheless indicate an association between men's fWHRs and their formidability. Among professional mixed martial arts fighters, high-fWHR men possess more favorable win-loss records (Trõebický et al., 2015; Zilioli et al., 2015), with naïve raters perceiving them as more successful in fights (Little et al., 2015; Trõebický et al., 2013). Archaeological and cross-cultural

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evidence further suggest that lay populations of high-fWHR men more frequently engage in and survive violent encounters (Christiansen & Winkler, 1992; Stirrat et al., 2012). This ratio is further associated with heightened aggression in men (e.g., Carré & McCormick, 2008; Goetz et al., 2013; Haselhuhn et al., 2015; Hehman, Flake, et al., 2015). High-fWHR men perceive themselves as advantaged in combat, which would calibrate their self-perception of physical aggression being a viable option for them to win conflicts (Eisenbruch et al., 2018; Stirrat & Perrett, 2010). Physical conflict with formidable conspecifics could prove taxing. Recognizing the potential capability of such an opponent to inflict greater harm unto their opponent could motivate individuals to reconcile with a high-fWHR opponent following a fight.

Despite this body of evidence, recent findings have presented various limitations in utilizing fWHR in affordance judgments. Large-scale studies indicate that fWHR is not associated with hostile behavioral repertoires (e.g., Kosinski, 2017; Wang et al., 2019), with body weight being potentially more predictive of aggression (Deaner et al., 2012). The discrepancy in these findings has led researchers to consider modern formidability inferences as part of an evolutionary mismatch (Li et al., 2018). Utilizing fWHR as a gauge of men's formidability appears to be a psychological relic rooted in how ancestral humans identified threatening conspecifics that has persisted into modern contexts (Stirrat et al., 2012). Indeed, face-to-face interactions would have been, and for the most part still are, a primary means of human sociality, and humans have consequently evolved to be particularly sensitive to the signal value provided by facial characteristics, both static and dynamic. Despite this cue becoming less diagnostic of physical prowess, humans' perceptual systems remain calibrated to utilize fWHR in threat assessments based on affordance judgments or inferences of their motivations. This calibration renders high-fWHR men to be perceived as more interpersonally dominant (Geniole et al., 2015; Mileva et al., 2014; but see Durkee & Ayers, 2020), aggressive (Deska et al., 2018), and valuable in selecting coalition members for physical conflicts (Hehman, Leitner, et al., 2015). Although this perceived aggression in high-fWHR faces also occurs in female faces (Deska et al., 2018), men's historical reliance on physical strength and involvement in physical combat implicates fWHR as especially relevant to inferring same-sex conspecifics' social value (McDonald et al., 2012; Sell et al., 2012); women's fWHRs do not veridically connote actual formidability (Palmer-Hague et al., 2018).

Men's Conflict and Postconflict Reconciliation

Humans and nonhuman primates have historically relied on hierarchically arranged groups, which serve to enforce intragroup rules and facilitate intergroup relations. Across species, high-status individuals are typically those most capable of winning fights (de Waal, 1986; Lukaszewski, 2013; von Rueden & Van Vugt, 2015). Success within competitions affords formidable men access to resources and mates (Puts, 2010), reinforcing them to maintain the hierarchy. Given men's greater size, musculature, and reliance on physical conflict compared with women, selecting men for roles requiring formidability should be especially apparent (Sell et al., 2012). Reproductive asymmetries have fostered intrasexual competition in men, a driving force for male formidability (Trivers, 1972). Men's engagement in physical conflict is greater than women's (McDonald et al., 2012), making formidability assessment critical in shaping expectations of others' willingness to serve as an ally in conflict or exploit others.

Although many conflicts for status and resources result in physical fights between group members, the resolution frequently involves postconflict reconciliation. Various primates exhibit postconflict reconciliation behaviors (e.g., touching, grooming, contact-sitting) following physical conflict, including macaques (Aureli & van Schaik, 1991) and chimpanzees (de Waal & van Roosmalen, 1979). Male humans demonstrate such reconciliation, often through handshakes and hugs (Benenson & Wrangham, 2016). According to the valuable relationship hypothesis (Cords & Aureli, 2000; de Waal & Aureli, 1997), reconciliatory behavior may serve to strengthen bonds between opponents following conflict when the benefits of subsequent cooperation outweigh the costs of prolonged conflict. For men, reconciliation may be less costly following defeat from someone likely to inflict considerable damage in further conflicts. This deference is evident by men displaying greater respect toward victorious

opponents (Barbaro et al., 2018; Pham et al., 2017), which may suggest that men would likely expect to defer more readily to victorious opponents.

In judging the social value of opponents, men must additionally identify concomitant affordances alongside those communicated by the outcome of the fight. The superior fighting abilities of high-fWHR men suggest it could be physically more costly to persist in physical conflict in which the likelihood of physical injury would be increased compared with the benefit of reconciliation (Zilioli et al., 2015). However, despite this potentially greater deference toward high-fWHR opponents, the inference of formidability may undermine perceptions of high-fWHR men as willing to reciprocate in this postfight reconciliation, given their threatening appearance (Geniole et al., 2015). Formidable men indeed feel more entitled to contested resources and are more exploitative, further undermining ingratiation efforts and potentially shaping individuals' expectations of such men as being disinterested in reconciliation (Lukaszewski, 2013; Sell et al., 2012; Stirrat & Perrett, 2010). Despite these interpersonal costs, it could be less costly to ingratiate oneself with high-fWHR men to reduce the likelihood of exploitation than continuing to compete with them; this awareness of the potential costs could therefore shape expectations of how one would specifically behave following a conflict with a formidable opponent.

Current Research

This research sought to identify men's expectations for postconflict reconciliation following affordance judgments of high- and low-fWHR men that would serve to shape individuals' decision to ingratiate with or avoid previous opponents. Given a proclivity toward displaying respect toward victorious opponents (Pham et al., 2017), we predicted that defeated men would be expected to display more respect than victorious men. We further predicted that this effect would be augmented toward victorious high-fWHR men because the formidability implicated in such structures would connote greater costs in continued conflict compared with low-fWHR men. Conversely, because of the possibility that formidable men perceive themselves as more entitled over resources following a conflict (Sell et al., 2012), we predicted that men would expect to receive less respect from high-fWHR targets compared with low-fWHR targets, especially among those described as victorious. In addition to a pilot study identifying whether an array of faces varying in fWHR would connote systematically different levels of formidability, we conducted two primary studies to identify how fWHR influences reconciliation (Study 1) and whether these decisional strategies vary across racial categories (Study 2). Data and materials for both studies are available at https://osf.io/esu5w/?view_only=8d207778e8b54e5b8b7e1eda8241cf4b.

Pilot Study

Prior to our main studies, we sought to identify whether a set of facial stimuli that naturally varied in fWHR would also predictably differ in perceived formidability, as suggested by previous studies with similar stimuli (e.g., Carré et al., 2009; Zilioli et al., 2015). We considered various facets of formidability while identifying boundary conditions for whether fWHR influences related judgments.

Method

Participants

We recruited 228 undergraduates from a medium-sized public university in the southeastern United States for course credit (183 women, 45 men; mean $[M]_{age}$ = *20*.73, standard deviation [*SD*] = 5.13; 63% White, 30% Black, 7% other). We sought to collect as many participants as possible in 2 weeks and did not determine an a priori sample size for this pilot. A sensitivity analysis indicated this sample sufficed to detect small effects for a comparison between high- and low-fWHR targets (Cohen's dz = .18). The inclusion of both male and female perceivers in this pilot study was in the service of increasing the generalizability of these inferences for future work utilizing these stimuli.

Materials and Procedure

Target Faces. Participants evaluated 20 Caucasian male faces from the Chicago Faces Database that included information on targets' fWHRs (Ma et al., 2015; Figure 1). Selected faces naturally varied in their fWHRs. The faces used in this study were selected for previous studies and comprised the 10 faces possessing the highest

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Figure 1
Examples of White and Black Targets With High (Left) and Low Facial Width-to-Height Ratio (Right)



Note. White targets were utilized in all studies, whereas Black targets were utilized only in Study 2. Faces are from the Chicago Faces database (Ma et al., 2015) and are freely available. See the online article for the color version of this figure.

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fWHRs in the database and the 10 possessing the lowest fWHRs to amplify differences (Deska & Hugenberg, 2018). Faces were neutrally expressive and presented in color, with no differences in attractiveness emerging. Importantly, stimuli demonstrated substantial magnitudinal differences in overall fWHR between the selected high- and low-fWHR targets (i.e., Cohen's $d = 6.32$).

Formidability Assessment. Using 7-point Likert-type items (1 = *Not at all*; 7 = *Very much*), participants indicated the extent to which they perceived each target to be a good fighter, the extent to which they perceived each target to be physically strong, and their interest in having the target back them up in a fight. These three were internally consistent for high- and low-fWHR targets (αs $>$ .96), prompting us to create a formidability composite. To assess discriminant validity in the coalitional affordances of fWHR, participants also indicated the extent to which they perceived targets as good leaders, wanted targets to be part of a team, and general liking, using single 7-point Likert-type items with the same anchors.

Consenting participants evaluated each target face in randomized, counterbalanced order before providing demographics and debriefing.

Results and Discussion

A paired-samples t test using our composite measure of target formidability indicated that high-fWHR targets were perceived as more formidable ($M = 3.38$, $SD = .98$) than low-fWHR targets ($M = 2.68$, $SD = .83$), $t(227) = 16.68$, $p < .001$, $d = 1.10$.[1] No differences emerged for liking, team membership, and leadership perceptions (ts < 1.63, ps $> .100$). In addition to validating these stimuli for formidability assessments, we replicated previous findings indicating that

[1] We conducted a subsequent analysis to determine potential sex differences in affordance judgments. Neither a main effect of participant sex nor an interaction with target fWHR (ps > 0.380) emerged.

individuals infer high-fWHR male faces as more formidable (e.g., Zilioli et al., 2015). Specifically, this assessment was rooted in identifying targets as better fighters, stronger, and more capable of backing one up in a fight, providing the basis of potential coalitional value.

This study additionally identified boundaries of how fWHR shapes coalition-building, with no difference emerging in evaluating targets as leaders or team members or general liking. This could have been the product of this item not providing context. Although formidable allies could be valuable in coalitions against outgroup threats, they may be too aggressive for contexts requiring warmth (Laustsen & Petersen, 2017). Similar cost–benefit analyses could lead perceivers to recognize high-fWHR leaders and teammates as especially effective in rule-enforcing aspects of leadership, given their inferred strength (Lukaszewski et al., 2016), yet ineffective for social aggression (Nguyen et al., 2020).

Study 1

Our pilot study replicated previous findings demonstrating that high-fWHR male faces are perceived as more formidable than low-fWHR male faces. Because of this inferred formidability in high-fWHR targets, this cue should be informative of an opponent's potential continued dominance following physical conflict. We predicted that men would expect to confer more respect toward high-fWHR targets, particularly following defeat (Barbaro et al., 2018).

Additionally, the sexual dimorphism in engaging in physical conflict positions men as having greater proclivity to aggress physically in conflicts, a proclivity historically relevant for men's reproductive success (Puts, 2010; Sell et al., 2012). Although fWHR is not necessarily a sexually dimorphic feature (Deska et al., 2018; Kramer et al. 2012), formidably structured facial ratios are nonetheless perceived as masculinized (Lefevre & Lewis, 2014), with men's (but not women's) perceived formidability through fWHR accurately connoting actual fighting ability (Palmer-Hague et al., 2018; Zilioli et al., 2015). Additionally, although it is not impossible for women to engage in physical conflict over status or for women to be capable of defeating men in combat, men's larger physical size and greater muscle mass typically position them as having a physical advantage over women in conflicts, on average. These considerations of sexual dimorphism saw us consider men's postconflict reconciliation intentions specifically.

Method

Participants

We recruited 238 men (m_{age} = 33.45, *SD* = 11.61; 71% White, 14% Black, 15% other) both through MTurk (n = 205) and through a participant pool (n = 33) at a medium-sized public university in the southeastern United States. We initially attempted to collect data entirely through the latter means but wanted to ensure we had adequate power to test our hypotheses. We thus collected additional data through MTurk. MTurk participants received $0.25 (USD), and those in the participant pool received course credit; data were not analyzed until collection ceased. Neither a main effect of sample nor any interactions emerged (Fs < 3.10, ps $> .079$); this prompted us to collapse across samples. A sensitivity analysis indicated that 238 participants sufficed to detect small effects for a 2 (Target fWHR: High- vs. Low-fWHR) × 2 (Outcome: Win vs. Loss) × 2 (Respect: Receive vs. Display) within-subjects design (Cohen's $f = .07$, $\beta = .80$).

Materials and Procedures

Fight Scenarios. Participants were instructed to imagine a scenario in which they would fight 20 pretested targets (i.e., 10 high-fWHR, 10 low-fWHR) described in the conflict scenario:

> We would like for you to imagine that you are going to be in a fight with the people you are about to see. In each situation, we will indicate the outcome of the fight and then have you indicate your level of respect toward these other people based on the information provided to you. Individuals can show "respect" in many ways: A handshake, a hug, or a verbal "good job" are some of many examples. Use your best judgment for what you think counts as "respect," as it will probably be appropriate.

Targets were presented twice in separate trials with varied fight outcomes (i.e., "You WON/LOST against this person in a fight"). This methodological decision was to increase the number of trials and prevent the stimulus effects inherent in presenting only some faces with one outcome. Each target–outcome combination was presented in a randomized order to minimize the expectancy

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effects inherent in the presentation of multiple stimulus trials (Christensen, 2012).

Measures. Participants responded to three questions presented in each trial. Specifically, they first indicated "How likely it would be for [them] to RECEIVE/DISPLAY respect to/from [this] opponent during this fight," with the opponent being one of the 20 targets with one of the two fight outcomes beneath. The receive and display items, which respectively represented participants' expectation for deference from another and expectation to display deference, operated along separate single-item 10-point Likert-type scales for both aspects of the respect exchange scales (1 = *Not at all likely*; 10 = *Extremely likely*; Pham et al., 2017). For the sake of constancy between trials, the question about receiving respect was presented before the question about displaying respect. As an internal manipulation check, we assessed the perceived formidability of each target in both scenarios with a single, face-valid assessment of how good of a fighter the target appears to be on a 7-point Likert-type scale (1 = *Not at all*; 7 = *Very much*) following the two respect questions for each trial.

Consenting participants indicated their behavior toward each face in the respective randomized and counterbalanced order, whe-rein they evaluated their expected likelihood of displaying and receiving respect following either a loss or victory. The order of outcome was counterbalanced between participants, with some indicating their expectations for losses for half the targets first and victories for the other half of the targets first. This was followed by demographics before debriefing and compensation.

Results

Manipulation Check

We conducted an initial 2 (Target fWHR: High vs. Low) × 2 (Outcome: Win vs. Loss) repeated-measures analysis of variance (ANOVA). High-fWHR opponents were perceived as better fighters (M = 4.28, SD = 1.08) than low-fWHR opponents (M = 3.75, SD = 1.22), $F(1, 237) = 164.95$, $p < .001$, $\eta_p^2 = .410$. Neither the main effect for outcome nor the interaction emerged (Fs < .38, ps > .539).

Primary Analyses

We conducted a 2 (Target fWHR: High vs. Low) × 2 (Outcome: Win vs. Loss) × 2 (Respect: Receive vs. Display) repeated-measures ANOVA. An outcome main effect indicated that participants anticipated more respect exchanges (i.e., both displaying and receiving respect) following victory (M = 5.66, SD = 1.90) than defeat (M = 5.36, SD = 1.89), $F(1, 237) = 50.53$, $p < .001$, $\eta_p^2 = .176$. A respect main effect indicated that participants anticipated displaying more respect (M = 5.58, SD = 1.97) than receiving (M = 5.42, SD = 1.82), $F(1, 237) = 11.25$, $p < .001$, $\eta_p^2 = .046$.

Effects were qualified by a Target fWHR × Respect interaction, $F(1, 237) = 19.21$, $p < .001$, $\eta_p^2 = .075$. Consistent with hypotheses, participants anticipated receiving more respect from low-fWHR opponents (M = 5.48, SD = 1.78) than high-fWHR opponents (M = 5.37, SD = 1.86), $F(1, 237) = 8.26$, $p = .004$, $\eta_p^2 = .034$. Conversely, and contrary to hypotheses, no difference emerged in anticipated displaying respect toward high-fWHR (M = 5.61, SD = 1.97) and low-fWHR opponents (M = 5.57, SD = 1.98), $F(1, 237) = .90$, $p = .342$, $\eta_p^2 = .004$.

Effects were further qualified by an Outcome × Respect interaction, $F(1, 237) = 4.07$, $p = .045$, $\eta_p^2 = .017$. Consistent with hypotheses, simple effects indicated that participants anticipated receiving more respect following victory (M = 5.60, SD = 1.83) than defeat (M = 5.25, SD = 1.78), $F(1, 237) = 47.75$, $p < .001$, $\eta_p^2 = .168$. Participants further anticipated displaying more respect following victory (M = 5.71, SD = 1.98) than defeat (M = 5.47, SD = 1.97), $F(1, 237) = 23.79$, ps < .001, $\eta_p^2 = .091$. No other main effects or interactions emerged (Fs < 1.73, ps > .190).

Discussion

Study 1 provided mixed support for hypotheses for how facial structures connoting formidability influence men's expectations of post-conflict reconciliation exchanges. As predicted, participants expected high-fWHR opponents to receive less respect from them than low-fWHR opponents. This asymmetry could be the result of complementary processes. First, the lack of respect received from men perceived as formidable could reflect inferences of entitlement from their identified increased social bargaining power (Lukaszewski,

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2013; Sell et al., 2012). High-fWHR men may be seen as expecting deference toward given the advantage they are perceived as having (von Rueden et al., 2008; Zilioli et al., 2015). This expectation of reluctance from high-fWHR targets could further explain why low-fWHR targets were additionally expected to be more deferent to opponents following conflict; low-fWHR men may not have the same social bargaining power that would have historically resulted in greater cession to dominant opponents. Alternatively, fWHR men could have additionally been seen as more aggressive, which could have connoted greater disinterest in ingratiation following conflict among such men (Deska et al., 2018).

Nonetheless, and contrary to hypotheses, participants did not differ in their expectations to display respect toward high-fWHR and low-fWHR targets. This lack of difference may reflect a self-perception of oneself as more magnanimous than the average person and a presumption that others may not be as willing to ingratiate with others as much as oneself (i.e., better-than-average effect; Alicke & Govorun, 2005). Alternatively, given that individuals are more likely to display respect toward less-formidable opponents (Pham et al., 2017), participants could have expected to display more respect toward low-fWHR opponents in appreciation of their efforts while simultaneously displaying similar levels of respect toward high-fWHR opponents to reduce the likelihood of further conflict.

Because our hypotheses remained partially supported, we found it prudent to conduct a replication of this previous study to determine their overall robustness. The purpose of Study 2 was to replicate these findings while also considering an additional moderator. In Study 2, we compared responses to White and Black targets (Cottrell & Neuberg, 2005) to consider facial features with varying degrees of stereotyping as aggressive that may influence how individuals reconcile following conflict.

Study 2

Although the signal value of fWHR is well documented in connoting social information, recent findings suggest that inferences of this feature may differ for both Black and White men. High-fWHR men are stereotyped as possessing higher physical constitution compared with low-fWHR men, but this perception is limited to White men, as Black men are perceived as unilaterally possessing high constitution regardless of fWHR, despite no evidence existing of racial differences in pain tolerance (Deska & Hugenberg, 2018). This racial asymmetry could be rooted in stereotypes about Black men being interpersonally threatening and aggressive (Hugenberg & Bodenhausen, 2004) that operate in parallel to fWHR stereotypes (see Williams et al., 2016). Black men are further perceived as physically larger and more imposing than White men, which could be a potential basis of increased expectations of hostility in social exchanges with Black men (Wilson et al., 2017). Race may therefore (whether accurately or inaccurately) represent its own threat-based signal value (Neuberg et al., 2011), either based in historical racism in the United States or because of more general outgroup biases that would have elicited a perceptual disadvantage against Black men (Dovidio et al., 2000). Because of this potential signal, we sought to identify whether race operates independently of morphological facial cues in shaping affordance judgments and if the affordance judgments of formidable structures in White male faces generalize to other racial categories, given the content of stereotypes toward Black men.

Given the possibility of perceived racial differences emerging in formidability assessments, we sought to replicate and extend the findings from Study 1. The replication was prudent to demonstrate consistency in the unexpected effects from Study 1 and to determine the generalizability of fWHR inferences across racial categories. If no difference emerges between racial categories for high-fWHR targets, it might suggest that morphological cues to formidability operate independently of race stereotypes, consonant with previous findings suggesting that individuals evaluate high-fWHR men similarly across racial categories (e.g., Wade & Benninger, 2016). However, if a difference emerges for Black and White targets in postconflict reconciliation as a function of fWHR, it might suggest that stereotypes of formidability through racial cues may override inferences through morphology.

Method

Participants

We recruited 303 men (M_{age} = *35.77*, *SD* = 2.52; 65% White, 28% Black, 9% other) through MTurk in exchange for $0.50 (USD).

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A sensitivity analysis indicated we were sufficiently sampled to detect small effects in the proposed 2 (Target Race: White vs. Black) × 2 (Target fWHR: High- vs. Low-fWHR) × 2 (Outcome: Win vs. Loss) × 2 (Respect: Receive vs. Display) mixed design (Cohen's f = .06. β = .80). No data warranted exclusion.

Materials and Procedure

Participants responded to the same scenarios as outlined in Study 1 with the same three questions per individual trial. Participants made their responses in the context of evaluating either the same 20 White targets from Study 1 (n = 150) or 20 Black targets that were previously categorized as high- and low-fWHR (n = 153), also from the Chicago Face Database (Ma et al., 2015). Evaluation of Black and White targets occurred on a between-subjects basis to reduce the likelihood of demand characteristics related to rating targets of different racial categories. The Black targets utilized for this study were selected for previous studies, much like the targets in Study 1, for having the highest and lowest ratios (Deska & Hugenberg, 2018); high-fWHR targets indeed had higher fWHRs (d = 2.88).

Results

Manipulation Check

We conducted an initial 2 (Target Race: White vs. Black) × 2 (Target fWHR: High vs. Low) × 2 (Outcome: Win vs. Loss) mixed-model ANOVA with repeated factors over the latter two factors. A Target fWHR main effect indicated that high-fWHR opponents were perceived as better fighters (M = 5.04, SD = 1.11) than low-fWHR opponents (M = 4.92, SD = 1.22), $F(1, 301) = 24.41$, $p < .001$, η_p^2 = .075. A target race main effect indicated that participants perceived Black opponents (M = 5.18, SD = 1.07) as better fighters than White opponents (M = 4.77, SD = 1.26), $F(1, 301) = 10.66$, p = .001, η_p^2 = .034. Interestingly, a Target Race × Target fWHR interaction emerged, $F(1, 301) = 43.04$, $p < .001$, η_p^2 = .125. Simple effects tests indicated that among White targets, high-fWHR opponents were perceived as better fighters (M = 4.92, SD = 1.18) than low-fWHR opponents (M = 4.63, SD = 1.35), $F(1, 301) = 65.50$, $p < .001$, η_p^2 = .179. However, no difference emerged between high- and low-fWHR among Black opponents, $F(1, 301) = 1.32$, p = .251, ηp^2 = .004. The outcome main effect was not significant, nor were any superordinate interactions (Fs < 3.48, ps > .062).

Primary Analysis

We conducted a 2 (Target Race: White vs. Black) × 2 (Target fWHR: High vs. Low) × 2 (Outcome: Win vs. Loss) × 2 (Respect: Receive vs. Display) mixed-model ANOVA with repeated factors over the latter three factors. A target race main effect indicated that participants anticipated more respect exchanges with Black opponents (M = 7.25, SD = 1.60) than White opponents (M = 6.68, SD = 1.82), $F(1, 300) = 9.39$, p = .002, η_p^2 = .030. An outcome main effect indicated that participants expected more respect exchanges following victory (M = 7.10, SD = 1.68) than defeat (M = 6.84, SD = 1.78), $F(1, 300) = 42.59$, $p < .001$, η_p^2 = .124.

Replication Analyses. As in Study 1, the effects were qualified by a Target fWHR × Respect interaction, $F(1, 300) = 4.97$, p = .027, η_p^2 = .016. Simple effects tests indicated that participants anticipated receiving more respect from low-fWHR targets (M = 6.98, SD = 1.72) than high-fWHR targets (M = 6.93, SD = 1.74), $F(1, 300) = 3.92$, p = .049, η_p^2 = .013, replicating the results of Study 1. No difference emerged in displaying respect toward high-fWHR (M = 6.99, SD = 1.73) and low-fWHR opponents (M = 6.97, SD = 1.76), $F(1, 300) = .53$, p = .468, η_p^2 = .002.

Study 2 replicated the Respect × Outcome interaction from Study 1, $F(1, 300) = 8.70$, p = .003, η_p^2 = .028. Simple effects indicated participants anticipated receiving more respect following victory (M = 7.11, SD = 1.69) than defeat (M = 6.80, SD = 1.78), $F(1, 300) = 46.46$, $p < .001$, η_p^2 = .134. Conversely, participants anticipated displaying more respect following victory (M = 7.08, SD = 1.70) than defeat (M = 6.88, SD = 1.78), $F(1, 300) = 23.21$, $p < .001$, η_p^2 = .072.

Race Interactions. Two interactions emerged that included target race as a variable. The first was a Target Race × Target fWHR interaction, $F(1, 300) = 10.68$, p = .001, η_p^2 = .034. Among Black opponents, participants anticipated more respect exchanges with low-fWHR opponents (M = 7.28, SD = 1.58) than high-fWHR opponents (M = 7.21, SD = 1.63),

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$F(1, 300) = 8.10$, $p = .005$, $\eta_p^2 = .026$. For White opponents, participants anticipated no difference in respect exchanges with high-fWHR opponents ($M = 6.70$, $SD = 1.80$) and low-fWHR opponents ($M = 6.66$, $SD = 1.84$), $F(1, 300) = 3.16$, $p = .076$, $\eta_p^2 = .010$.

Finally, a Target Race × Outcome interaction emerged, $F(1, 300) = 6.24$, $p = .013$, $\eta_p^2 = .020$. Simple effects indicated greater anticipation of respect exchanges following victory over White opponents ($M = 6.86$, $SD = 1.76$) than defeat ($M = 6.50$, $SD = 1.88$), $F(1, 300) = 40.45$, $p < .001$, $\eta_p^2 = .119$. A similar effect emerged for Black targets, with greater anticipation of respect exchanges following victory ($M = 7.33$, $SD = 1.59$) than defeat ($M = 7.17$, $SD = 1.62$), albeit at a reduced magnitude, $F(1, 300) = 8.17$, $p = .005$, $\eta_p^2 = .027$. No other main effects or interactions emerged (Fs < 2.65, ps $> .104$).

Discussion

We replicated the critical finding from Study 1 demonstrating that participants expected to receive less respect from high-fWHR targets compared with low-fWHR targets. This consistency in findings suggests that differences in reconciliation are driven by identifying potential reluctance from interpersonally dominant individuals to ingratiate with others following conflict. The continued lack of difference in responses among victory and defeat further suggests an affordance judgment of high-fWHR men being unwilling to confer respect even if ingratiation could increase coalitional benefits.

The aforementioned effect did not differ by race, but perceptions of formidability via fWHR were only apparent for White opponents. That is, Black targets were perceived as more formidable than White targets, but this inference did not differ as a function of fWHR. This could suggest that the cue to formidability imposed through racial stereotypes operates independently from morphological cues to formidability (Wilson et al., 2017). Indeed, racial cues possess considerable perceptual saliency, particularly Black skin, for both Black and White perceivers (Ito & Urland, 2003; McGraw et al., 1989). Facial features typically categorized as "Afrocentric" are further biased independent of a target individual's race (e.g., White target with Afrocentric features; Blair et al., 2004). These results suggest that postconflict reconciliation facilitates salience of categories over features in perceptions. Although participants' expectations for receiving respect from high-fWHR opponents were the same across racial categories, the overall salience of racial categories for Black opponents could have reduced the salience of fWHR in their perceptions. This could further suggest a lack of generalizability of formidability inferences across certain racial categories, given the salience of physical toughness stereotypes for Black men that could have resulted in a relative floor effect for Black targets (Deska & Hugenberg, 2018). Future research would benefit from clarifying why expectations for reconciliation emerged for high- and low-fWHR targets similarly across racial categories.

Consistent with previous findings demonstrating interactive effects between fWHR and race (Deska & Hugenberg, 2018), participants only expected differences in respect exchanges (both displaying and receiving) among Black opponents but not White opponents. Specifically, participants expected greater exchanges of respect with low-fWHR Black opponents than high-fWHR Black opponents. This difference in expectancies could be rooted in a compounding of two threat stereotypes that may result in perceptions of Black men being especially aggressive when possessing an additional cue to formidability that could foster perceptions of high-fWHR Black opponents as unwilling to ingratiate (Becker et al., 2010; Cottrell & Neuberg, 2005). This salience of racial stereotypes may reflect the interactive effects between race and outcome, wherein individuals expected greater respect exchanges following victory than defeat. Although this expectation following victory emerged for both Black and White opponents, the effect for Black opponents was substantially smaller. Future research would benefit from identifying the basis for these muted effects and whether they are most prevalent among perceivers who endorse stereotypes about Black men more readily (Hugenberg & Bodenhausen, 2004).

General Discussion

Across two studies, we found consistent evidence for how facial structures inferred as formidable influence men's expectations for postconflict reconciliation. High-fWHR opponents were perceived as particularly unlikely to confer respect

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unto an opponent following conflict. Interestingly, these differences in reconciliatory exchanges across both studies were not superordinately influenced by the outcome of the fight: Participants' expectations for ingratiation did not vary as a function of whether they won or lost. This lack of difference could suggest that fWHR provides a more reliable affordance judgment of success in conflict than would one single fight with the participant that could provide a downstream cue of an opponent's future advantages in combat (Durkee et al., 2018; Sell, Tooby, et al., 2009). For participants who may additionally be successful in physical fights, the prospect of defeating a formidable fighter may not undermine perceptions of his ability to win in future contests.

These findings replicate and extend previous findings investigating postconflict reconciliation. Respect displays were more prevalent following victory than defeat. When considering both the valuable relationships and male warrior hypotheses (Cords & Aureli, 2000; McDonald et al., 2012), this deference could serve as an ingratiation strategy to increase access to allies and minimize the costs of physical conflict with a former opponent (Barbaro et al., 2018; Pham et al., 2017). Expectations of receiving respect were also greater following victory than defeat at a much larger magnitude than the expectation of displaying respect. This magnitudinal difference could reflect a highly intrapersonal component to postfight reconciliation. Men could view their victory as an impetus for high status and would therefore expect others to defer to their status because of their self-perceived prowess (Anderson et al., 2012).

Social Underpinnings of fWHR

Despite continued evidence for an association between perceived formidability and male fWHR, fWHR is minimally sexually dimorphic (d = .11; Geniole et al., 2015; Kramer et al., 2012; Lefevre et al., 2012). Recent findings indicating that fWHR is not associated with several fitness-relevant behavioral repertoires further suggest a limitation of utilizing discrete ratios in explaining how natural selection shaped facial morphology beyond perceiver inferences (Kosinski, 2017). It could be possible that selection for high-fWHR men is instead rooted in a unique interaction between the fWHR components of width and height. Wide-faced men are more likely to be physically strong and masculine, traits that are the product of testosteronization (Lefevre & Lewis, 2014; Whitehouse et al., 2015), yet fWHR appears unrelated to testosteronization (Welker et al., 2016). The high-fWHR of some highly masculinized men could facilitate self-perceived formidability that calibrates their behavioral repertoire to rely on dominant interpersonal strategies (see Eisenbruch et al., 2018; Lukaszewski & Roney, 2011) in a manner that corresponds with others' perceptions of their prowess based on fWHR's historically important signal value in identifying interpersonal threats (Wang et al., 2019).

From understanding which components of fWHR are specifically leading men to reconcile differently with the opponents, one can identify the biological antecedents of these morphological cues to understand what leads to the selection of these faces (Blows & Brooks, 2003). Future research could utilize multivariate experiments to simulate generations of social selection by presenting raters with targets possessing varying facial dimensions across subsequent "generations" to identify which aspects of a ratio eventually lead to its emergence in identifying optimal allies (e.g., Brooks et al., 2015). Future research could present similar paradigms with male faces varying in width and height to identify which aspects are specifically driving selection (Costa et al., 2017).

Limitations and Future Directions

There are important limitations of this research to consider. First, it is unclear why men expected equivocal deference toward high- and low-fWHR targets. Although intended respect displays could have been due to target-specific motivations, it could be possible that different environmental stressors additionally alter how ingratiating one is toward former opponents. Previous research indicates that activation of self-protection motives heightens individuals' sensitivity toward fWHR (Becker et al., 2010), which could lead individuals to perceive formidability from the perspective of identifying prospective allies to address threats to physical safety. Men who believe the world is dangerous report greater tolerance in interacting with interpersonally dominant men, a potential coalition-building tactic (Brown et al., 2017). Future research would benefit from considering the environment wherein men are making specific

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affordance judgments, such that men could expect greater ingratiation toward formidable men following a conflict when the environment is perceived as more hostile, in the service of building coalition alliances (McDonald et al., 2012).

Men's historically greater likelihood of engaging in physical conflict compared with women would necessitate greater primacy in identifying the physical formidability of intrasexual rivals for men (Sell, Cosmides, et al., 2009, Sell et al., 2012), which was the basis of our consideration of men exclusively in the current program of research. Women's facial formidability is further unassociated with their actual formidability (Palmer-Hague et al., 2018). Nonetheless, heightened anger is inferred equally in male and female faces with high fWHRs (Deska et al., 2018). This similarity requires future research to consider how women approach postconflict reconciliation with intrasexual rivals and whether this ratio elicits similar coalitional decision-making in women, perhaps in nonphysical contexts.

Although an opponent's formidability should predict how individuals engage them, it should be similarly likely that one's own formidability is predictive. Future research would benefit from assessing perceivers' formidability in predicting how individuals reconcile with opponents. Most germane to this research, future studies would benefit from specifically assessing participants' own fWHRs, objective measures of fighting ability (Muñoz-Reyes et al., 2012), or self-perceived fighting ability (Lukaszewski, 2013). Given the entitlement displayed by formidable men (Sell et al., 2012), it would seem sensible to predict that formidable men would be more likely to receive respect but less likely to display respect. Despite high-fWHR men indeed enjoying advantages in physical combat (e.g., Zilioli et al., 2015), we further had no information on the actual physical prowess for the social targets utilized in this research. Consideration of an opponent's actual formidability, perhaps through assessments of handgrip strength, beyond heuristic cues would be further advantageous in future research. A study could assess reconciliatory intentions toward social targets with favorable win-loss records while identifying the facial features from which perceivers make their decisions.

One advantage of the current research is its utilization of stimuli that naturally varied in fWHR, affording greater ecological validity. However, another cost emerges through this methodological decision in that the fWHR of each target may have lacked a degree of standardization. Although a large difference between high- and low-fWHR targets existed, the array of Black targets had less variability in fWHR compared with the White targets, which could have been a basis for fWHR not connoting formidability as readily in Black targets (i.e., d = 2.88 vs. 6.32). Future work would benefit from utilizing targets that have been highly standardized through computer alterations to ensure more equivocal fWHRs across unique identities (e.g., Wade & Benninger, 2016; Zilioli et al., 2015).

Methodologically, it could be possible that our findings have some bases in the question ordering. Specifically, participants responded to a question assessing their likelihood of receiving respect before displaying respect in each trial. The possibility of receiving respect could invoke consideration for norms of reciprocity, wherein expecting to receive respect from an opponent could motivate participants to display their own respect (Cialdini et al., 1991). That is, expectations of postconflict reconciliation in the current program of research could have been reactive rather than preemptive. Whereas a reactive display could be reciprocity for another's ingratiation, a preemptive display could invoke the norm of reciprocity toward another so that the opponent may be less likely to aggress following the initiator's response. It could be possible that the order in which participants are prompted to indicate their expectation of receiving and displaying respect influences their responses based on adherence to social norms (Grice, 1975). Future research would benefit from tasking participants to indicate their expectation of receiving or displaying respect first on a between-subjects basis (e.g., Murray et al., 2017), which could inform whether this reconciliation is reactive or preemptive.

Conclusion

Following physical conflict, men typically engage in reconciliatory behavior in the service of optimizing group functioning by preventing more costly physical conflicts between combatants and ensuring access to coalitional allies. The current research demonstrated how physical features connoting formidability inform how

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individuals ingratiate with opponents by showing how physical features shape group formation.

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